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Indonesia: Selected Issues

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INDONESIA

Selected Issues

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Approved by the Asia and Pacific Department

August 21, 2012

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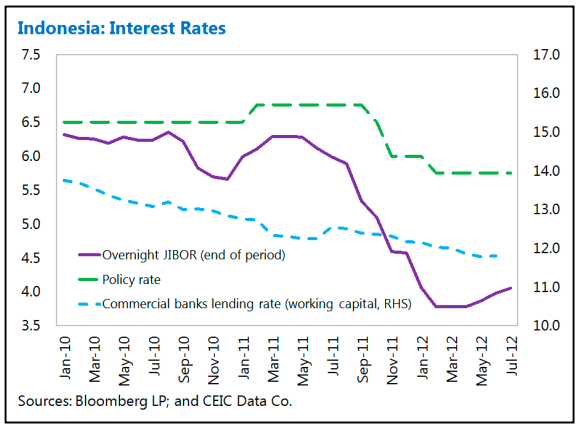
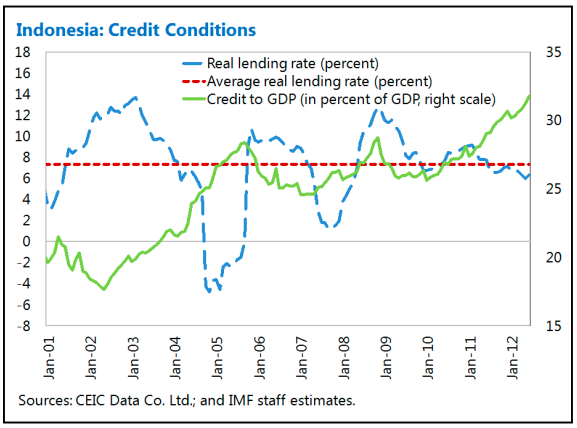
I. Global Spillovers, Lending Conditions, and Monetary Policy in Indonesia[1]

Policy interest rates are expected to anchor money market rates and Treasury bill/bond yields that act as benchmarks for deposit and loan rates. Historically, retail deposit and lending rates have closely followed the policy rate (and the SBI auction rate before 2005). However, recently the SBI deposit facility and other money market rates have been allowed to fall below the policy rate, potentially reducing the effectiveness of monetary policy transmission by blunting the impact of policy rates on retail bank rates. The concern here is that lower market rates could translate to retail bank rates that are below levels consistent with the central bank's policy stance and thus inflation objective. Therefore, this chapter evaluates the role of policy rates as well as lending conditions (proxied by the spread between the policy and market rates) when assessing monetary conditions.





1. **To assess the impact of policy rates and lending conditions as well as the second-round effects of higher global commodity prices, the chapter estimates a small open economy version of the Global Projection Model (GPM) using Bayesian techniques.** The Great Recession highlighted the importance of taking into account both domestic and global shocks (and uncertainty) as well as macrofinancial transmission mechanisms in the design of monetary policy in emerging markets. We estimate a GPM model using Bayesian techniques that incorporates global factors and lending conditions to consider the policy trade-offs under an inflation forecast targeting regime like in Indonesia.

2. **The model estimates shed important insights for monetary policy making.** First, a 1 percentage point increase in the spread leads to a 0.15 percent change in the output gap, compared to 0.13 percent for the policy rate. Taken together with the impact of the spread on the output gap, this suggests scope for currently reducing inflationary pressures by lowering the spread rather than hiking the policy rate itself. Second, there are significant second-round effects of headline inflation on core inflation, making core inflation susceptible to global

[1] Prepared by Shanaka J. Peiris.

commodity prices and domestic fuel price adjustments, potentially requiring a monetary policy response (see IMF 2011).

A. Small Open Economy GPM Model

3. **The analysis is conducted with the use of a modified version of the small "New Keynesian" macroeconomic model of Berg, Karam, and Laxton (2006).** The model is a stripped-down version of a stochastic general equilibrium (DSGE) model with rational expectations. By virtue of their relatively simple structure, small New Keynesian models have been used for forecasting and policy analysis purposes in central banks and by IMF country desks. A number of inflation forecast targeting (IFT) central banks have used similar models as integral parts of their forecasting and policy analysis system (see Laxton and others, 2009).

4. **To capture the commodity dependence and importance of the banking system in Indonesia, the baseline model is extended to incorporate oil prices and macrofinancial linkages through a credit conditions variable (Carabenciov and others, 2008).** The model features a small open economy including forward-looking aggregate supply and demand with microfoundations and with stylized (realistic) lags in the different monetary transmission channels. External shocks from the rest of the world are captured here by U.S. growth. Output developments in the rest of the world feed directly into the small economy as they influence foreign demand for Indonesian products. Changes in foreign inflation and interest rates affect the exchange rate and, subsequently, demand and inflation in Indonesia.

5. **The model is estimated using Bayesian techniques based on prior distributions for the parameters from cross-country work and assumptions about the Indonesian economy.** Bayesian estimation in a situation of a relatively small sample size helps ameliorate the problems of classical econometric estimation, which often gives macro model results that are inconsistent and faced with simultaneity challenges. This is a particularly important aspect for Indonesia where there was a structural change in 2005 when the Bank Indonesia (BI) switched to an IFT framework, necessitating a subsample estimation from 2005 to 2012 to confirm the robustness of the full sample estimates. The model is estimated based on quarterly data from 2000 to 2012 using prior empirical knowledge about the parameters of interest for Indonesia or cross-country studies on emerging markets (see Anand, Ding, and Peiris, 2011; and Bathaluddin and Waluyo 2010). All variables are seasonally adjusted using the X12 filter, with the exception of the interest rate and the exchange rate, and expressed in "gap" terms, defined as deviations from a Hodrick-Prescott time trend or a multivariate filter (see Benes and others, 2010) in the case of the output gap.

6. **The parameter estimates shed new insight into the monetary transmission mechanism in Indonesia, the role of domestic and global shocks, and the weights placed on inflation, the output gap, and the exchange rate in an open-economy Taylor-rule.** The model has four behavioral equations: (1) an aggregate demand or IS curve that relates

the level of real activity to expected and past real activity, the real interest rate, the real exchange rate, foreign demand, and financial conditions; (2) a price setting or Phillips curve that relates inflation to past and expected inflation, the output gap, and the exchange rate; (3) an uncovered interest parity condition for the exchange rate, with some allowance for backward looking expectations; and (4) an open-economy Taylor-rule for setting the policy interest rate as a function of the output gap, expected inflation, and the exchange rate.

(1) The aggregate demand equation and results are as follows:

$$ygap_t = \beta_{ld} ygap_{t+1} + \beta_{lag} ygap_{t-1} - \beta_{RRgap} RRgap_{t-1} + \beta_{Zgap} zgap_{t-1} + \beta_{RWygap} ygap_t^{RW} + \beta_{BL}\eta_t + \varepsilon_t^{ygap}$$

where $ygap$ is the output gap, *RRgap* the real interest rate gap, *zgap* the real exchange rate gap, $ygap^{RW}$ the output gap in the United States, η a measure of lending conditions based on the spread between market and policy rates,[2] and the, β a series of parameters attached to these variables, and ε^{ygap} an error term that captures other temporary exogenous demand shocks (details of the extension to the model to include lending conditions is in Appendix 1).

- Berg, Karam, and Laxton (2006) suggest that the value of β_{lag} will lie between 0.5 and 0.9, with a lower value for less advanced economies more susceptible to volatility. The coefficient of 0.47 for β_{lag} is comparable to other emerging markets. The lead of the output gap (β_{ld}) is typically small, between 0.05 and 0.2, and the estimated value for Indonesia is at the high end of that range. The parameter β_{RRgap} indicates the effectiveness of the monetary transmission mechanism, while β_{zgap} and β_{RWygap} depend on the importance of the exchange rate channel and the degree of openness. The posterior estimates of β_{RRgap} and β_{zgap} suggest that the interest rate effect on aggregate demand is stronger than the exchange rate affect, possibly reflecting the importance of factors beyond the exchange rate for competitiveness (e.g., costs of doing business). However, lending conditions have a slightly (0.15) stronger influence on aggregate demand than policy do rates. The value for β_{RWygap} is 0.15, in line with BI ARIMBI model of Bathaluddin and Waluyo 2010.

Parameter	Prior	Posterior
β_{ld}	0.6	0.479
β_{lag}	0.2	0.183
β_{RRgap}	0.15	0.129
β_{Zgap}	0.05	0.038
β_{RWygap}	0.15	0.123
β_{BL}	0.15	0.145

(2) The Philips curve equation and results are as follows:

[2] The spread between the one-month SBI rate and the policy rate is used prior to June 2010 and the JIBOR one-month rate is used as a measure of market rates after June 2010.

$$\pi_t = \alpha_{\pi ld}\pi 4_{t+1} + (1-\alpha_{\pi ld})\pi 4_{t-1} + \alpha_{ygap} ygap_{t-1} + \alpha_{zgap}(z_t - z_{t-1}) + \varepsilon_t^{\pi}$$

where $\pi 4_{t+1}$ is the four-quarter ahead inflation rate (year/year), $\pi_t\ 4_{t-1}$ the four-quarter lagged inflation rate, *ygap* the output gap, $z_t - z_{t-1}$ the real depreciation, α the parameters, and ε_t^{π} an error term.

