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Armida S. Alisjahbana & Jonah M. Busch

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Survey of Recent Developments

FORESTRY, FOREST FIRES, AND CLIMATE CHANGE IN INDONESIA

Armida S. Alisjahbana*   Jonah M. Busch*
Universitas Padjadjaran   *Center for Global Development*

In recent months, strong global growth, rebounding commodity prices, and relatively accommodative financial conditions have benefited the Indonesian economy. The first quarter of 2017 in Indonesia saw resilient GDP growth, moderate inflation, stable exchange rates, an increase in the growth of non-oil exports, and an investment upgrade from ratings agency Standard & Poor's. Investment growth, however, did not pick up enough to drive overall growth to a higher rate. The poor quality of banking-sector assets and the gaps in tax revenue—despite the fulfilment of the government's tax-amnesty program—are two of the most immediate economic concerns. President Joko Widodo (Jokowi), who is well into the second half of his term, is under pressure to deliver on his development platform, which includes making progress in sustainable development and climate change mitigation. The effective management of forests is key to this platform. There has been longstanding tension over Indonesia's forests between the protection of environmental values, including carbon storage, and the production of valuable commodities, including timber, palm oil, and pulpwood, which generate revenue and employment. We survey recent developments in four storylines related to forestry and climate change: first, Indonesia's commitment to reducing emissions to 29%–41% below projected business-as-usual levels by 2030, as well as the international climate agreements and finance that can help achieve this commitment; second, land-use rights and regulations, including a moratorium on clearing, draining, or setting fires on peatland; third, measures to prevent catastrophic forest fires like those during the 2015 El Niño, including the establishment of the Peatland Restoration Agency; and, fourth, the actions of non-state actors, especially large agribusinesses, in managing forests and peatland. We conclude by discussing differences in the approaches of Jokowi's administration and those of former president Susilo Bambang Yudhoyono's administration and by questioning whether Indonesia's budgeted resources, actions, and results to date are commensurate with its climate commitments.

Keywords: *climate change, credit growth, forest fires, investment upgrade, land rights, oil palm, peatland, tax revenue*
JEL classification: Q18, Q23, Q54

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POLITICAL DEVELOPMENTS AND THE GLOBAL ECONOMY

In April, Jakarta's gubernatorial election was won by Anies Baswedan and Sandiaga Uno, with 58% of the vote, over incumbents Basuki Tjahaja Purnama (Ahok) and Djarot Saiful Hidayat, with 42%. Anies, the governor-elect, who will take office in October, is a former rector of Paramadina University and was minister of education and culture under President Joko Widodo (Jokowi) until he was dropped from the cabinet in August 2016. As if it were not enough for Ahok, a non-Muslim, to bear the defeat of his campaign for a fresh term as governor, in May he was sentenced to two years in prison for blasphemy. The case attracted much publicity even during the election campaign. The judge gave him a harsher sentence than the prosecutor had requested, which delighted Ahok's opponents but left his supporters aghast. In a related development, the central government banned Hizbut Tahrir Indonesia on the grounds of the group's support for a global caliphate. The ban arose out of concern over the increasingly anti-government activities being conducted elsewhere by Hizbut Tahrir and other transnational Islamic movements.

Ongoing tensions between Ahok's supporters and those of Anies will have broad implications for Jokowi's political support in the lead-up to the 2019 presidential election. The bitterness of the contest in Jakarta is likely to prefigure events at the national level; it may have also brought to the surface a trend of rising nationalism and religious fanaticism. In recent months, Jokowi has looked to consolidate his support among the country's moderate Islamic forces. During Ramadan he intensified his communication with the Indonesian Ulema Council (MUI) and with various ulemas (Muslim clerics) and *pesantren* (Islamic schools). He has also instituted a new agency, the Presidential Working Unit for the Implementation of Pancasila as the State Ideology, or UKP-PIP, directly under the president's office. Megawati Sukarnoputri, the leader of PDI–P (the Indonesian Democratic Party of Struggle), is on the agency's advisory board, as are Ma'ruf Amin (the head of MUI) and representatives of other religious organisations (*Jakarta Post*, 7 June 2017).

In the global economy, there are signs of optimism in spite of President Donald Trump's uncertain economic stewardship of the United States. Global economic growth for 2017 is projected to be 3.5%—up from 3.1% in 2016—with a pickup in growth in certain countries (including India and the United States), a moderation of China's economy, and a slight improvement in the European Union (EU) economy (IMF 2017). Commodity prices, including the oil price, surged in the fourth quarter of 2016 but have since levelled off. The US Federal Reserve has increased its benchmark interest rate twice this year, from 0.75% to 1.00% in March and then to 1.25% in June, the probability of which had already been priced in by investors. Another rate increase is expected later this year (*Wall Street Journal*, 14 June 2017). The movement of funds from the Fed's long-term placement to a one- to two-year placement is likely to continue. Some of these funds have flowed to emerging markets, including Indonesia.

President Trump's stated economic aim is to boost US growth (*Economist*, 13–19 May 2017). He aims to renegotiate trade agreements that he perceives to be unfair, or even damaging, to the US economy. This strategy may invoke protectionist measures against US trading partners and dampen global trade (and hence global growth). Trump's most controversial international policy decision has been for the United States—the world's second-largest emitter of carbon pollution, after China—to exit the Paris Agreement on climate change (BBC.com, 1 June 2017). The Paris Agreement came into force on 4 November 2016, after more than 55 countries

(which between them produce more than 55% of global carbon emissions) ratified it. All major countries and country groups, including the G7 (minus the United States), the EU, China, and India have pledged their continued commitment to the agreement.[1] Climate policy has become a new international fault-line, with the United States isolating itself from the rest of the world.

MACROECONOMIC DEVELOPMENTS: REVIVED GROWTH?

In the first quarter of 2017, Indonesia's economy grew by 5.0%, year on year, slightly faster than in the same quarter of 2016 (table 1). The small uptick was mostly supported by growth in net exports, which contributed 0.7 percentage points to GDP growth—up from 0.3 percentage points in the fourth quarter of 2016 (World Bank 2017b). Improved global demand and an upsurge in commodity prices have contributed to a strong rebound in exports since the fourth quarter of 2016. Positive growth in non-oil exports, in particular, is expected to continue for the rest of the year, albeit more slowly. Several factors have contributed to the increase in commodity and resource prices, including a cut in OPEC's oil production, an improved global economic outlook, increased property investment in China, and the expected but by no means certain increase in infrastructure investment in the United States. Metal prices have surged, while agricultural commodity prices have increased moderately and the coal price has edged upwards since bottoming out in 2015. Imports also grew in the first quarter of 2017. Most notable were capital-goods imports, which moved into positive figures; oil and gas imports also increased.

The robust growth of private consumption, which comprises about 55% of GDP, has in recent years been the backbone of Indonesia's economic resilience, supported by high levels of consumer confidence, low lending rates, and a stable rupiah (World Bank 2017b). The rate of growth in private consumption has moderated, however, and was slightly less than 5.0% in the first quarter. Consumer and business confidence were also flat in the first few months of the year; they started to pick up only in March (BI 2017). The upward trend in non-oil-and-gas exports has not translated into higher growth in domestic demand. Government spending was slow in the first quarter; it tends to quicken only in the third and fourth quarters. Growth in investment, including the growth of credit in the banking sector, has stagnated at around 5%.

In terms of sectors, growth in agriculture has been more buoyant recently than in the past, consistent with higher commodity prices and supported by a good paddy harvest season earlier this year. In the first quarter it accelerated to 7.1% year on year. Agriculture contributes 13.4% to Indonesia's GDP and generates a third of total employment.[2] Food crops, which make up a third of the agricultural sector, grew by 12.9% year on year, owing to the paddy harvest season returning to February and March (from April and May last year). Estate crops, which were half of the agricultural sector's total output, grew by 5.7%. The same is not true in the mining sector, even though it should have benefited from higher global prices. The export ban on raw minerals and metals remains in place and continues to con-

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1. In the United States, more than 20 states, including California and New York, have pledged to combat climate change without the Trump administration's support.

2. See https://www.bps.go.id/linkTabelStatis/view/id/970.

TABLE 1 *Components of GDP Growth, 2015–17 (% year on year)*

	2015			2016				2017
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
GDP	4.7	4.8	5.2	4.9	5.2	5.0	4.9	5.0
By expenditure								
Consumption	4.4	5.3	5.4	4.8	5.2	4.0	3.4	4.8
Private	5.0	5.0	4.9	5.0	5.1	5.0	5.0	4.9
NPIs serving households	−8.0	6.6	8.3	6.4	6.7	6.6	6.7	8.0
Government	2.6	7.1	7.1	3.4	6.2	−2.9	−4.0	2.7
Investment	4.0	4.9	6.4	4.7	4.2	4.2	4.8	4.8
Structures	4.7	6.1	7.8	6.8	5.1	5.0	4.1	5.9
Machinery & equipment	−4.2	2.9	5.2	−8.2	−7.3	−9.5	−1.9	1.4
Vehicles	−6.2	6.8	7.3	−0.2	5.2	14.8	27.4	25.4
Other	14.5	−2.4	−2.7	5.3	8.8	7.4	5.9	−9.2
Exports	−0.3	−0.9	−6.4	−3.3	−2.2	−5.6	4.2	8.0
Imports	−7.4	−6.6	−8.7	−5.1	−3.2	−3.7	2.8	5.0
By sector								
Tradables								
Agriculture, livestock, forestry & fisheries	6.5	2.9	1.6	1.5	3.4	3.0	5.3	7.1
Mining & quarrying	−3.6	−4.4	−6.0	1.2	1.2	0.3	1.6	−0.5
Manufacturing	4.2	4.6	4.4	4.7	4.6	4.5	3.4	4.2
Excluding coal, oil & gas	5.2	5.3	4.5	4.5	4.5	4.8	3.9	4.7
Non-tradables								
Electricity & gas supply	0.8	0.6	0.6	7.5	6.2	4.9	3.1	1.6
Water supply & sewerage	7.3	8.4	7.4	5.4	4.1	2.4	2.7	4.4
Construction	5.4	6.8	7.1	6.8	5.1	5.0	4.2	6.3
Wholesale & retail trade, repairs	1.6	1.4	3.7	4.1	4.1	3.6	3.9	4.8
Transport & storage	5.9	7.3	7.7	7.9	6.9	8.3	7.9	7.6
Accommodation, food & beverages	3.7	4.4	5.7	5.7	5.0	4.7	4.5	4.7
Information & communication	9.3	10.6	9.2	7.6	9.3	9.0	9.6	9.1
Finance & insurance	2.6	10.4	12.8	9.3	13.6	9.0	4.2	5.7
Real estate	4.3	4.1	3.5	4.9	4.8	4.0	3.6	3.7
Business services	7.6	7.6	8.1	8.1	7.6	7.0	6.8	6.8
Other services	8.6	5.0	6.1	5.7	5.3	3.9	2.9	3.9

Source: Data from Statistics Indonesia (BPS), via CEIC.

Note: Calculated on the basis of GDP at 2010 constant prices. NPIs = Non-profit institutions.

strain growth. The manufacturing sector, too, has not grown faster than 5% year on year since the third quarter of 2014. It has continued on its low-growth path owing to slow domestic and global demand and to its low competitiveness in the global market. Indonesia's manufacturing products are only partly integrated in global value chains (Athukorala 2011).

The non-tradable sector grew by 5.5% year on year in the first quarter, faster than the national average. Other subsectors that grew faster than the national average

were construction, information and communication that support e-based services such as e-commerce and app-based transport services (Uber, Go-Jek, and the like); and services that support logistics (transport, warehousing, and restaurant and accommodation services).

Whether Indonesia's economic growth has been revived to more than 5% per year remains to be seen. Quarterly growth needs to accelerate from its present rate in a sustained manner. This will require stronger growth in investment, the bulk of which will have to come from the private sector.

Balance of Payments: Driven by Exports and Financial Flows

The positive trend in non-oil-and-gas exports continued in the first quarter of 2017, buoyed by an upsurge in commodity prices in the preceding quarter. About 30% of Indonesia's non-oil-and-gas exports comprise commodities—most notably, crude palm oil, coal, rubber, and metals. Although price increases were notable in the fourth quarter of 2016 and continued into the first quarter of 2017, prices have levelled off for some commodities (figure 1). At the same time, the world Brent oil price has been steady, at around $50 per barrel. Imports have also rebounded, including those of capital goods. Growth of imports reflects higher demand for capital goods, which strengthen investment. The trade balance has been in surplus for eight consecutive quarters, resulting in a current-account deficit of about 1% of GDP in the first quarter of 2017 (table 2).

In the fourth quarter of 2016, the impact of the US presidential election created a short spate of negative capital flows from Indonesia (and elsewhere) to the United States. Flows of portfolio investment returned to Indonesia in the first quarter of 2017, however, aided by flows from funds to emerging countries, tax-repatriation proceeds, government issuance of foreign bonds, and a positive perception of the Indonesian economy. As of March, Indonesia's balance of payments was in surplus and foreign reserves had increased by $5.4 billion since the end of 2016. Despite improvements in exports and portfolio investment flows, the balance of payments is still prone to terms-of-trade shock, volatility in global financial flows, and other external risks.

Monetary Policy, Inflation, and Credit Growth

*Monetary Policy and the Exchange Rate*

The continuing accommodative monetary policy of Bank Indonesia (BI), the central bank, has translated into lower working-capital and investment-credit interest rates.[3] The transmission of BI's rate cut of October 2016 reduced them to 11.35% and 11.20%, respectively, in the first quarter of 2017. However, the interest rate on consumer loans has been downwardly rigid. Effective 1 June, BI has capped credit card interest rates at 2.2% per month, or 27.0% per year.[4] BI continues to hold its benchmark rate at 4.75%, reflecting the stability in the exchange rate, the level of GDP growth, and the inflation risk.

Annual consumer price inflation has risen owing to hikes in electricity tariffs and vehicle registration fees, which pushed up administered prices by 5.5%, year on year, in the first three months of 2017 (BPS 2017; Dong and Manning 2017).

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3. See http://www.bi.go.id/sdds/SeriesGroup/14_InterestRates.xls.

4. See http://www.bi.go.id/id/peraturan/sistem-pembayaran/Pages/SE_183316.aspx.

FIGURE 1 *Global Prices for Indonesia's Key Export*
Commodities, 2015–17 (January 2016 = 100)
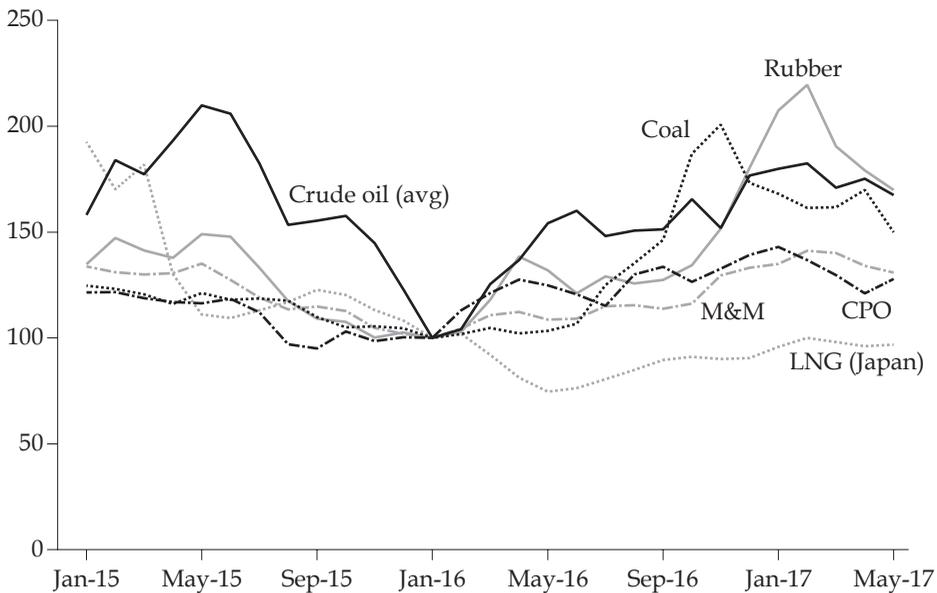
Source: Data from Global Economic Monitor Commodities (2017).

Note: M&M = metals and minerals; CPO = crude palm oil; LNG = liquefied natural gas.

Households in the 900-volt-ampere electricity category—about 18.7 million customers, or 29% of the total—bore tariff increases every two months from January 2017 to May 2017. Core inflation remains in the 3.1%–3.4% range, while volatile food prices have declined steadily owing to a good harvest season, especially for paddy rice and other food crops. Inflation is expected to remain within BI's target range of 2.5% to 4.5% throughout the year.

The exchange rate has also been stable, at around Rp 13,300 per US dollar, aided by capital inflows and an increase in non-oil-and-gas exports. Pressure from impending US monetary normalisation has been minimal. The recent Standard and Poor's (S&P) sovereign-bond upgrade has added to this positive sentiment. On 19 May, the day of S&P's investment-grade announcement, the Jakarta Composite Index jumped by 3%, to close at 5,700 points, a record high. The index has grown by 8.8% this year, as of the end of May. Net inflows have been about $1.6 billion, also as of May, and broad-based, although trade and manufacturing stocks have done particularly well.