- The $\alpha_{\pi ld}$ parameter in the headline inflation equation determines the forward-looking component of inflation (while its inverse $1-\alpha_{\pi ld}$ determines the backward-looking component). The parameter value can be interpreted as depending in part on the credibility of the central bank and in part on institutional arrangements regarding wage indexation and other price-setting mechanisms. A high value of $\alpha_{\pi ld}$, close to 1, would suggest that small changes in monetary policy cause large changes in price expectations. The α_{ygap} parameter depends on the extent to which output responds to price changes and, conversely, how much inflation is influenced by real demand pressures, and is typically between 0.25–0.50. This parameter ultimately depends on the "sacrifice ratio" (the loss of output necessary to bring down inflation) and is estimated to be 0.25. The α_{zgap} parameter represents the short-term pass-through of (real) exchange rate movements into prices, and depends on trade openness, price competition, and monetary policy credibility. The exchange rate pass-through coefficient is estimated to be relatively high in the Indonesia.

Parameter	Prior	Posterior
$\alpha_{\pi ld}$	0.25	0.288
α_{ygap}	0.25	0.245
α_{zgap}	0.15	0.171

As an extension, the following equation for core inflation is added:

$$\pi_{c,t} = \alpha_{c,\pi ld}\pi 4_{c,t+1} + (1-\alpha_{c,\pi ld})\pi 4_{c,t-1} + \alpha_{c,ygap} ygap_{t-1} + \alpha_{c,zgap}(z_t - z_{t-1}) + \alpha_c(\pi 4_{t-1} - \pi 4_{c,t-1}) + \varepsilon_{c,t}^{\pi}$$

- where the term $(\pi 4_{t-1} - \pi 4_{c,t-1})$ has been added to the simple canonical inflation equation to allow for the possibility of relative price and real wage resistance (second-round effect); or more precisely that workers and other price setters may try to partially keep their prices from rising in pace with past movements in headline CPI. If the parameter α_c, is zero, commodity price shocks that raise headline inflation, for example, will have no effect on core inflation and may not necessitate an increase in interest rates. However, to the extent that higher commodity prices are an important input into the production costs of many consumer goods, or if workers resist the reduction in their real wages in response to an increase in headline inflation, there could be a role for headline inflation to play in monetary policy-making. The estimated coefficient of α_c of 0.49 is significant and should be taken into

Parameter	Prior	Posterior
α_c	0.4	0.494

account, although there are a number of reasons to target core inflation in an economy prone to commodity price swings like Indonesia (see IMF 2011).

(3) The uncovered interest parity equation and results are as follows:

$$z_t = \delta_z z_{t+1} + (1-\delta_z) z_{t-1} - [RR_t - RR_t^{RW} - \rho^*]/4 + \varepsilon_t^z$$

where z_t is the real exchange rate (an increase represents a depreciation), RR_t the real interest rate, RR_t^{RW} the U.S. real interest rate, $\rho*$ the historical average risk premium on the domestic currency, δ_z the smoothness parameter, and ε_t^z an error term. This equation, an uncovered interest rate parity condition, posits that the real exchange rate is a function of the expected real exchange rate (the first two terms), the real interest rate differential (the currency risk premium), and a disturbance term.

- The δ parameter in the real exchange rate equation determines the relative importance of forward- and backward-looking real exchange rate expectations. If δ is equal to 1, the exchange rate behaves as in the Dornbusch overshooting model (the real exchange rate is a function of the future sum of all real interest rate differentials). The estimated coefficient of 0.51 makes monetary policy potentially a more effective tool.

Parameter	Prior	Posterior
δ_z	0.6	0.509

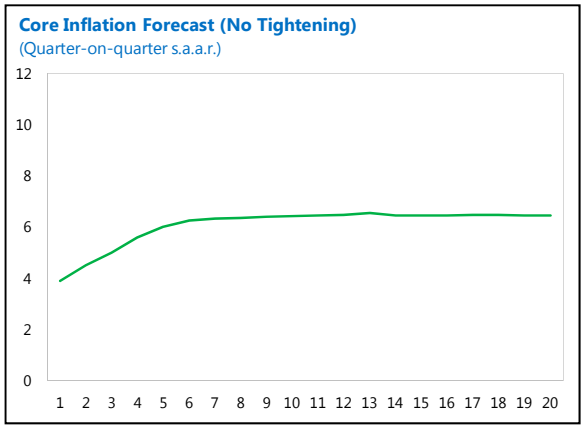
(4) The open-economy Taylor-rule and results are as follows:

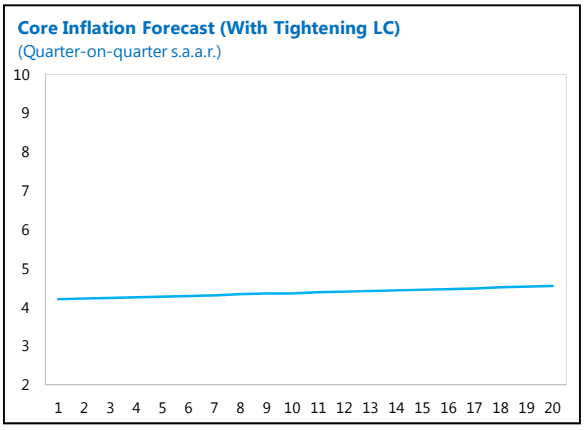
$$RS_t = \gamma_{RSlag} RS_{t-1} + (1-\gamma_{RSlag}) * \left(RR_t^* + \pi 4_t + \gamma_\pi \left[\pi 4_{t+4} - \pi_{t+4}^*\right] + \gamma_{ygap} ygap_t + \gamma_{zgap} zgap_t\right) + \varepsilon_t^{RS}$$

- The γ parameters in the monetary policy rule equation depend on the speed and extent to which the monetary authorities adjust the nominal interest rate, and the relative importance of the inflation target versus the real activity target. There is a significant degree of interest rate smoothing in Indonesia but BI does aggressively respond to inflation forecasts (expectations) above the targeted level. It is common for central banks to pay some attention to real activity even in a "pure" inflation targeting framework and, thus, for the γ_{ygap} coefficient to be greater than zero. This is borne out in the Indonesia data where the weight on real activity is comparable to other emerging markets. γ_{zgap} reflects the weight on the real exchange rate, which has been observed to be quite significant in emerging markets (see Stone and others, 2009). The estimated coefficient is low and indicates that BI does not appear to place weight on exchange rate developments in conducting monetary policy, although it may reflect the use of foreign exchange intervention to manage the exchange rate instead.

Parameter	Prior	Posterior
γ_{RSlag}	0.5	0.494
γ_π	1.5	1.509
γ_{ygap}	0.2	0.195
γ_{zgap}	0.05	0.011

7. **The model-based forecast suggests that in order for inflation to remain within BI's target range, lending conditions would need to be tightened over the next two years.** The analysis forecasts inflation and other real economy factors (such as the output gap) conditional on the WEO forecast for the U.S. economy, global inflation, and estimated distributions for stochastic shocks including supply-side factors in Indonesia. The simulations based on no tightening of lending conditions would result in core inflation exceeding the authorities' inflation target, while gradually moving market rates to the policy rate (i.e., closing the spread between them) would help keep core inflation within the target range with broadly unchanged policy rates. The exact magnitudes of the estimated impact have significant uncertainties around them, as they depend on exact model specification, but the direction of change is likely to be instructive.





B. Conclusion

8. **The model estimates shed other important insights for monetary policy making.** The Bayesian estimates show that the impact of lending conditions on the output gap is 0.15 compared to a coefficient of 0.13 for the policy rate. Thus, evaluating the monetary stance and inflation forecast without taking into account lending conditions could potentially lead to overshooting the inflation target if lending conditions are accommodative. Importantly, however, the model forecasts suggest that inflation could be kept within target by tightening lending conditions (raising market rates to the policy rate) without hiking policy rates. In addition, there are significant second-round effects, with a 1 percentage point increase in the difference in headline from core inflation leading to a 0.45 percentage point increase in core inflation. Therefore, changes to administered fuel prices that have not kept up with global prices can be another source of inflation pressure that may require a policy response.

REFERENCES

Anand, R., D. Ding, and Shanaka J. Peiris, 2011 "Towards Inflation Targeting in Sri Lanka" IMF Working Paper No. 11/81 (Washington: International Monetary Fund).

Beneš, Jaromír, Kevin Clinton, Roberto Garcia-Saltos, Marianne P. Johnson, Douglas Laxton, Peter B. Manchev, and Troy Matheson, 2010, "Estimating Potential Output with a Multivariate Filter" IMF Working Papers 10/185.

Berg, A., P. Karam, and D. Laxton, 2006, Practical Model-Based Monetary Policy Analysis: A How-to Guide," IMF Working Paper 06/081 (Washington: International Monetary Fund).

Carabenciov, I., I. Ermolaev, C. Freedman, M. Juillard, O. Kamenik, D. Korsunmov, and D. Laxton, 2008, "A Small Multi-Country Global Projection Model with Financial-Real Linkages and Oil Prices," IMF Working Paper No. 08/280 (Washington: International Monetary Fund).

Harmanta, Barik Bathaluddin, and Jati Waluyo, 2010, "Inflation Targeting Under Imperfect Credibility: Lessons from Indonesia," presentation at the Central Banking Macroeconomic Modeling Workshop (October 19–20, 2011, BSP Manila).

International Monetary Fund, 2011, *World Economic Outlook, October 2011: Commodity Prices Swings and Monetary Policy*, World Economic and Financial Surveys (Washington).

Laxton, Douglas, David Rose, and Alasdair M. Scott, 2009, "Developing a Structured Forecasting and Policy Analysis System to Support Inflation-Forecast Targeting (IFT)," IMF Working Paper No. 09/65 (Washington: International Monetary Fund).