Portfolio flows can be volatile, owing to movements in the global financial market. However, stable macroeconomic conditions can draw in more inflows relative to externally triggered outflows. This happened in Indonesia, after a brief period of capital outflows in the wake of the US presidential election in November 2016. Capital flows have since returned. Indonesia's bond yields fell in the second quarter of 2017, as they did in the first quarter. The S&P upgrade, however, will also have a fiscal benefit. It will reduce the cost of financing government bonds and thereby the interest expenditure in the national budget (see 'The 2017 Budget', below).

TABLE 2 *Balance of Payments, 2016–17 ($ billion)*

	2016					2017
	Q1	Q2	Q3	Q4	Total	Q1
Current account	−4.7	−5.1	−5.0	−2.1	−16.9	−2.4
Goods	2.6	3.8	3.9	5.1	15.4	5.6
Exports	33.0	36.3	34.9	40.2	144.4	40.8
Non–oil & gas	29.8	32.8	31.3	36.3	130.2	36.5
Oil & gas	2.9	3.2	3.3	3.5	12.9	3.9
Other goods	0.4	0.3	0.3	0.4	1.4	0.3
Imports	−30.4	−32.5	−31.0	−35.1	−129.0	−35.1
Non–oil & gas	−26.6	−27.8	−26.3	−29.9	−110.5	−28.8
Oil & gas	−3.8	−4.7	−4.6	−4.7	−17.7	−6.1
Other goods	0.0	−0.1	−0.1	−0.6	−0.8	−0.2
Services	−1.1	−2.4	−1.5	−2.0	−7.0	−1.3
Exports	5.8	5.3	5.9	6.5	23.5	5.8
Imports	−6.9	−7.7	−7.4	−8.5	−30.5	−7.2
Primary income	−7.4	−7.7	−8.4	−6.1	−29.7	−7.5
Secondary income	1.3	1.2	1.0	0.9	4.4	0.8
Capital & financial account	4.2	6.8	9.8	7.6	28.4	7.9
Direct investment	2.9	3.3	6.5	3.3	16.0	2.5
Portfolio investment	4.4	8.3	6.5	−0.3	18.9	6.5
Financial derivatives & other	−3.1	−4.8	−3.3	4.6	−6.6	−1.1
Errors & omissions	0.2	0.5	0.9	−1.0	0.6	−0.9
Overall balance (change in reserves)	−0.3	2.2	5.7	4.5	12.1	4.5
Foreign reserves	107.5	109.8	115.7	116.4	116.4	121.8
Current account (% of GDP)[a]	−2.1	−2.2	−2.0	−0.9	−1.8	−1.0

Source: Data from Bank Indonesia, via CEIC.

*Note:* Discrepancies are due to rounding.

[a] Using quarterly GDP in current US dollars, as generated by CEIC.

Credit Growth and Asset Quality in the Banking Sector

Credit growth in Indonesia's banking sector appears to be rebounding (figure 2). From around 2013, the end of the commodity boom, the volatile global financial situation and its impact on exchange rates, and the subsequent tightening of monetary policy slowed the economy and hindered credit growth. In September 2016, credit growth bottomed out at 6.5% per year, largely because of large falls in its investment and working-capital components. The sharp decline in credit growth coincided with a slowdown in deposit growth, which fell to 4% per year in October 2016, its slowest rate for 14 years (World Bank 2017a).

Banks' asset quality has been beset by non-performing loans (NPLs), the level of which has been more or less steady, at 3.0%–3.2%, since March 2016. Although the proportion of NPLs is below what is considered high (5.0%), it has edged up from below 2.5% in only two years. In an attempt to improve asset quality, Indonesia's

FIGURE 2 *Credit Growth (lhs) and Asset Quality (rhs)*
in the Banking Sector, 2014–17 (%)
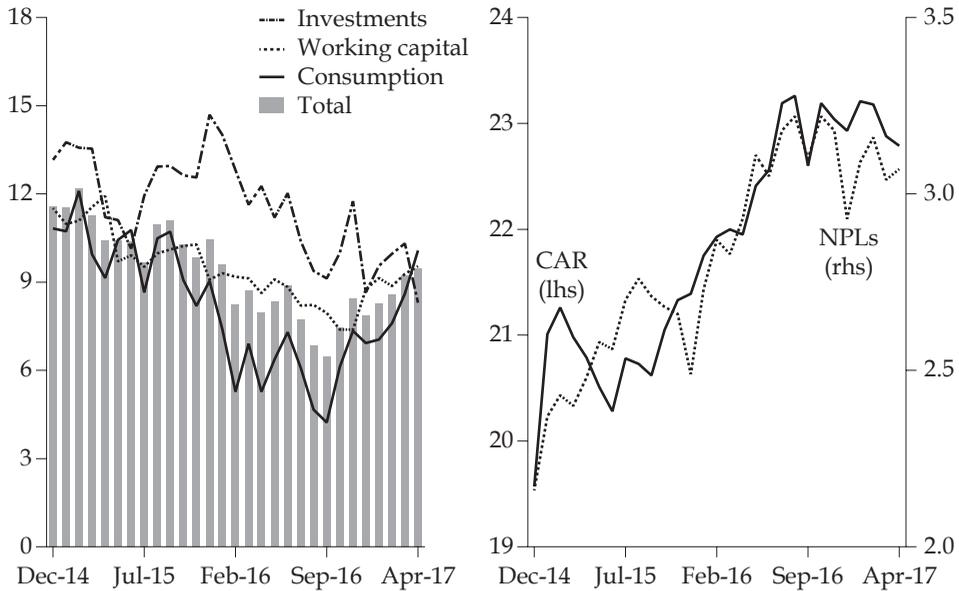
Source: Data from the OJK (2017).

Note: CAR = capital adequacy ratio; NPLs = non-performing loans.

Financial Services Authority (OJK) relaxed regulations on loan restructuring in August 2015; banks are now allowed to use only one business pillar—the borrowers' ability to repay loans—rather than the usual three pillars.[5] Questions linger, however, about whether the OJK will extend this relaxation of regulations after it expires, in August 2017, and what the likely impact will be on NPLs.

Although there are signs of credit growth, the banking sector is still in consolidation mode. The number of loans at risk remains sizeable, as of December 2016, and comprise elevated NPLs, special-mention loans, and performing restructured loans. The banking-industry average share of NPLs stands at 3.2%, while that of special-mention loans is 4.1% and that of performing restructured loans is 3.6%: a total of 10.7% loans are still at risk. Sectors with large NPLs include mining, at 7.0%; transport, at 5.2%; trading, at 4.6%; and construction, at 4.4%, which together reflect the extent of banks' exposure to commodities and the decline in credit growth during 2013–16.

The size of NPLs depends on how much debt banks can absorb by allocating loan-loss provisions. The five state banks combined hold about 40% of outstanding loans; private banks about 41%; and the rest (foreign banks, joint-venture banks, and regional development banks) about 19% (OJK 2017). As of the first quarter of

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5. The OJK's Regulation 11/POJK.03/2015 on Prudential Regulation in the Context of National Economic Stimulus for Commercial Banks eases requirements on lending and loan restructuring, particularly for loans under Rp 5 billion.

2017, banks' capital adequacy ratios are still sizeable, with the industry average at 23%—much higher than the 8% minimum required (figure 2). Banks can absorb losses due to bad debts, although doing so eats up profit and capital. There are also uneven deposit and credit growth prospects between banks, especially between state-owned banks and the rest. Much of the credit and deposit growth has been dominated by large state-owned banks in loans for government-led infrastructure projects. More investment from the private sector is needed, but such investment depends on the prospect of growth in the real sector. If more private-sector investment were to materialise, it would provide room for faster credit growth, lower the proportion of loans at risk, and reduce the number of NPLs.

The 2017 Budget: Lagging Tax Revenues
The government's internal amendment of the revised 2016 budget put the country's finances on a more realistic and sustainable footing (Hamilton-Hart and Schulze 2016). In August 2016, in the face of a potential tax-revenue shortfall of Rp 219 trillion, the government implemented a series of cost-saving measures—mostly in the form of expenditure cuts to routine and non-priority programs of central government ministries and non-ministries, but it also deferred some regional transfer payments. The measures were helped by an increase in revenue from the tax-amnesty program, which would garner an extra Rp 109.5 trillion by the end of 2016. The government further refined the budget by focusing on only the highest-priority spending—namely infrastructure, basic services, and regional transfers. The deficit of the realised 2016 budget was manageable, at 2.46% of GDP.

S&P, in its update of Indonesia's sovereign rating to investment-grade status on 19 May, applauded the government's having resorted to realistic budgeting that has reduced the likelihood of the deficit widening significantly should future revenue fall short of expectations. Fiscal policy is now considered strong in the face of broader external vulnerabilities. After the government took drastic measures to cut central spending and defer regional transfers, the 2016 budget realisation came close to meeting its outlook. In the 2017 budget, total expenditure increased by less than 10%, or Rp 220.2 trillion, from the 2016 realisation, whereas total revenue increased by more than 12%, or Rp 195.2 trillion (table 3). The primary balance was reduced slightly, by Rp 25 trillion, but the overall deficit was contained at 2.41% of GDP.