Stone, M., S. Roger, S. Shimizu, A. Nordstrom, J. Restrepo, 2009 "The Role of the Exchange Rate in Inflation-targeting Emerging Economies" IMF Occasional Paper 267 (Washington: International Monetary Fund).

APPENDIX

This chapter extends the workhorse model of Berg, Karam, and Laxton (2006) to better capture macrofinancial and global linkages:

- The global financial crisis and great recession have highlighted how financial developments can affect the real economy, particularly through "financial accelerator" effects. Given the dominance of banks in Indonesia, the analysis focuses on bank lending conditions, as in Carabenciov and others (2008). Bank lending (*BL*) is a function of *BL** (defined as the equilibrium level of *BL)*, the real interest rate gap, and banks' expectation of the economy four quarters ahead. The output gap is explained by the same variables as in equation (1) above as well as by a distributed lag of ε_t^{BL}. The values of the coefficients imposed on the distributed lag of ε_t^{BL} are intended to react to a pattern in which an increase of ε_t^{BL}(a loosening of credit conditions) is expected to positively affect spending by firms and households in a hump-shaped fashion, with an initial buildup and then a gradual rundown of the effects as in Carabenciov and others (2008). The specification in this case is:

  where η is the distributed lag of ε_t^{BL} and is calculated as:

$$BL_t = BL^* + \chi_{ygap} ygap_{t+4} + \varepsilon_t^{BL}$$

$$\eta_t = 0.04\varepsilon_{t-1}^{BLT} + 0.08\varepsilon_{t-2}^{BLT} + 0.12\varepsilon_{t-3}^{BLT} + 0.16\varepsilon_{t-4}^{BLT} + 0.20\varepsilon_{t-5}^{BLT} + 0.16\varepsilon_{t-6}^{BLT} + 0.12\varepsilon_{t-7}^{BLT} + 0.08\varepsilon_{t-8}^{BLT} + 0.04\varepsilon_{t-9}^{BLT}$$

- Global linkages are modeled as a two-country small open economy version of the GPM (United States and Indonesia) instead treating the global factors as purely exogenous (AR process) in order to incorporate agents expectations about the global economy such as the large negative output gap in the United States and thus the Federal Reserves' policy intention to maintain interest rates near-zero until 2014, that is likely to have an important bearing on emerging markets like Indonesia.

II. WHAT DETERMINES INVESTMENT IN INDONESIA?[1]

Rising investment has become a key driver of Indonesia's recent robust growth and its continuation is important to sustain growth going forward. This raises the following question: What macroeconomic policy-related variables are important for determining investment? While attention generally and rightly focuses on the levels of the macroeconomic variables, regression results suggest that reducing the volatility of interest and real exchange rates, as well as capital markets deepening, may also be important factors for policy makers to take into account.

A. Introduction

1. **Promoting investment is key to achieving the growth target in Indonesia's Master Plan.** The economic Master Plan, unveiled in 2011, targets a growth rate of 7−8 percent after 2013 and aims to transform Indonesia into one of the world's largest economies by 2025. Achieving this growth rate, however, would require substantial enhancements in capital and efficiency.[2]

2. **Recent investment performance is strong but there exists room for improvement.** After collapsing in the late 1990s, the investment-to-GDP ratio recovered very sluggishly, and has only recently regained earlier levels. Strong recent investment has focused on the booming commodities sector and is driven by favorable terms of trade. Infrastructure needs, however, remain pressing with the overall public investment ratio among the lowest in the region. To achieve Indonesia's long-term growth objectives outlined in the economic Master Plan, high investment needs to be sustained. Furthermore, putting in place the necessary infrastructure, which is cited as one of the main growth constraints for Indonesia in numerous business surveys, calls for substantially boosting public investment from the current low levels.

3. **This chapter examines the main determents of Indonesia's investment.** Empirical results from aggregate and firm level data show that not only the levels of various macroeconomic variables matter, but also that their volatility affects investment. In other words, it is not only the means that matter but also the standard deviations. Our analysis also suggests that enhancing monetary policy to reduce uncertainty, improving the business environment, enhancing financial access, and developing infrastructure could all support investment.

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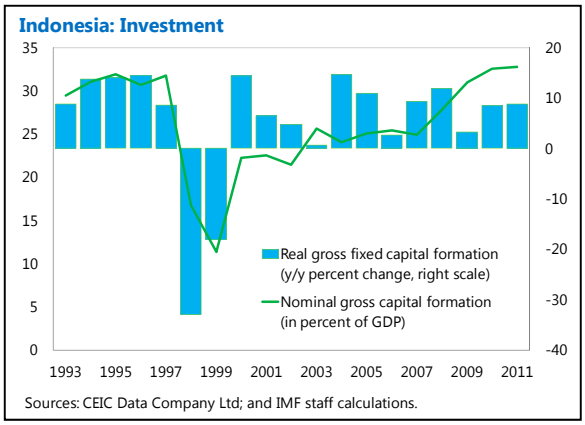
[1] Prepared by Yong Sarah Zhou and Dulani Seneviratne.

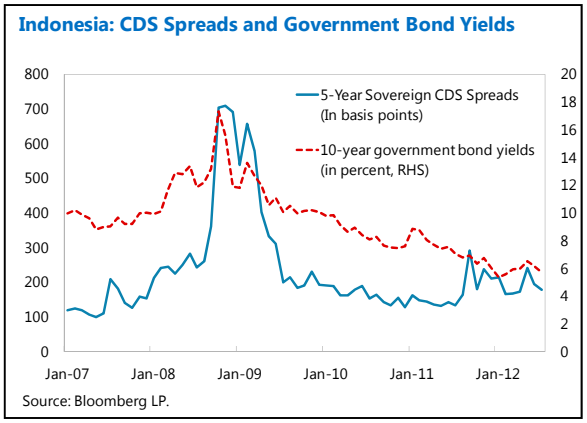
[2] Zhou (2011).

B. Some Stylized Facts

4. **Indonesia has experienced a sizable increase in investment in recent years.** Investment collapsed during the late 1990s and only started recovering very recently, with aggregate investment reaching the pre-crisis 30 percent of GDP in 2008. However, with public investment remaining very low, this increase reflects a sharp increase in private investment.



5. **Lower cost of capital, thanks to the prudent and stable macroeconomic environment, has helped support the rapid investment growth.** Indonesia's cost of capital is on a structural decline, with the prudent and stable macroeconomic environment leading to lower inflation and an improved credit rating.[3] As a result, the credit default swap (CDS) and long-term government bond yield spreads have been falling, and Indonesia's real lending rate has also declined remarkably—dropping by over 4 percentage points between 2000–04 and 2005–11. At the same time, the improved public finances have allowed the government to increase the absolute magnitude of investment, even if as a share of GDP public investment remains very low.



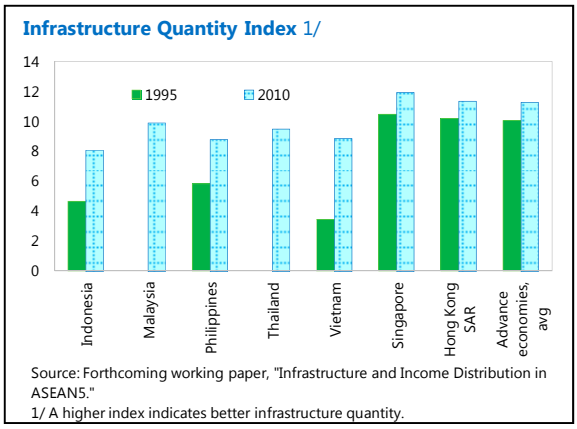
6. **Strong regional demand for commodities has driven up commodity prices and spurred investment in these sectors.**[4] Despite some correction during the global crisis, Indonesia enjoyed a sizable gain in its terms of trade (TOT) in the past decade. Moreover, Indonesia's export destinations have shifted from slow growing advanced economies to fast-growing emerging market economies like China and other emerging Asian countries. Strong demand for commodities, especially from China, has driven up global commodity prices and spurred investment in Indonesia in these sectors. For example, the mining sector in Indonesia accounted for over 13 percent of the total investment in 2010–11, while the share was only 1 percent a decade ago. Similarly, investment in food crops and plantations (sources of

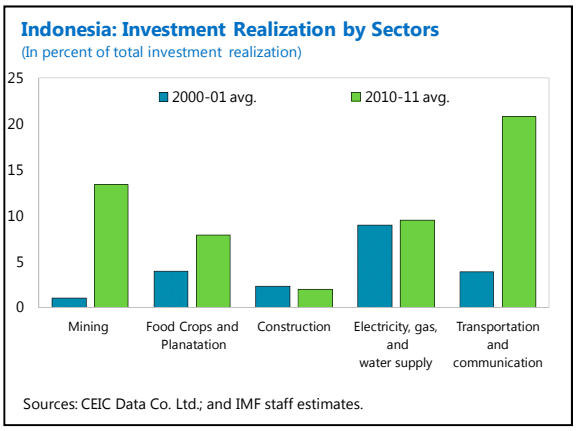
[3] Both Fitch and Standard & Poor's are now rating Indonesia as investment grade. And Moody's is rating Indonesia one notch below investment grade but with positive outlook.

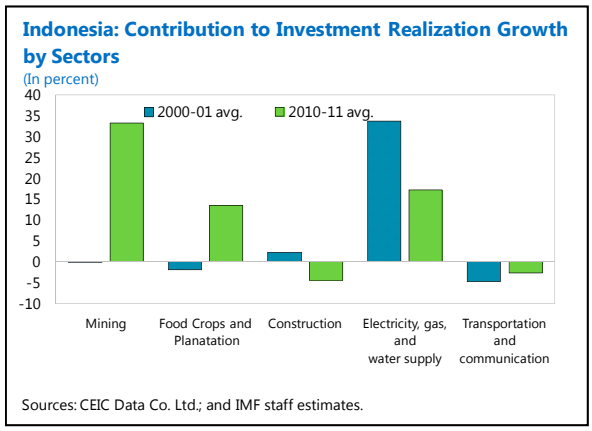
[4] See Chapter III of this selected issues paper (SIP) and Zhou (2011) on Indonesia's potential growth.

rubber and palm oil), also more than doubled during the same period. In fact, mining and plantation together have contributed on average around 47 percent of the total investment growth during 2010–11.

7. **Infrastructure investment, however, remains relatively subdued**, **leading to inadequate infrastructure indicators compared to regional peers.** Despite notable improvements, Indonesia's roads and railroads remain in poor condition, and the capacity of seaports remains limited.[5] In the latest World Economic Forum global competitiveness index (GCI) (2010−11), Indonesia ranks 82 out of 139 economies in infrastructure.[6] An index of basic infrastructure quantity—capturing information in three key sectors: communication, power, and the road network—shows that Indonesia continues to lag regionally in infrastructure.[7] Looked at another way, when one considers construction, electricity, water and gas (EWG), and transportation and communication, only the share of the last in total investment has increased during the past decade. Investment share in EWG has remained steady between the two periods of 2000–01 and 2010–11, while investment share in construction actually decreased, from the original low level. As a result, the total share of investment in the three sectors (construction, EWG, and transportation and communication) has declined from around one-third in 2000–01 to only 10 percent in 2010–11.





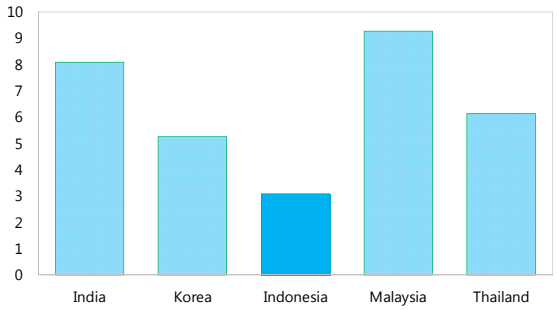


[5] Geiger (2011).

[6] It is well behind more advanced ASEAN members Singapore (5), Malaysia (30), and Thailand (35), and also behind China (50) and India (62). (World Bank, 2011).

[7] Sun and Seneviratne (forthcoming).

8. **Furthermore, public investment is low and progress with public private partnership (PPP) to promote infrastructure investment has been slow.** Public capital spending, which collapsed during 1998–99, has only recovered partially and is currently at about 3 percent of GDP— among the lowest in the region. While increasing in absolute terms, only 80 percent of the budgeted amount was executed in 2011, with about half disbursed only in the last two months of the year. The government has taken several recent steps to improve the implementation of infrastructure projects. A new procurement regulation has been adopted and budget preparation and payment processes streamlined. However, the PPP program is being held back by weaknesses in project selection and preparation, especially at the local government level. Recent success with a specific project that can serve as a model for others, however, augurs well going forward.



Source: IMF, *World Economic Outlook* database; and IMF staff calculations.
1/ Average pulic gross fix capital formation over 2008–2011.

C. Determinants of Investment

Aggregate trend

9. **The accelerator model from the economic literature combined with the neo-classical theory of investment can be used to estimate long run investment trends.** The accelerator model assumes that investment depends on real GDP and its growth. Neoclassical theory shows that, in the long-run equilibrium, there is a stable relationship between an economy's capital stock, the level of real output and the real user cost of capital. Investment is therefore modeled[8] as a function of: (i) its own lagged value to capture persistence; (ii) lagged GDP value for accelerator effect; (iii) GDP growth as a proxy for the aggregate return on investment; and (iv) the real lending rate as the cost of capital.

Long-Run Aggregate Investment Equation 1/
(Dependant variable of natural logarithm of real investment growth)

	Coefficient	Standard Error
Log real Investment (lag 1)	0.685***	0.055
Log real GDP (lag 1)	0.464***	0.079
Δ(Log real GDP)	1.133***	0.221
Real lending rate (lag 1)	0.002***	0.000
Constant	-2.435***	0.430
Adjusted R-squared	0.99	...
Durbin-Watson stat	2.03	...

Source: IMF staff estimates.

1/ An * indicates significance at 10 percent, ** significant at 5 percent, and *** at 1 percent. All explanatory variables are in natural logarithm except for the base lending rate. The equation is estimated by OLS.

10. **Long-run results.** Using quarterly data over the period 1993–2011, our analysis identifies the following key relationships for Indonesia:

- The investment growth is positively associated with real

[8] Guimaraes and Unteroberdoerster (2006) have used a similar method to estimate the determinants of long run private investment for Malaysia.

GDP growth. During 2000–11, average real GDP growth in Indonesia accelerated, driving up investment growth by 8 percentage points on average.

- The real lending rate is positively correlated with investment. This appears counterintuitive, but is not surprising for developing countries with shallow financial markets. In the absence of sufficient financial deepening, high interest rates could drive up savings necessary to finance higher investment. The other reason may be that strong investment demand surpasses investment supply and therefore drives up the equilibrium interest rate.

11. **We use an Error Correction Model with quarterly data from 2001−11 to capture short term investment dynamics.**[9] After identifying the long run relationship between investment and growth; short run investment growth is then regressed on past investment growth, past GDP growth, the error correction term (deviation from the long-run equilibrium), interest rate volatility, real exchange rate volatility, terms of trade growth, real lending rate, real exchange rate growth and a crisis dummy to exclude the impact on investment from crises.

12. **Short run results.** The main results for different specifications are summarized below.

Short-Run Aggregate Investment Equation 1/
(Dependant variable of natural logarithm of real investment growth)

	Model 1	Model 1 (2005–11)	Model 2	Model 3	Model 4	Model 5	Model 6
Real Investment growth (lag 1)	0.749***	-0.121	0.775***	0.690**	0.738***	0.717**	0.762***
	(0.26)	(0.341)	(0.261)	(0.299)	(0.258)	(0.296)	(0.264)
Error correction term	-0.845***	0.184	-0.877***	-0.804***	-0.875***	-0.823***	-0.838***
	(0.272)	(0.345)	(0.274)	(0.293)	(0.27)	(0.292)	(0.275)
Interest rate volatility	-0.055**	-0.096***	-0.05**	-0.054**	-0.049**	-0.055**	-0.054**
	(0.02)	(0.022)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Real lending rate (lag 1)	-0.002**	0.000	-0.002**	-0.002*	-0.002*	-0.002*	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
REER volatility	-0.004**	-0.001	-0.003*	-0.004**	-0.003	-0.004***	-0.004*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Terms of trade growth	0.004*	0.001	0.005*	0.004	0.003	0.004	0.004*
	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)
VIX			-0.000				
			(0.000)				
Base lending rate volatility				-0.003			
				(0.008)			
REER appreciation					-0.093		
					(0.070)		
Credit growth						0.023	
						(0.096)	
Market capitalization growth							0.015
							(0.026)
Constant	0.032***	0.029***	0.038***	0.033***	0.031***	0.032***	0.031***
	(0.009)	(0.008)	(0.011)	(0.010)	(0.009)	(0.010)	(0.010)
Adjusted R-squared	0.44	0.65	0.44	0.42	0.45	0.42	0.43
Durbin-Watson stat	1.73	1.97	1.71	1.68	1.63	1.72	1.69

Source: IMF staff estimates.
1/ Standard errors are in parentheses. An * indicates significance at 10 percent, ** significant at 5 percent, and *** at 1 percent. The equations are estimated as error correction models.

[9] Descriptions of the model and the detailed path of variables will be included in a forthcoming working paper and are available from the author by request.

- Despite its long run one-to-one impact on investment, output growth is not related robustly to the short run investment growth. This is as expected since short-term investment is normally more volatile than output because of the importance of expectations and confidence. The negative adjustment coefficient on the error correction term in most model specifications, however, suggests that investment tends to return to its long run relationship to output growth.

- The real lending rate has a statistically significant impact on investment growth in the short run, with 1 percent lower real interest rate leading to 0.2 percent decline of investment growth. The recent prudent macro environment, which has helped to reduce the cost of capital, has contributed to around 39 percent of investment growth.

Economic Contribution from the Variation in Independent Variables to Investment Growth 1/
(In percent)

	2000–11	2000–04	2005–11
Interest rate volatility	-34.47	-25.02	-49.77
Real lending rate	-37.19	-27.86	-38.96
REER volatility	-24.95	-22.34	-29.29
Terms of trade growth	20.65	13.00	31.19
Memorandum item:			
Mean investment growth	1.88	1.86	1.89

Source: IMF staff estimates.

1/ Estimated based on the standard deviations of independent variables and mean investment growth rate over the period.

- Interest rate volatility has the single biggest short-run impact on investment growth. It is statistically significant and negative in all specifications. The measured coefficient, which almost doubles after 2005, implies that the detrimental effects of uncertainty appear more pronounced in the more recent period.

- REER volatility, which captures direct investment risk as well as the overall role of macroeconomic stability, is negative and statistically significant as a determinant of investment growth.