Despite the seemingly realistic budget for 2017, significant tax-revenue challenges remain.[6] As S&P rightly notes, taxation in Indonesia has structural problems. Tax revenues have long relied too much on price fluctuations in oil, gas, and other commodities, as has the economy more broadly. The tax ratio will therefore be increased from a paltry 10.3% of GDP (2016) to 10.9% (2017). The tax-revenue target for 2017, Rp 1,498.9 trillion, is a 16.6% increase from its 2016 realisation. Most of the increase will have to come from domestic tax revenue, most importantly from income tax. Although the numbers seem reasonable, the challenges are immense.

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6. The government submitted a revised 2017 budget to the parliament in early July 2017, in consideration of a more realistic tax-revenue growth rate of 13% (rather than 16%), a crude-oil price of $50 per barrel (rather than $45 per barrel), and Rp 16 trillion of further cuts to routine central government expenditures. The net increase of Rp 31 trillion in government spending will be allocated for priority expenditures (Office of the President, press release, 30 May 2017).

TABLE 3 *Central Government Budgets, 2016–17 (Rp trillion)*

	2016			2017		
	Budget	Revised	Actual	Budget	Growth on actual (%)	To May (%)
REVENUE	1,822.5	1,786.2	1,555.1	1,750.3	12.6	33.4
Domestic revenue	1,820.5	1,784.2	1,546.9	1,748.9	13.1	33.4
Tax	1,546.7	1,539.2	1,285.0	1,498.9	16.6	30.9
Domestic	1,506.6	1,503.3	1,249.5	1,464.8	17.2	30.6
Income tax	757.2	855.8	666.2	787.7	18.2	32.9
Value-added tax	571.7	474.2	412.2	493.9	19.8	31.4
Other	177.6	173.3	171.0	183.2	7.1	18.6
International	40.1	35.9	35.5	34.1	−4.0	43.8
Non-tax	273.8	245.1	261.9	250.0	−4.5	48.6
Resource revenues	124.9	90.5	65.7	87.0	32.4	55.5
Profits of SOEs	34.2	34.2	37.1	41.0	10.5	64.7
Other	114.8	120.4	159.1	122.0	−23.3	38.2
Grants	2.0	2.0	8.2	1.4	−83.3	10.3
EXPENDITURE	2,095.7	2,082.9	1,860.3	2,080.5	11.8	34.7
Central government	1,325.6	1,306.7	1,150.1	1,315.5	14.4	29.5
Personnel	347.5	342.4	305.1	343.3	12.5	35.4
Material	325.4	304.2	259.4	296.6	14.3	23.5
Capital	201.6	206.6	166.4	194.3	16.8	16.0
Interest	184.9	191.2	182.8	221.2	21.0	44.7
Subsidies	182.6	177.8	174.2	160.1	−8.1	26.8
Energy	102.1	94.4	106.8	77.3	−27.6	41.8
Non-energy	80.5	83.4	67.4	82.7	22.8	12.7
Other	83.6	84.5	62.1	100.1	61.2	23.9
Regions & villages	723.2	729.3	663.6	704.9	6.2	43.5
Special Allocation Fund	208.9	211.0	163.9	173.4	5.8	37.7
Village Fund	47.0	47.0	46.7	60.0	28.5	47.0
BALANCE	−273.2	−296.7	−305.2	−330.2	8.2	41.7
(% of GDP)	2.2	2.4	2.5	2.4		
ASSUMPTIONS						
GDP growth (%)	5.3	5.2	5.0	5.1		
Inflation (%)	4.7	4.0	3.0	4.0		
Exchange rate (Rp/$)	13,900	13,500	13,307	13,300		
SPN rate (avg %)	5.5	5.5	5.7	5.3		
Crude oil price (avg $/barrel)	50	40	40	45		
Oil production (avg '000 barrels/day)	830	820	829	815		
Gas production (avg '000 barrels/day)	1,150	1,150	1,184	1,150		

Sources: Data from the Ministry of Finance and the Supreme Audit Agency (BPK), via CEIC.

Note: Discrepancies are due to rounding. SOEs = state-owned enterprises. SPN = Treasury bills.

The realisation of income-tax revenues until April 2017, compared with the same period in 2016, grew by 19.3% with the tax amnesty but by only 5.2% without it. From January to March 2017, however, the third and final phase of the amnesty garnered only Rp 20.9 trillion in revenue before it ended. Now the tax amnesty is over, the main challenge is for the government to institute tax reform in an environment characterised by a high degree of tax avoidance, tax evasion, and informality. The Directorate-General of Taxes will have to broaden the tax base and increase tax compliance if Indonesia is to reach its tax-revenue target. The agency will have to be supported by medium-term tax-reform priorities that focus on human resources, information technology, organisational structure and business processes, and tax laws and regulations (Ministry of Finance, press release, 3 Apr. 2017). Unlocking potential tax revenues will require improvements in three major dimensions of the tax ecosystem: administration, taxpayer services and communication, and the tax system (Pereira, Hoekstra, and Queja 2013).

The issuance of Government Regulation in Lieu of Law 1/2017 on Financial Information Access for Tax Purposes is a step in the right direction. The government argued that the regulation is essential to trump the existing laws on banking and general taxation, which guarantee bank secrecy. The new regulation also aims to support Indonesia's commitment to the automatic exchange of information, starting in 2018 (*Jakarta Post*, 19 May 2017). A successful tax system is transparent, accountable, and fair, one in which honest measures are expected not only from taxpayers but from tax officials as well. These measures must be regulated to ensure proper implementation of the exchange of customer banking information to tax officials.

Jokowi is more than halfway into his term and is under pressure to deliver on his development platform, in which sustainable macroeconomic development and climate change mitigation are high priorities (Bappenas 2015). Indonesia signed the Paris Agreement, and its commitment to climate change mitigation was endorsed through the First Nationally Determined Contribution, which it submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in November 2016. Indonesia has also committed to reducing greenhouse gas emissions by 29% from their business-as-usual trajectory by 2030, and by 41% with international assistance. The reduction in emissions from forestry-sector sources comprises about 58% of Indonesia's total commitment. The forestry sector is key to Indonesia's efforts to mitigate climate change and to move towards more sustainable economic development.

INDONESIA'S FORESTS: PROTECTION VERSUS PRODUCTION

Forests are the defining feature of Indonesia's terrestrial landscape. Indonesia reports 91 million hectares of forest cover, or around half its land area, making it the country with the third-largest area of tropical forest, after Brazil and the Democratic Republic of Congo (FAO 2015). There has been longstanding tension over this resource between protection for environmental values, including carbon storage, and production of valuable commodities, including timber, palm oil, and pulpwood, which generate revenue and employment (see, for example, McCarthy and Robinson 2016). The result has been decades of unabated deforestation (the conversion of forests to non-forests), often carried out through large and economically damaging fires such as those during the 2015 El Niño.

The environmental values of Indonesia's forests are globally significant. Indonesia's position as an archipelagic bridge between Asia and Australia means that it evolved extraordinary and globally significant biological diversity (Metcalfe et al. 2001). Indonesia's forests rank first in the world in endemic birds and mammals (Birdlife International 2010; Schipper et al. 2008) and sixth in endemic amphibians (Stuart et al. 2004). Its famed fauna includes orangutans, tigers, rhinoceroses, elephants, and birds of paradise. For decades the rich biodiversity of Indonesia's forests has attracted international conservation attention.

More recently, the importance of Indonesia's forests to the global climate has attracted international attention, too. Indonesia's forests are among the most carbon-dense in the world (Baccini 2012). When cleared and burned, trees release their stored carbon into the atmosphere, contributing to climate change. On peatlands, which are prevalent throughout lowland Indonesia, soils can contain several times more carbon than the trees themselves. When cleared and drained by canals, peat soils dry out and become susceptible to fires that can emit carbon for decades (Hooijer et al. 2010). In addition to global environmental services, Indonesia's forests provide a host of other locally valued services, including clean water (Carlson et al. 2014), shade (Meijaard et al. 2013), non-timber products (Angelsen et al. 2014), and protection from waves (Bayas et al. 2011).

On the other hand, the economic values captured by logging and converting Indonesian forests for agricultural production are immense. Indonesia produced 28 million cubic metres of sawlogs and veneer logs in 2015, making it the world's fourth-largest producer (FAOSTAT 2017). Production levels have fallen since the early 1980s and 1990s but remain high (figure 3). Revenues from timber exports topped $2.2 billion in 2015; those from illegal logging may exceed $0.5 billion annually (Corruption Eradication Commission, press release, 16 Oct. 2015). Forestry employed 660,000 people in 2015 (MOEF 2015).

Logging may degrade forests and open them up to further exploitation, but wholesale conversion to plantation crops (including oil palm and fast-growing trees for pulp and paper production) destroys them. Oil palm has the most productive oil seed in tonnes-per-hectare terms. Native to West Africa, oil palm was first cultivated in Indonesia in 1911. The country's production of palm oil has roughly tripled every decade since 1970, reaching nearly 30 million tonnes in 2014, mostly in the lowlands of Sumatra and Kalimantan. In 2014, Indonesia produced 51% of the world's palm oil, while Malaysia produced another 34%. In 2015, palm oil exports exceeded $15 billion (FAOSTAT 2017), with large domestic sales as well. Production is spread across diverse ownership types, with 40% of land held by independent smallholders; 7% by state-owned enterprises; and 53% by private companies, including company-tied smallholders—that is, nucleus–plasma estates (BPS 2015).[7]

Pulp and paper production, first from natural forests and later from fast-growing tree plantations (generally acacia monocultures in five- to seven-year harvest cycles), has also grown in the last two decades. Between 1998 and 2015, pulpwood production doubled, from 15 million to 30 million cubic metres. Pulpwood exports were worth more than $1.8 billion in 2015 (FAOSTAT 2017). Independent satellite estimates identified more than 24 million hectares of oil palm and tree plantations across Indonesia, or around 12% of the total land area (Petersen et al. 2016).

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7. For more on Indonesia's palm oil industry, see Cramb and McCarthy's (2016) book.

FIGURE 3 *Production of Sawlogs, Pulpwood, and Palm Oil, 1961–2015 (million)*
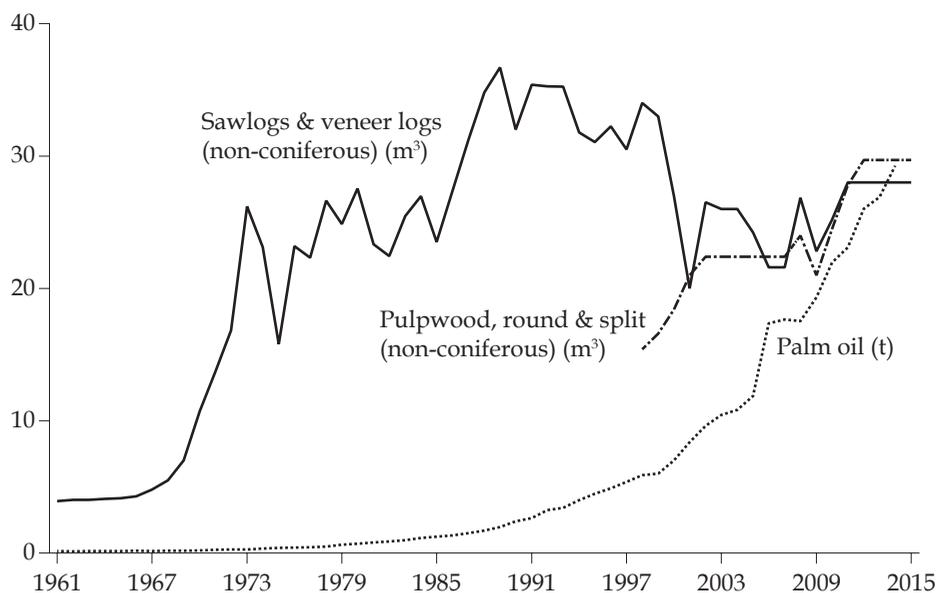
Source: Data from FAOSTAT (2017).

For decades, Indonesia has experienced high rates of deforestation. During 1990–2012, for example, deforestation averaged around 0.92 million hectares per year, according to official data (MOEF 2016), while tree-cover loss averaged around 1.38 million hectares per year, according to independent satellite monitors (figure 4; Hansen 2013). By the end of this period, Indonesia had surpassed Brazil as the tropical country with the highest levels of deforestation (Margono et al. 2014). During 2001–15, deforestation was greatest in Sumatra and Kalimantan (table 4), with emerging areas in Papua; little forest remains in Java and Sulawesi. A large portion of deforestation and associated emissions are attributable to oil palm and pulp and paper plantations; 36% of emissions during 2000–2010 came from concession areas for these tree crops (Busch et al. 2015). The carbon sequestered by oil palm and tree plantations is only a fraction of that stored in original forests (Morel et al. 2011). Of the 9.2 million hectares of oil palm and pulp and paper plantations in Kalimantan in 2015, 7.0 million hectares had been old-growth forest in 1973. Attributing deforestation to plantations is not always straightforward, however, because in some cases planting follows an intervening period during which the land returned to scrubland or was used as agroforest (Gaveau et al. 2016).

Also during 1990–2012, forest loss resulted in at least 529 million tonnes of carbon-dioxide emissions per year, according to official data, including 293 million tonnes from deforestation, 58 million tonnes from forest degradation (the reduction of carbon stocks within forests), and 178 million tonnes from peat decomposition (MOEF 2016). Peat fires were responsible for a further 466 million tonnes of carbon-dioxide emissions per year between 2000 and 2006 (MOE 2010). The combined annual emissions from forest loss and peat fires—roughly one billion tonnes—were

FIGURE 4 *Annual Deforestation in Indonesia, 1991–2015 (million hectares)*
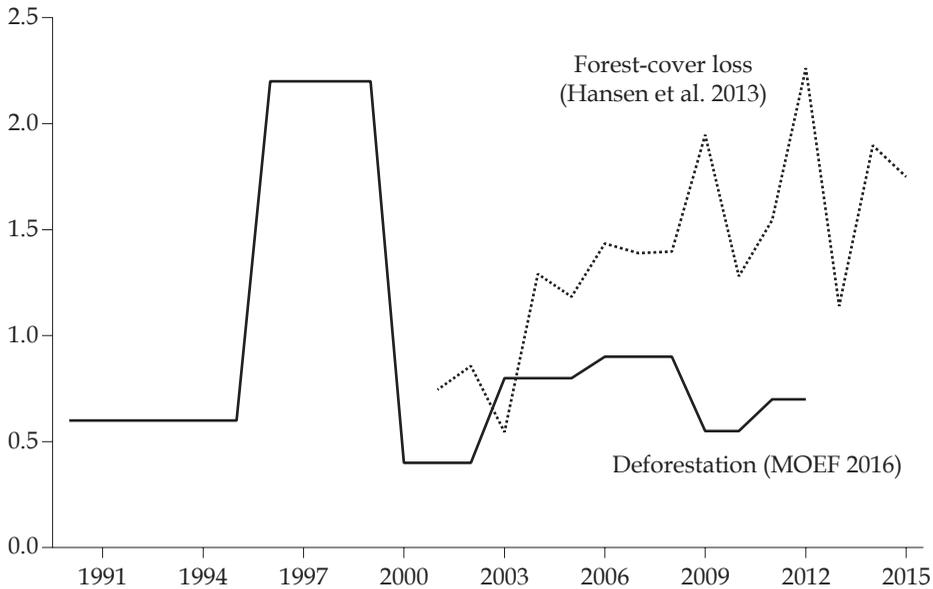
larger than the annual emissions of all but six other countries (China, the United States, India, Russia, Brazil, and Japan), even before considering Indonesia's industrial emissions.

In 2015, Indonesia committed to reducing emissions from deforestation, forest degradation, and peat degradation by an amount equivalent to 66%–90% below 2010 levels, as described below. Would achieving national goals related to reducing deforestation necessarily mean reducing commodity production? Not necessarily, because a trade-off between environmental protection and commodity production could potentially be mitigated by some combination of (a) zoning to spare forests, especially those considered of highest value, from agricultural expansion and fires; (b) expanding production on non-forested land; and (c) increasing productivity on land currently used for crop production — for example, by narrowing the productivity gap between smallholders and large companies. All these efforts are being attempted to some extent.

Whether Indonesia can meet its climate commitments will depend in large part on four evolving and interrelated storylines where efforts are being focused: international climate agreements and finance; land-use rights and regulations; forest fires; and the activities of non-state actors. We discuss recent developments in each of these storylines in turn. We conclude by discussing differences in approach between Jokowi's administration and that of his predecessor, Susilo Bambang Yudhoyono, and by examining indicators of whether Indonesia's resources, actions, and results to date are commensurate with its climate commitments.

International Climate Agreements and Finance
Climate change poses extreme economic threats to Indonesia, which has many low-lying islands dependent on fisheries and coral reefs, numerous coastal cities and agricultural areas, and a vulnerability to droughts and fires (MOE 2010).