- Terms of trade gains are the biggest driving factor behind the recent robust investment growth, contributing about one-third of the total recent investment growth. Despite some correction during the global crisis, Indonesia enjoyed a sizable gain in its TOT (of an average about 3 percent over 2007−11). The favorable TOT developments have clearly driven up investment, especially in the commodity sector, which is also apparent in the BOP data (see Chapter III).

13. **The effects of interest rate and real exchange rate volatility on investment are robust when adding other controls.** Model 2-6 suggests that both VIX and lending volatility affect investment negatively, but the impact is not statistically significant. The insignificant impact also applies to real credit and market capitalization growth, despite the fact that both variables are positively associated with investment growth.

Corporate investment

14. **We use firm-level panel data on listed companies from the Worldscope database to estimate the standard neoclassical investment model.** This relates current investment to expectations of future profitability through Tobin's Q ratio,[10] and is augmented by additional variables including: (i) liquidity, which measures the internal funds available to finance investment projects and is typically used in the literature as a proxy for financing constraints; (ii) leverage as a proxy for the effect of financial structure on investment; and (iii) interest rate volatility to capture the potential negative impact of uncertainty[11] on investment (Box 1).

Estimation of Firm-Level Investment Function 1/ 2/ 3/ 4/

	Expected Profitability	Liquidity	Leverage	Interest Rate Volatility	Lagged Investment Rate
All nonfinancial firms					
1990–10	1.726***	0.104**	-0.102***	-0.001*	0.274***
2005–10	1.939***	0.079**	-0.085***	-0.010**	0.280***
Manufacturing firms					
1990–10	1.008**	0.062	-0.090***	-0.001*	0.261***
2005–10	0.786*	0.045	-0.085***	-0.010	0.272***
Services firms					
1990–10	3.626*	0.192**	-0.058	-0.002	0.452***
2005–10	4.715**	0.099**	-0.058*	-0.012	0.420***
Small firms					
1990–10	1.976**	0.135***	-0.101***	-0.002***	0.199***
2005–10	4.315***	0.066	-0.101***	-0.010	0.123**
Large firms					
1990–10	0.41	0.199***	-0.077***	-0.002***	0.404***
2005–10	0.368	0.148***	-0.052*	-0.033***	0.375***

Source: IMF staff estimates.

1/ Two-step robust Arellano and Bond GMM estimates.
2/ An * indicates significance at 10 percent, ** significant at 5 percent, and *** at 1 percent.
3/ Instruments are second and third period lags of Tobin's Q, liquidity, leverage, and the investment rate.
4/ Year dummies are included in the estimation, but not reported here.

15. **Estimation results show that there are strong links between investment and fundamentals, although the significance and magnitude of links vary based on time and firm characteristics.** In the corporate sector, balance sheets and profits strengthened considerably, leverage declined and profits are high. All of this has contributed to recent high investment growth. Increased interest rate volatility and financing constraints, on the other hand, have hindered recent investment, particularly for large firms.

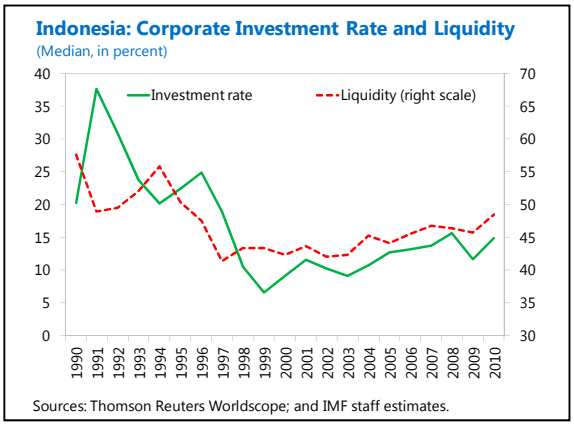
- The results of the main model confirm that the profitability expectations, positive and mostly significant, are crucial in sustaining higher investment rates. Profitability expectations are more important for investment in the services sector and small firms, as evident from the much larger coefficients to investment growth.

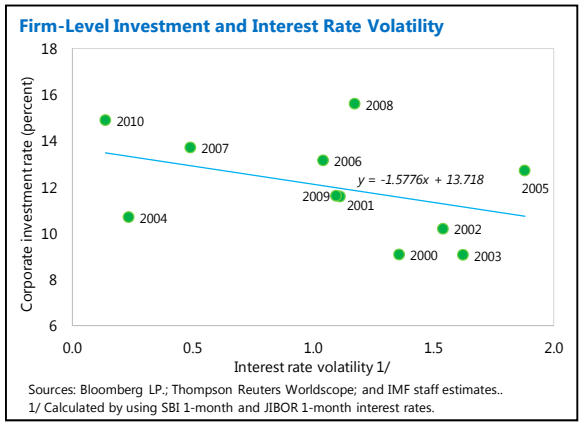
[10] Defined as the ratio of the stock market value of the firm to the replacement cost of its capital stock.

[11] Recent microeconomic theory emphasizes the role of uncertainty on investment (Dixit and Pindyck, 1994).

- Liquidity is positively associated with investment and significant in all samples, suggesting that firms may be financially constrained in exercising their investment decisions. The model suggests liquidity is more important for larger firms.

- Leverage is significant at 1 percent with a negative coefficient, implying that higher debt-to-assets ratio would impede investment. The leverage coefficients of smaller and manufacturing firms are much larger and significant, implying that greater access to debt by those firms could also lead to negative implications if debt accumulation increases thus ultimately offsetting the benefit of lax liquidity constraints.





- Moreover, high market volatility acts as an impediment to investment as suggested by the negative coefficient of the interest rate volatility measure. This is also evident from the historical volatility and investment trends. Specifically post-2004, volatility has become a more crucial factor for investment. Although interest rate volatility is of equal importance for small and large firms, it is more significant for larger firms.

Economic Contribution from the Variation in Independent Variables to Investment Growth, 2005–10 1/

(In percent)

	Full Sample	Small Firms	Large Firms	Manufacturing Firms	Services Firms
Expected profitability	20.60	63.52	3.13	53.83	30.40
Liquidity	14.09	18.31	18.49	13.22	14.51
Leverage	-15.92	-29.21	-6.93	-22.86	-7.60
Interest rate volatility	-4.07	-5.61	-10.59	-4.73	-3.56
Memorandum item:					
Median investment rate, 2005–10	13.2	9.3	16.8	11.1	18.2

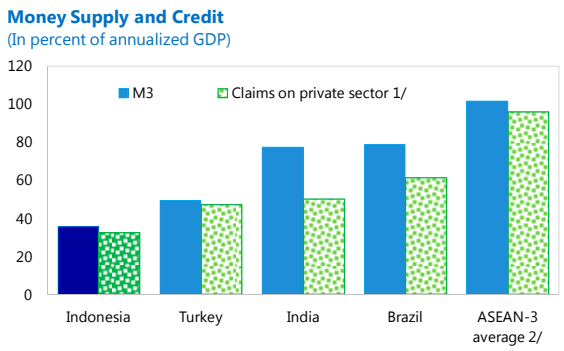
Source: IMF staff estimates.

1/ Estimated based on the standard deviations of firm-level data for independent variables and median investment rate.

D. Policy Implications

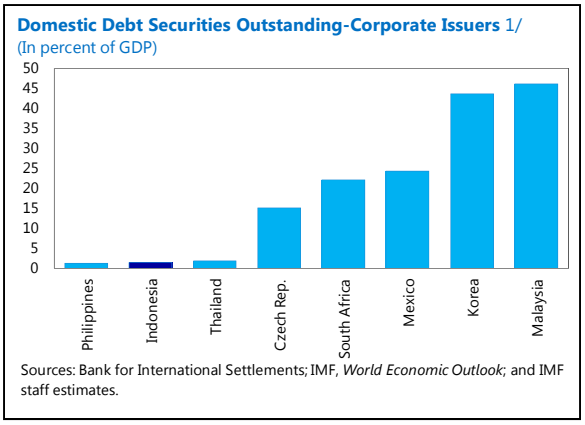
16. **The sensitivity of investment to interest rate and exchange rate volatility reinforces the benefits of certainty and predictability of the monetary policy framework.** The empirical results suggest that investment decisions can be affected by uncertainty of the environment concerning interest rate and exchange rate policy. To the extent that the Bank Indonesia can effectively communicate its policy objectives, it would help guide market expectations better and hence reduce interest and exchange rate volatility.

17. **Deepening financial markets is crucial to strengthen investment.** Indonesia's banking sector is far smaller than in other emerging markets, which may reflect, in part, the continued aversion to debt since the 1998 financial crisis. The insignificance of credit and significance of cash flow for investment imply that most firms, especially in the dynamic resource extraction sector, choose to finance investment through retained earnings. Financial deepening will be key to mobilizing domestic savings to fund both private and public investment.

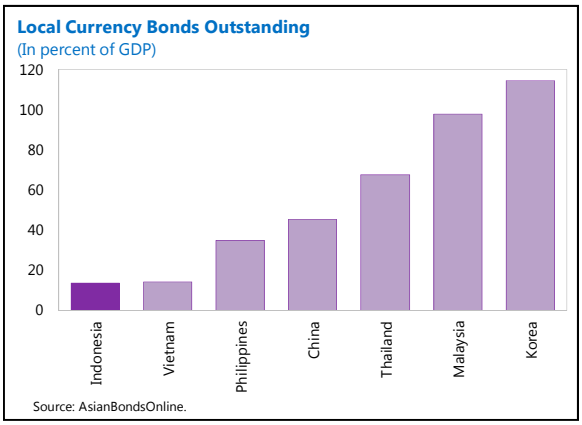


Sources: CEIC Data Co. Ltd.; IMF, Integrated Monetary Database; and IMF staff estimates.
1/ Claims on private sector credit at Financial Corporations Survey level.
2/ Includes Malaysia, Thailand, and the Philippines.