TABLE 4 *Forest Loss, by Province, 2001–15 (% of 2015 provincial area)*

Riau	36.4	Gorontalo	6.9
Bangka Belitung	23.0	North Maluku	5.8
Jambi	20.9	Lampung	5.2
South Sumatra	19.3	North Sulawesi	4.8
West Kalimantan	16.7	South Sulawesi	3.8
Central Kalimantan	15.3	Maluku	3.3
South Kalimantan	13.8	Banten	2.3
East Kalimantan	13.6	West Nusa Tenggara	2.0
North Sumatra	13.5	West Papua	1.9
Bengkulu	13.0	East Nusa Tenggara	1.3
Riau Islands	10.4	West Java	1.3
West Sulawesi	9.7	East Java	1.2
West Sumatra	9.3	Papua	1.1
Southeast Sulawesi	8.2	Central Java	0.8
Aceh	8.2	Bali	0.8
Central Sulawesi	7.6	Yogyakarta	0.2
North Kalimantan	7.0	Greater Jakarta	0.0

Source: Data from Global Forest Watch and the Ministry of Home Affairs (http://www.kemendagri.go.id/pages/profil-daerah/provinsi).

Indonesia pledged in 2015 to reduce emissions by 29% unconditionally, or by 41% conditionally (that is, with international financial support), from a projected business-as-usual baseline of 2.868 billion tonnes of carbon dioxide ($GtCO_2$) per year in 2030. This projected level of emissions assumes an increase of 115% between 2010 and 2030, led by aggressive projected growth in non-forest emissions of 213% (figure 5). (Forest and peat degradation comprised about half of Indonesia's emissions in 2010.) Of the unconditional emission reductions, 58%, or 0.497 $GtCO_2$ per year in 2030, is planned to come from forests. That is, 17.2 percentage points of emission reductions are to come from reducing emissions from forest loss and peat decomposition, while the remaining 12.0 percentage points are to come from actions in the energy, waste, industry, and agricultural sectors. Forests are the only sector in which mitigation scenarios imply reducing emissions to below current levels rather than merely to below projected growth—reductions of 66% (unconditional) or 90% (conditional) below 2010 levels, or of 70% and 91%, respectively, below projected 2030 levels.[8]

These commitments were articulated in Indonesia's Intended Nationally Determined Contribution submitted to the UNFCCC in September 2015 and elaborated in the First Nationally Determined Contribution in November 2016. The UNFCCC has, for more than 20 years, been the premier forum for international negotiations on avoiding dangerous levels of climate change. Indonesia has been an active participant in these negotiations, including as the host of the 13th Conference of the Parties, in Bali, in 2007. In November 2015, UNFCCC negotiations

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8. For a discussion of green growth and energy emissions in Indonesia, see Burke and Resosudarmo's (2012) Survey.

FIGURE 5 *Indonesia's National Climate Commitment,*
November 2016 (million tonnes of CO_2e)
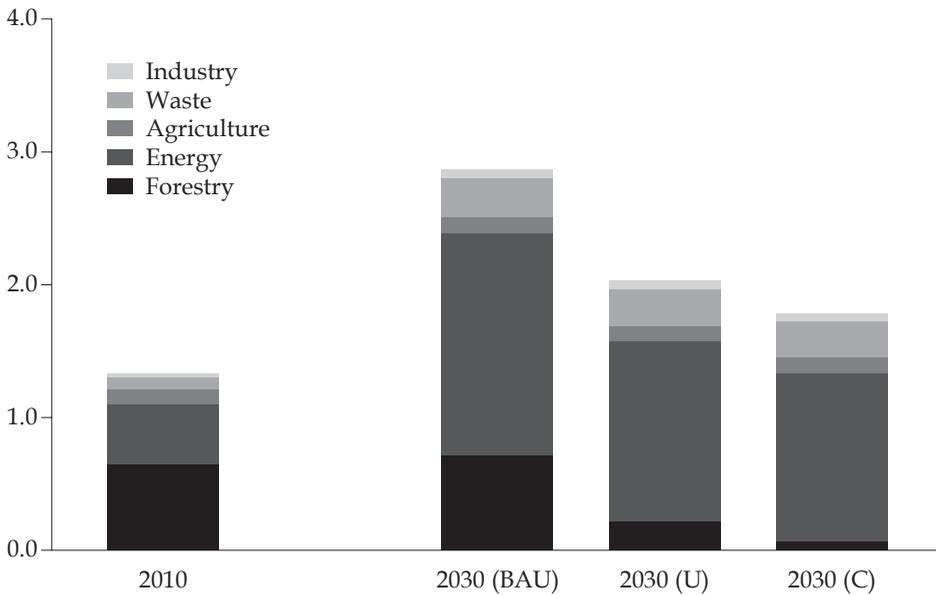
Source: Indonesia's First Nationally Determined Contribution, November 2016.

Note: CO_2e = equivalent carbon dioxide; BAU = business as usual; U = unconditional; C = conditional.

successfully produced the Paris Agreement. The crux of the Paris Agreement is bottom-up pledges of climate action, or 'nationally determined contributions', from signatory countries, including Indonesia.

Indonesia's commitment follows a national target announced by former president Yudhoyono at the G20 summit in Pittsburgh in 2009, later elaborated in the National Action Plan for Greenhouse Gas Emission Reductions (RAN-GRK; ROI 2011), of reducing emissions by 26% unilaterally, or by 41% with international support, from a projected 2.950 $GtCO_2$ per year in 2020 (23% above or 2% below emissions of 1.780 $GtCO_2$ per year in 2005). Of these reductions, 87% would be from forests—that is, from reducing emissions from forests and peatland by between 672 and 1,039 million tonnes from a 2020 business-as-usual scenario of 0.898 $GtCO_2$ from deforestation and 0.753 $GtCO_2$ from sequestration due to regrowth.

The Jokowi-era unconditional reduction from forests, of 0.497 $GtCO_2$ per year by 2030, appears less ambitious than that of the Yudhoyono era, of 0.672 $GtCO_2$ per year by 2020. However, the two sets of pledges cannot be compared directly, owing to different time periods (2020 versus 2030); scopes (for example, the 2011 RAN-GRK includes sequestration, the 2016 nationally determined contribution includes peat fires, and the 2016 reference level discussed below includes peat decomposition); and assumptions about future emissions growth.

The Paris Agreement includes a prominent role for forests in its article 5 on reducing emissions from deforestation and forest degradation, plus enhancing forest carbon stocks, in developing countries (REDD+). The premise of REDD+ is that developing countries that reduce emissions from forests to below agreed

benchmarks, or reference levels, become eligible for results-based payments from developed countries, financed by either carbon markets or public funds. External finance for protecting and restoring forests would then provide support for an alternative development path that relies less on logging and converting forests. In effect, REDD+ pays developing countries for providing environmental services to the rest of the world. Indonesia took a major step towards obtaining REDD+ payments in January 2016, by submitting its reference levels to the UNFCCC for technical assessment (MOEF 2016). The reference levels of 0.293 $GtCO_2$ per year from deforestation, 0.058 $GtCO_2$ per year from forest degradation, and 0.178 $GtCO_2$ per year from peat decomposition represent an official unified agreement on emissions across all ministries of government, coordinated by the Ministry of Environment and Forestry.

Indonesia is one of a few countries that already have experience with a REDD+ payment-for-performance agreement, having signed a $1 billion letter of intent (LOI) with Norway in 2010. Under this LOI, $200 million is to be spent on pre-financing measures to reduce deforestation and $800 million on paying for verified emission reductions. Of the pre-financing, around $110 million has been committed and around $85 million has been spent to date, according to a representative of the embassy of Norway. For results-based payments to be made, preconditions include a financing instrument with fiduciary and fiscal safeguards, and a system for monitoring, reporting, and verifying emission reductions, neither of which is yet in place.

Approaches to institutional structure and financing for REDD+ in Indonesia diverged markedly between the Yudhoyono and Jokowi presidencies. Under Yudhoyono, a stand-alone REDD+ agency reporting to the president was intended to be the recipient of international funding for REDD+. Although the REDD+ agency was established in August 2013, its deputies were not appointed until May 2014 (Mangkusubroto et al. 2016), less than six months before the end of the Yudhoyono presidency, and its funding instrument was never established. Soon after Jokowi took office he folded the REDD+ agency into the newly consolidated Ministry of Environment and Forestry, under the Directorate-General of Climate Change. Concurrently the Indonesian National Council on Climate Change (DNPI) was folded into the Ministry of Environment and Forestry as well.

Financing for REDD+, from the Norway LOI or from other sources, is planned to flow to the Ministry of Finance, which, in consultation with various line ministries, will then direct funding to programs for climate change mitigation. This yet-to-be-established funding instrument for climate change will finance not only the REDD+ budget but also energy, peatland restoration, and other sources of climate change mitigation.