18. **Promoting financial sector development, especially encouraging bond market development, would help open up additional channels for funding.** The authorities' growth model relies on private investment for a significant part of infrastructure creation, to which the current bank-centric financial market structure is ill-suited. That large firms—exactly the types to engage in risky long-term investment—appear credit constrained suggests that it is not ample liquidity provision by banks at low interest rate that matters for investment, but rather the financing model itself. Specifically, it calls for the development of a corporate bond market, which is extremely small, thin, and illiquid in Indonesia.



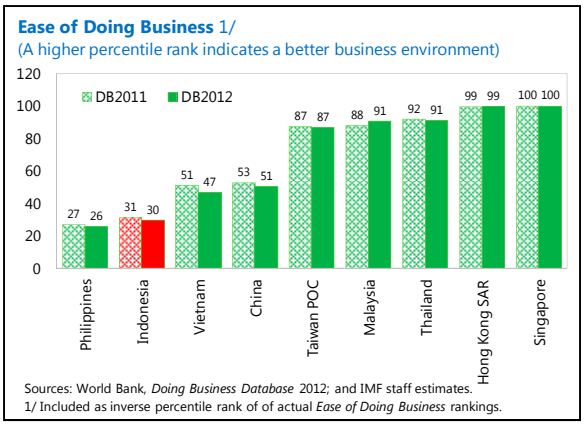
Sources: Bank for International Settlements; IMF, *World Economic Outlook*; and IMF staff estimates.



Source: AsianBondsOnline.

19. **Fiscal reforms to increase capital investment and the stock of infrastructure remain a priority.** The PPP program could be improved by strengthening project selection and preparation, especially at the local government level. As regards purely private infrastructure investment, a critical constraint is land. The recently approved land acquisition law could be an important means for unlocking this bottleneck once all the related implementing regulations are finalized.

20. **While progress has been made, there exists scope to further improve the business environment.** Indonesia does relatively poorly in the ease of doing business[12] and the rigidity of employment is high. These inhibit investment and employment creation in the formal sector, especially for new labor force entrants. Further business climate reforms could help boost FDI and domestic investment and raise potential GDP growth. Surveys suggest that a streamlined process for business creation, greater labor market flexibility, and improved legal and regulatory framework for entrepreneurs and bankruptcy would reduce risk perceptions. Persistent labor market rigidities could make it more difficult and expensive for companies to manage the workforce, constraining the manufacturing sector.



E. Conclusion

21. **The recent rapid investment growth has been driven by the booming commodity sector, but investment in infrastructure remains lagging.** Indonesia has benefited from demand for commodities from major emerging markets, which has driven up global commodity prices and spurred investment in those sectors in Indonesia. Infrastructure investment—and public investment more generally—however, remain low, with infrastructure bottlenecks identified as pressing issues in the global competiveness ranking.

22. **At the aggregate level, investment in Indonesia is negatively correlated with interest rate volatility, exchange rate volatility, and the real lending rate, while it is positively correlated with improvements in the terms of trade.** Prudent macroeconomic policies over the past decade have reduced the cost of capital and the recent high investment growth is being supported by strong regional demand for commodities, which has, in turn, strengthened Indonesia's TOT. On the other hand, continued volatility of real exchange and interest rates has hurt investment. Importantly, interest rate volatility is becoming an

[12] There was a slight drop in Indonesia's ranking in the *2011 Doing Business Report* from 115 in 2010 to 121 in 2011.

increasingly important factor in affecting investment, as indicated by the doubling of the magnitude of the coefficient in regression estimates for the post-2005 period.

23. **Firm level estimation results confirm the important role interest rate volatility plays in firms' investment decisions and also point to the importance of continued financial market deepening and development.** Our analysis suggests that overall investment is negatively affected by interest rate volatility (reinforcing the benefits of focusing on monetary stability) and insufficient financial market deepening (which is again affected by the monetary policy framework).Regression equations with firm-level data show that interest rate volatility negatively affects investment, and similar to the macroeconomic level data results, the responsiveness of investment decisions to interest rate volatility has increased significantly in the more recent sample period. Finally, firms' investment decisions are highly affected by their internal cash positions, especially for large firms.

Box 1. Estimation Model of the Corporate Investment in Indonesia

Determinants of corporate investment in Indonesia are estimated using the standard neo-classical investment model. Preliminary data are obtained from Thompson Reuters Worldscope database, which covers over 400 listed firms in Indonesia for the years 1990–2010. We have further refined the sample by excluding firms in the financial services sector based on the GICS industry classification system. The majority of listed nonfinancial firms in Indonesia are in the consumer discretionary, industrial, materials, and consumer staples sectors. Firm-level sub-industry models are estimated by further collapsing GICS sectors into three broad sectors: manufacturing, services, and IT. Finally, separate models are estimated based on a more recent period (2005–10) sample. The main sample is also divided into two subsamples, small and large, based on sales size compared to the median.

The model is estimated by modeling the relationship between the current corporate investment rate and expected profitability along with a vector of other related variables. The model can be expressed as follows:

$$\Delta\left(\frac{I}{K}\right)_{it} = c_t + b\Delta Q_{it} + \gamma\Delta Z_{it} + \Delta\varepsilon_{it}$$

In the above equation, I/K denotes the investment rate, calculated as capital expenditure over plant, property, and equipment. Furthermore, Q stands for Tobin's Q, which is introduced as a proxy for expected profitability. Tobin's Q is calculated as the market value of equity plus the book value of debt over book value of total assets. The vector of additional factors includes leverage, liquidity, and interest rate volatility variables. Leverage is estimated using the debt-to-total assets ratio, while liquidity is estimated by the ratio of liquid assets to capital. Interest rate volatility is estimated as the standard deviation of the SBI rate, gap-filled with JIBOR to obtain a longer series.

The models are estimated as first-differenced Arellano-Bond dynamic panel data models with GMM instruments.[1] This method (xtabond2) is widely used to estimate neo-classical investment models using micro-level data. This approach further allows the capture of endogeneity and to estimate a more efficient long run model by eliminating individual effects through first differencing and introducing more robust instruments for the IV estimation. Second and third period lags of the dependant variable, profitability, leverage, and liquidity are included as instruments; the validity of these instruments is confirmed in all models using the Hansen J test. Furthermore, first-differenced lagged dependant variables included in the models contain no second-order serial correlation.

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[1] The dynamic panel data models with GMM instruments were chosen over several other techniques including fixed effects, OLS, and first-differenced models. Random effects model was rejected by the Hausman test at 95 percent confidence interval.

REFERENCES

Dixit, Avinash K., and Robert S. Pindyck, 1994, Investment under Uncertainty (Princeton, New Jersey: Princeton University Press).

Fazzari, S., R. Hubbard, and B. Petersen, 1988, "Financing Constraints and Corporate Investment," Brookings Papers on Economic Activity, Vol. 1, No. 1, pp. 196−120 (Washington: Brookings Institution).

Geiger, Thierry, 2011, The Indonesia Competitiveness Report 2011, World Economic Forum, June 2011. Available via the Internet: http://www.weforum.org/reports/indonesia-competitiveness-report-2011.

Guimaraes, Roberto, and Olaf Unteroberdoerster, 2006, "What's Driving Private Investment in Malaysia? Aggregate Trends and Firm-Level Evidence," IMF Working Paper No. 06/190 (Washington: International Monetary Fund).

Hayashi, F., 1982, "Tobin's Marginal q and Average q: A Neoclassical Interpretation," *Econometrica*, Vol.50, pp. 213–224.

Hubbard, R. Glenn, 1998, "Capital-Market Imperfections and Investment," *Journal of Economic Literature*, Vol. 36, No. 1, pp. 193−225.

Sun, Yan and Dulani Seneviratne (forthcoming working paper), "Infrastructure and Income Distribution in ASEAN 5" (Washington: International Monetary Fund).

World Bank, 2011, *Doing Business*. available via the Internet: http://www.doingbusiness.org/reports/global-reports/doing-business-2011/ (Washington: World Bank).

World Economic Forum, 2010, The Global Competitiveness Report, 2010−12, available via the Internet: http://gcr.weforum.org/gcr2011/.

Zhou, Yong Sarah, 2011, *Indonesia—Selected Issues,* "Estimating Indonesia's Potential Growth Rate," Chapter I (Washington: International Monetary Fund).

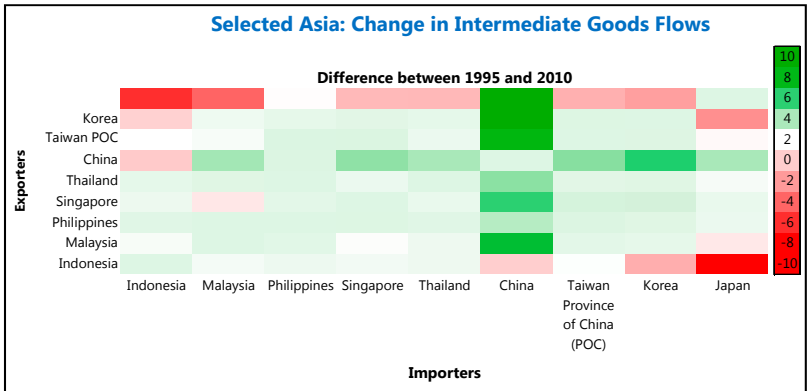
Zhou, Yong Sarah (forthcoming working paper), "Asia's Investment Puzzle: A Tale of Two Sectors," (Washington: International Monetary Fund).

III. China's Growth Pattern: Implications for Indonesia[1]

China's rapid growth in recent years has contributed to changes in global trade patterns as well as global commodity demand. China has become an important part of the global supply chain in many manufacturing goods such as electronics (see IMF, 2012a, and IMF, 2011, for example). Moreover, strong domestic growth in China, together with its shift in composition toward investment, has played an important role in the global commodity boom, affecting both price and volume, as well as capital goods imports. This chapter considers the implications for Indonesia.

A. Context

1. **While others in the Asian region have benefited more from vertical integration in manufacturing with China, Indonesia has emerged as the top regional resource supplier.** Indonesia has not become a significant part of the regional Asian manufacturing chains, which involve the more advanced economies of Japan, Korea, and Taiwan Province of China and, to a lesser extent, the other ASEAN countries. This, for example, is evident in the increases in intermediate goods trade between these economies and China. The more advanced Asian countries have also experienced a boost in their capital goods exports to China. In contrast, Indonesia has responded to rapid growth in China by positioning itself as one of the main suppliers of commodities in the region.



Sources: Institute of Development Economics, Japan External Trade Research Organization, *Asian Input Output Tables* , 2000; United Nations, *Comtrade* database; and IMF staff calculations.

2. **A slowdown in China could have significant implications for the Asian region, including Indonesia.**[2] A slower rate of growth in China could translate to a more sluggish demand for commodities, implying lower world market prices and slower pace of export volume growth. Over the medium term, China's rebalancing of growth away from investment toward consumption could also have significant implications on the composition of Chinese import demands, and hence Indonesian exports. This chapter examines (i) how the rise of China has impacted Indonesia so far; and (ii) the implications, going forward, for Indonesia of any changes in China's growth.

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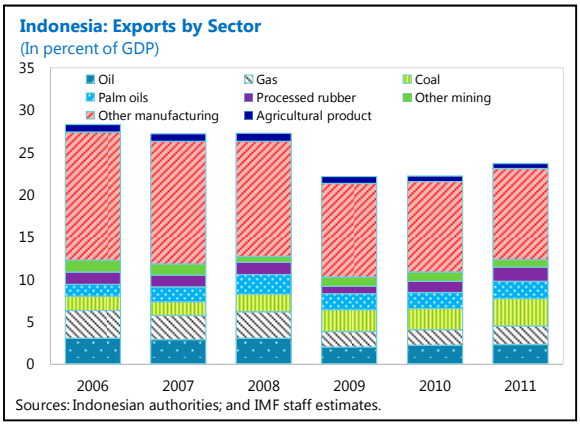
[1] Prepared by Mali Chivakul.

[2] IMF (2012b), for example, projects China's growth at 8 percent in 2012 and an average of 8.5 percent growth in the next five years compared with an average of 10.5 percent growth from 2006–11.

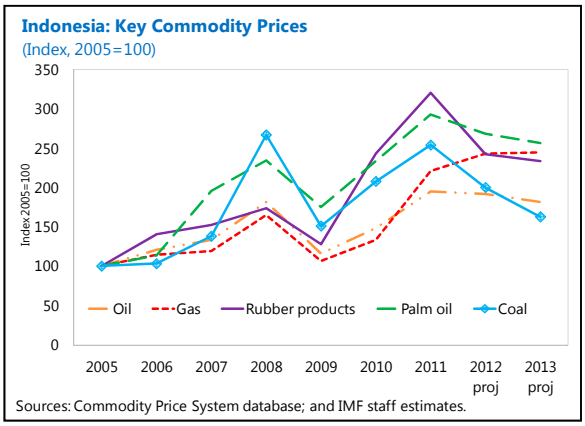
B. Indonesia's Major Commodity Exports and the China Factor

3. **China's rapid growth in recent years has contributed to robust demand for raw materials.** In reflection of the rapid expansion of Chinese exports and investment, the growth of China's commodity consumption has been very high. China's rising contribution to global demand of many commodities has been well documented (see for example Coates and Luu, 2012; Roach, 2012; and World Bank, 2009). This includes rapid increase in demand for fuels and many metals. China is now accounting for about 20 percent of global oil consumption and has recently become the world's largest oil importer. On the metal side, China's metal demand sharply outpaced GDP growth over the years and China has become the largest consumer of steel, aluminum, and copper, accounting for about 40 percent of global consumption for each metal. The rising demand has coincided with increases in global commodity prices.

4. **Indonesia has benefited from China's rise mostly through commodity trade.** With increasing global prices and demand, Indonesia's commodity exports now account for 55 percent of its total export value, up by about 10 percentage points since the mid-2000s. Three commodities—coal, palm oil, and rubber—have particularly gained prominence. In contrast, Indonesia's mineral exports (copper, tin, and bauxite) only account for about 4–5 percent of total export value.

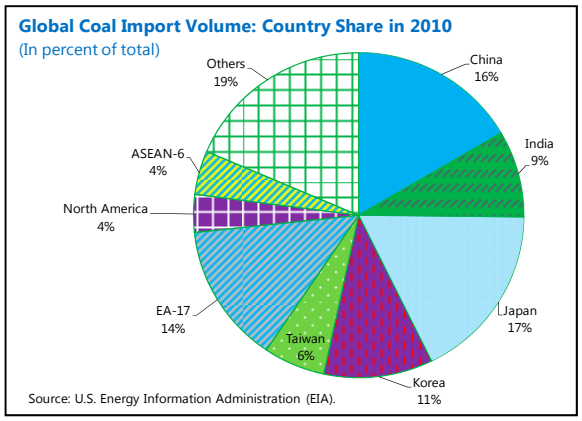


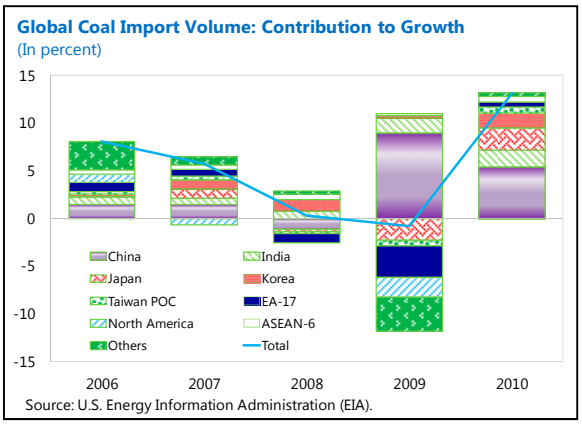
- China is now a top global importer of coal (about 16 percent of global imports), palm oil (25 percent) and rubber (30 percent). Since 2009, China's contribution to global import growth in these commodities has been very high. It is also among the top importers of these commodities from Indonesia.
- For Indonesia, the three commodities together account for about 30 percent of total export value in 2011, ahead of oil and gas (at about 20 percent). The share was only 13 percent in 2005. Global prices of these commodities have increased markedly in recent years. At the same time, investment has increased capacity and led to greater production and export volumes. As a result, Indonesia has already surpassed Australia as the top global exporter of coal, Thailand as the top exporter of rubber, and Malaysia as the top exporter of palm oil (data from U.S. Energy Information Administration and FAO).

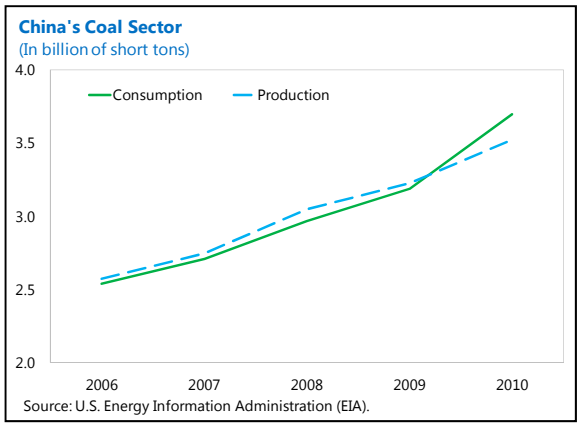


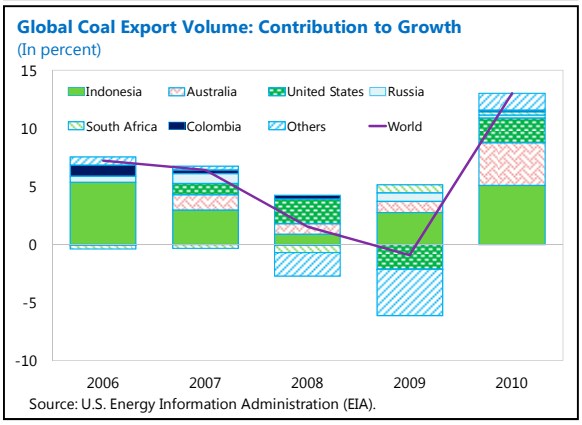
5. **China's demand for coal grew rapidly in recent years.** China is by far the biggest consumer and producer of coal in the world. Its share of coal consumption almost doubled over the decade and reached almost half of global consumption in 2010. Coal still accounts for the majority of China's total energy consumption with oil being the second largest. About half of the coal usage goes toward electricity generation. Domestic production and transport infrastructure expansion has not kept up with the pace of consumption.[3] As the cost of importing coal became more competitive, China became a net coal importer in 2009 and by 2010, its import share rose to 16 percent of global imports. Especially in 2009–10 when the investment boom was in place, China was the main contributor to global coal import volume growth.