Seven years after the signing of the LOI, no reduction in deforestation has occurred, according to independent satellite estimates (Hansen et al. 2013), nor have any emission reductions been monitored, reported, and verified. Nonetheless, the premise of the original agreement endures: preventing the deforestation of Indonesia's massive stocks of forest carbon is a relatively cost-efficient means of mitigating greenhouse gas emissions, both within Indonesia and globally. Moreover, Norway remains committed to paying for verified emission reductions. In Paris in 2015, Norway announced that the budget line for the Norwegian International Climate and Forest Initiative would be extended to 2030, while it pledged, along

with Germany and the United Kingdom, \$5 billion for REDD+ through 2020. Since 2010 the Norwegian krone and Indonesian rupiah have devalued in almost equal measure against the US dollar, meaning that the krone-denominated agreement remains of comparable rupiah value to Indonesia. However, it remains to be seen how long Norway's parliament will maintain its offer of support if measured and verified emission reductions are not achieved in the next two years.

The Green Climate Fund (GCF), a new multilateral finance institution, is another potential source of funding for Indonesian climate change mitigation and adaptation in general and forests in particular. As of May 2017, the GCF, which is a central part of efforts to mobilise \$100 billion per year in climate finance, had received just over \$10 billion in pledges and had a portfolio of around \$2 billion across 43 projects (GCF 2017b). Indonesia's first nationally designated authority to receive funds from the GCF, PT Sarana Multi Infrastruktur, a vehicle for accelerating infrastructure investment, was accredited in April 2017, 22 months after submitting its application (GCF 2017a). The GCF board is scheduled to vote in 2017 on issuing a request for proposals for results-based payments for REDD+. The level of funds that would be allocated for REDD+ are not yet known.

Prospects for private-sector funding for REDD+ appear dim in the near to medium term, because no major economy's cap-and-trade program looks likely to include offsets from REDD+. In 2016 the International Civil Aviation Organization pledged to achieve carbon-neutral growth in international flights after 2020, in large part by purchasing carbon offsets. Such offsets could potentially include REDD+ credits, though the standards that could be used to certify such credits are yet to be determined. California has long been seen as the best hope for compliance-market-based tropical forest offsets, but prospects for offsets face continued opposition from advocates seeking a greater proportion of emission reductions domestically and, anyway, California would likely source its offsets first from Brazilian states that have already reduced deforestation. Voluntary carbon markets traded just 13.1 million tonnes of forestry and land-use credits in 2016 (Forest Trends 2017).

Land-Use Rights and Regulations

Around 70% of Indonesia's total land area is administered by the Ministry of Environment and Forestry, with the remainder designated as area for other purposes (CIFOR 2017). This legal 'forest' should not be confused with 'forested land', defined by tree height, coverage, and extent. *Kawasan hutan*, or forest areas, are classified into four use types: production, protection, conservation, and conversion (CIFOR 2014). A complex system of procedures governs which authorities may grant licences for which activities in which classification of forest. The authority to issue concession licences is seen as a significant source of rent for financing local elections (Burgess et al. 2012). In practice, claims to land are overlapping and opaque. Registry information available to the public on concession boundaries and ownership is notoriously incomplete and unreliable. The One Map initiative, started under Yudhoyono in 2010 and continued under Jokowi, seeks to clarify all concessions by defining them in a single digital map. This map has not yet been made public.[9]

Through Presidential Instruction 10/2011, Yudhoyono placed a two-year moratorium on the granting of new logging, oil palm, and timber concession licences on

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9. For more on land issues in Indonesia, see McCarthy and Robinson's (2016) book.

primary forest land and peatland. The moratorium, which took effect in May 2011, could not have been expected to have more than a limited impact on the rate of emissions from deforestation and peat conversion, given that its scope was limited to new concessions and did not affect deforestation within previously granted concession-licence areas or outside concession areas (Busch et al. 2015). However, this moratorium potentially opened a window of opportunity for forest governance reforms (WRI 2014). Under Yudhoyono, the moratorium area was publicly reviewed every six months and was renewed in 2013 for another two years. In May 2013, Yudhoyono extended the moratorium for two years beyond his final term, which ended in October 2014.

In May 2015, and again in May 2017, Jokowi successively extended the moratorium for additional two-year terms with the same objectives and provisions. He also expanded the reach of the moratorium in several ways. In 2016, after the devastating El Niño fires described below, Jokowi issued a set of moratorium restrictions (Government Regulation 57/2016) that prohibited (a) land clearing for certain tree crops (such as oil palm and acacia) until the delineation between forests zoned for conversion and protection was clear; (b) constructing drainage systems for drying peatland; and (c) setting or allowing fires on peatland. Further implementation guidelines are to be issued through a ministerial decree.

These government regulations in effect prohibit the conversion of peatland regardless of licence status. That is, there is to be no clearing even where a concession licence has already been obtained, or outside concession areas. Furthermore, cleared areas on peatland that have not yet been planted face a requirement to restore hydrological function, and planted areas on peatland would potentially be prohibited from replanting after the current harvest cycle (around 6 years for timber and 25 years for oil palm) on the basis of water-table depth and other factors. One private-sector informant characterised the new criteria on already planted peatland under regulation 57/2016 as 'creating havoc', especially for mid-size companies. For example, companies fear that a requirement to keep a water-table depth of greater than 40 centimetres could reduce productivity or kill crops. In general, acacia companies were seen as more prepared to comply with the 40-centimetre rule than palm oil companies. Although the Ministry of Environment and Forestry promised that planted land rendered unsuitable for cultivation by the regulation could be swapped for land elsewhere, much of the land identified as biophysically suitable for cultivation had already been claimed, or had been designated through land reform programs.

Implementing regulation 57/2016 has provoked a strong backlash from the palm oil industry (*Tempo*, 22–29 May 2017). It was reported that the minister of industry wrote to the president on behalf of the palm oil industry to defend licence-holders from the provision that investors should apply the 'latest technology on peat land management' so as not to harm peatland. Investors and companies also protested the provision that crops on conservation peatland can be harvested only once and cannot be replanted (article 8 of Minister of Environment and Forestry Regulation 17/2017 on Forest Industry).

In June 2013, the Constitutional Court ruled that the government needs to recognise the existence of indigenous forest (*hutan adat*). This implies that the Ministry of Forestry must release some forests to recognised *adat* communities (Constitutional Court Decision 35/2013), potentially affecting millions of hectares of forest. The government has begun to verify community claims to indigenous forests. In

December 2016 the government released 13,000 hectares of forest area to nine indigenous communities (Setkab, press release, 30 Dec. 2016). In parallel, the Social Forestry program aims to allocate 12.7 million hectares of land from state forests for community management (McCarthy and Robinson 2016).

Laws and regulations related to land use are only as effective as their enforcement. Evidence that law enforcement is stronger now than in earlier years was provided by a landmark 2015 decision by the Supreme Court in which a palm oil company, PT Kallista Alam, was convicted of deliberately burning 1,000 hectares of peatland in Tripa, Sumatra (*Jakarta Post*, 23 Sept. 2015). The Supreme Court rejected the company's appeal and affirmed the decision of the lower courts. The company was ordered to pay Rp 366 billion in compensation to the government. This was the highest fine ever imposed in an environmental case in Indonesia and set a precedent for combating forest fires. The Kallista case demonstrates that existing legal instruments can be utilised if the government and law enforcement agencies are serious in combating forest fires.

Forest Fires

For decades Sumatra and Kalimantan have been subject to recurring and severe dry-season forest fires set by agribusinesses and farmers clearing land to plant crops. In their natural state the wet forests of these regions do not burn easily, but extensive logging has dried and degraded large areas of forest, thereby increasing vulnerability to fires. Fires in 1998 were especially widespread, causing an estimated $4 billion in damage (Glover and Jessup 1999). Fires recurred thereafter in 2002, 2005, 2006, 2009, 2013, and 2015, tending to be most severe during hot, dry El Niño years. Where such fires occur on peatland, they are difficult to extinguish and can smoulder underground for years.

The most severe fires since 1998 burned in 2015. From 21 June to 20 October, fires burned more than 2.4 million hectares of land, of which between 0.43 million and 0.67 million hectares was forested (World Bank 2016). By one independent estimate, on many days the carbon emissions exceeded those of the entire US economy (Harris et al. 2015). The fires polluted the air, closed schools and airports, and damaged crops and timber stands. The worst damage was in Indonesia, but haze spread to neighbouring Singapore and Malaysia as well. The World Bank estimated that the cost of the 2015 fires within Indonesia alone was $16 billion—larger than the $12 billion of value added from Indonesia's total palm oil production in 2014 (World Bank 2016).

The 2015 fires made the headlines for months and dominated international news coverage of Indonesia. As during previous catastrophic fire seasons, the fires elevated the profile of forest and peatland management from a sectoral issue within the purview of the Ministry of Environment and Forestry to a national concern raised across sectors of health, education, infrastructure, and foreign policy.

In response to the fires, Jokowi issued a presidential decree (11/2015) to strengthen coordination and quicken mitigation acts. He instructed the military and police to work with district governments to fight fires. In a cabinet meeting during the height of the fires, and the day before flying to Washington, DC, to meet with President Obama, Jokowi made two policy decisions. The first was to expand the peatland moratorium, as described above. The second was to call for the creation of a new ad hoc agency reporting to the president, the Peatland Restoration Agency (BRG), which was established in January 2016. The BRG operates on a

five-year mandate through 2020. In November 2016 it received a budget for 2017 of Rp 865 billion, from a request of Rp 1.2 trillion. Its budget is administered by the Ministry of Environment and Forestry. Of at least 15 million hectares of peatland across Indonesia, 7 million hectares have already been converted while 7 million hectares remain intact. The BRG has identified 13 million hectares as priority and has a target of restoring 2 million hectares of peatland by 2020 in seven priority provinces (Papua, South Kalimantan, Central Kalimantan, West Kalimantan, South Sumatra, Riau, and Jambi), with restoration targets by forest type. Papua retains most intact forest, while South Sumatra was opened earliest and has been the most drained by palm oil, pulp, and paper. The BRG has a target in 2017 of restoring 200,000 hectares, with private companies responsible for restoration of an additional 200,000 hectares on their land.

Technical requirements for restoring the hydrological function of peatlands include mapping, engineering, and monitoring. The Geospatial Information Agency is performing detailed mapping of peatland depth and extent by using airborne lidar and aerial photographs. Around 700,000 hectares in Riau, South Sumatra, and Central Kalimantan has already been mapped, according to the head of the BRG, though the maps have not yet been released. Engineering plans include the construction of many dams in an effort to block drainage canals to keep peat soils wet. Where dams are not sufficient, it may also be necessary to construct deep wells, landfills, and irrigation systems. The BRG monitoring system calls for hundreds of electric sensors to be installed, to log hourly data on moisture, rainfall, and water movement. Of 400 sensors to be installed in 2017, 20 sensors had already been installed by May, according to the head of the BRG.

In addition to technical challenges, the BRG faces daunting institutional challenges. Lacking its own authority and arms in the field, the BRG must secure local consent through consultations. It must rely on other ministries, especially the Ministry of Environment and Forestry for its budget, the Ministry of Public Works and Housing for dam maintenance, and the police for enforcement. It must overcome the reluctance of district governments that may be afraid to take on responsibilities outside their mandate, communities who may see inundation of land as a threat to their crops, and companies that have allies across line ministries. These tasks present sizeable obstacles for a new, small, and time-limited agency.

Non-state Actors
Land use in Indonesia is determined not only by national commitments and policies but ultimately also by the actions of many non-state actors, including large companies, non-governmental organisations, and individuals throughout the highly decentralised archipelago.

In general, deforestation is highly responsive to the rise and fall of agricultural commodity prices (Busch and Ferretti-Gallon 2017), including in Indonesia (Wheeler et al. 2013). Several recent developments have affected the demand for palm oil. In 2015, the central government enacted a requirement that diesel sold in Indonesia must comprise a 20% blend of biodiesel from palm oil (Regulation of the Minister of Energy and Mineral Resources 12/2015).[10]

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10. For a further discussion of biofuel production in Indonesia, see Basri and Patunru's (2006) Survey.

On 4 April 2017, the European Parliament adopted a resolution on 'palm oil and deforestation of rainforests', calling on the European Commission to work towards establishing an EU-wide commitment to obtaining 100% of its palm oil from sources certified as sustainable by 2020. This includes eliminating deforestation from supply chains—that is, to 'take measures to phase out the use of vegetable oils that drive deforestation, including palm oil, as a component of biofuels, preferably by 2020' (European Parliament 2017). This resolution was criticised by Indonesia's Ministry of Foreign Affairs (press release, 8 Apr. 2017) as protectionism of rapeseed oil and sunflower oil produced by European farmers.

In recent years many Indonesian palm oil companies have committed to voluntary sustainability standards without government monitoring or enforcement. The 2014 New York Declaration, committing signatories to eliminating deforestation from the production of commodities—including palm oil and paper products—by no later than 2020, was signed by companies including Asia Pulp and Paper, Asian Agri, Golden Agri-Resources, Musim Mas, Sime Darby, and Wilmar International (United Nations 2014). An annual progress report found that palm oil producers have taken on more commitments than companies producing other commodities, but monitoring to trace the sustainability of palm oil supply chains back to farm level is difficult (Climate Focus 2016).

A multitude of sustainability standards face a common challenge of being strict enough to be environmentally meaningful yet achievable enough not to alienate industry members. Such standards include the Roundtable on Sustainable Palm Oil, a non-profit consortium established in 2004 that covers 1.8 million hectares of Indonesian palm oil production and commits members to a range of social and environmental criteria and indicators; the Indonesian Palm Oil Pledge, formed in 2014 but dissolved in 2016; and the Indonesian Sustainable Palm Oil System, formed in 2009.

Such consumer demand as exists for deforestation-free palm oil originates largely from developed-country markets. Companies selling in these markets are often more sensitive to activist campaigns and, more cynically, face more competition from domestic oil seed producers. A large and growing share of demand for palm oil is in China, India, and Pakistan, as well as Indonesia, where concerns about the sustainability of commodity sourcing are a lower priority. In January 2017, in Davos, the president of Chinese agricultural trader COFCO announced that the company would eliminate deforestation from its supply chain (*New York Times*, 21 Jan. 2017), the first commitment of its kind by a Chinese company.

Several informants mentioned a perception that logging and peatland plantations are becoming less lucrative and are perhaps in their sunset days, because much accessible and valuable timber has already been extracted, returns on investment have fallen owing to peat fires, and banks are less likely to lend for such activities than in the past.

Are Resources, Actions, and Results Commensurate with Commitments?
Indonesia's national commitment to reducing emissions from deforestation and peat by 66%–90% from 2010 levels by 2030 is strong and far more ambitious than most climate commitments by other countries for other sectors, building on the previous commitment of the RAN-GRK, as described in the first storyline. Corporate commitments to eliminating deforestation from oil palm and timber supply chains by 2020, described in the fourth storyline, are also ambitious. Are the recent

developments described above consistent with a path towards Indonesia meeting these commitments? It is worth considering this question in light of resources, actions, and results.

Resources, in the form of budget, personnel, institutional authority, and rhetorical support from the president, are not yet commensurate with the task of effecting change in multibillion-dollar industries with entrenched government connections. National climate programs do not yet have an instrument for receiving external funding support. The budget of the BRG is small, as described in the third storyline. The personnel of the BRG numbers less than 100. The BRG is a time-limited ad hoc agency, lacks authority for its own budget, and can influence the actions of local governments only through consultation. In comparison, the REDD+ agency staffed by Yudhoyono six months before the end of his second term focused on larger institutional reforms but was also ad hoc and never received a funding instrument. Rhetorically, Yudhoyono was outspoken on environmental issues, even receiving an international prize (UNEP 2014). Jokowi has been more reserved, focusing his rhetorical attentions elsewhere, leading some to wonder if national commitments on climate have been forgotten.

The portfolio of actions that Indonesia has prioritised for reducing deforestation and fires is reasonable, but many of these actions are still of fledgling scale relative to the size needed to achieve the commitments. Actions shown to reduce deforestation in other countries include zoning of where deforestation may or may not occur, enforcement of forest laws, recognition of territorial rights of indigenous peoples, and initiatives to fulfil demand for agricultural commodities from non-forested rather than recently deforested areas. This holds generally (Busch and Ferretti-Gallon 2017) as well as in Brazil (Nepstad et al. 2014; Seymour and Busch 2016), which achieved an 80% drop in Amazon deforestation between 2004 and 2014, while increasing soy and beef production.

Indonesia is embarking on a similar set of actions. The 2015 moratorium on peat conversion, described in the second storyline, builds on the groundwork laid by the 2011 moratorium on concession licences and has the potential to achieve significant results if enforced. Law enforcement can be used effectively, as shown in the Kallista case, though there do not yet appear to have been many other applications. Other actions related to fire prevention, peat mapping, transparent concession mapping, and distribution of land rights to indigenous peoples and other local communities are all at very small and early stages relative to the targets that have been set. Indonesia is hardly alone in lagging on its self-imposed climate targets; developed countries that pledged in 2009 to mobilise $100 billion a year for international climate finance by 2020 have so far succeeded in mustering only $10 billion for the GCF.

Ultimately, whether or not Indonesia is on course to achieve its commitments will be judged on the basis of results. Three indicators are salient: deforestation, fires, and emission reductions. Deforestation rates have continued to climb through both the Yudhoyono and the Jokowi administrations, as measured by independent annual satellite monitors. Catastrophic fires occurred during both administrations as well—under Yudhoyono in 2006 and 2013, and under Jokowi in 2015. Whether recent fire-prevention measures are successful will be tested during the next El Niño. For these results to come to fruition before the end of Jokowi's term, in 2019, much stronger actions and scaled-up resources are required.

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