6. **Responding to this strong demand, Indonesia's coal production quadrupled over the decade.** With production outstripping domestic consumption, Indonesia was by far the largest contributor to global coal export volume growth in recent years. Average coal export volumes increased at about 20 percent per year from 2005 to 2010. Around the mid-2000s, its exports mainly went to Japan (20 percent), Taiwan POC (15 percent), Korea, and India (10 percent each). China only accounted for about 3 percent at the time. By 2011, however, China had taken over as the top destination for Indonesia's coal (30 percent), followed by India (17 percent) and Japan (14 percent).





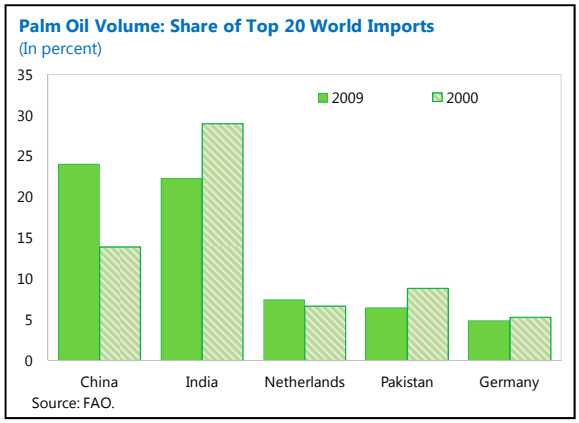


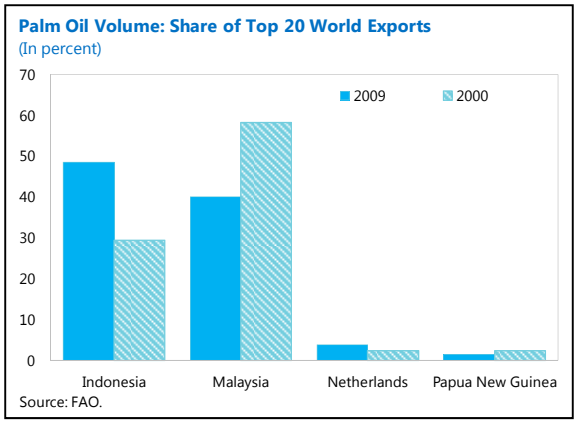


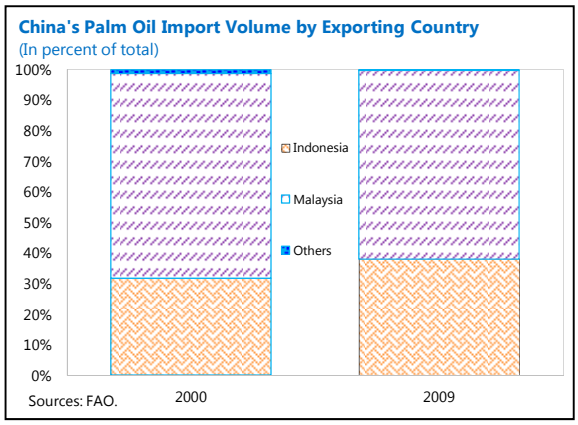
[3] Most domestic coal mines are in the inland regions (Inner Mongolia, Ningzia, and Shaanzi) while the demand has been strongest in the industrial coastal regions.

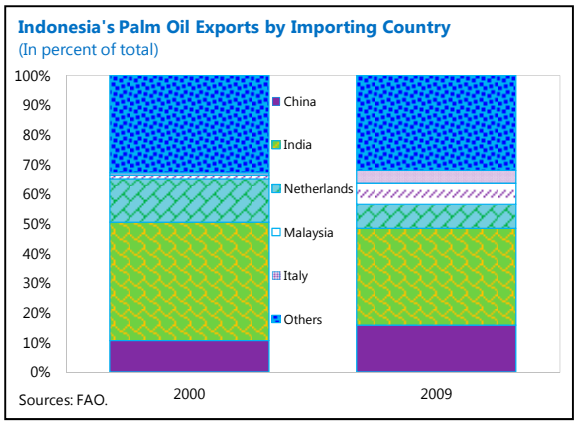
7. **Demand for palm oil mainly comes from income growth in the developing world, including China.** As one of the edible oils widely used in the food industry, palm oil consumption growth has gone hand in hand with improved income per capita in populous developing countries like China and India. Palm oil today represents about one-third of global consumption of edible oil, followed by soy bean oil at about 23 percent.[4] Beyond its main use for food consumption (about 80 percent) and chemical industry (about 10 percent), demand for palm oil for biofuels has also recently increased and now represents about 10 percent of total palm oil usage. In the last decade, China's import volume growth averaged around 20 percent, while India's growth averaged around 10 percent. Today, China and India together import about half of the world's palm oil.

8. **Indonesia and Malaysia have dominated as palm oil suppliers.** Indonesia is currently the largest producer and exporter of palm oil, having about half of the global export market share. Indonesia's main market traditionally has been India, but it has recently increased exports to China. China's imports are now mainly from Malaysia (60 percent) and Indonesia (40 percent).





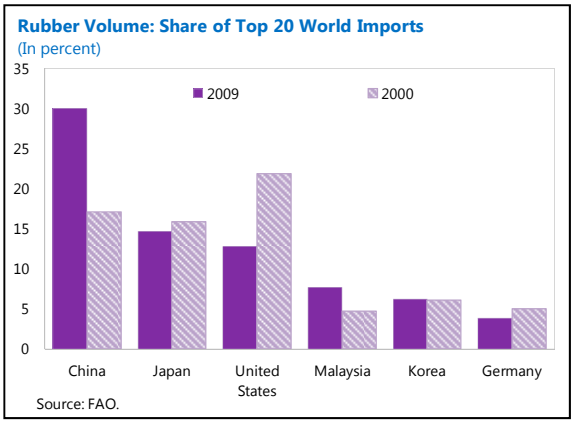


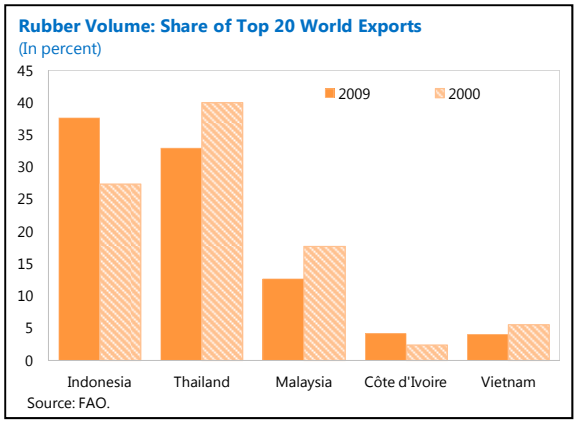


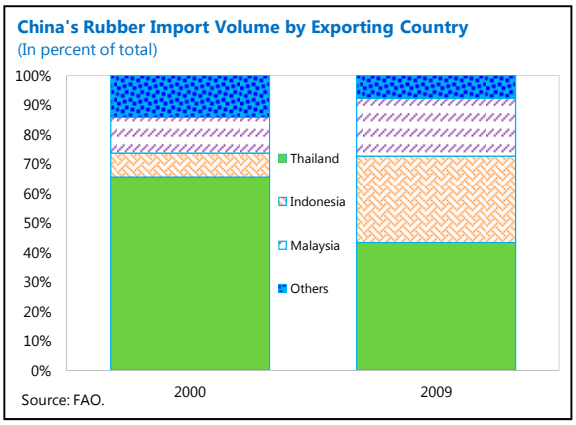
[4] Some of the data quoted in this paragraph are from Citi's note on vegetable oil industry, June 2012.

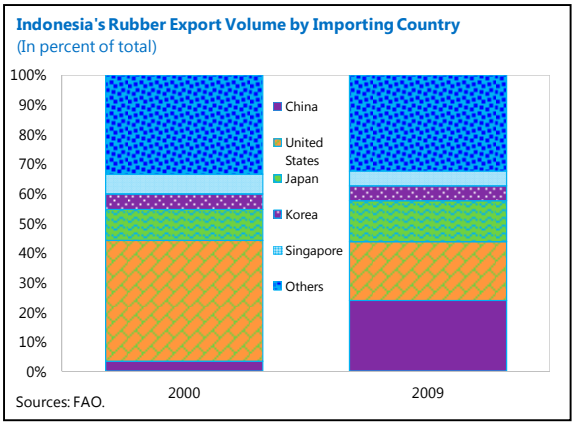
9. **China has also become the biggest importer of rubber.** Natural rubber is an important raw material for many household and for industrial goods manufacturing. The automotive industry is one significant user of rubber products. With large increases in automobile production, China has become the largest global consumer as well as importer of natural rubber. Its share of global imports almost doubled over the last decade.

10. **Indonesia has long been one of the top global exporters of natural rubber.** Rubber exports have long been dominated by Thailand, Indonesia, and Malaysia. According to FAO data, Indonesia overtook Thailand in 2006 to become the largest global exporter of natural rubber. By 2009, its share in world exports rose to almost 40 percent. Its traditional export market has been the United States, while China had been relying on imports from Thailand. However, over the last decade, Indonesia's rubber exports to China rose from only 3 percent of its total export volume to about a quarter. Indonesia grew quickly to become the second largest exporter of rubber to China after Thailand. China's average rubber import volume growth over 2000–09 was around 7 percent and about half of that was contributed by Indonesian suppliers.









C. Implications for Indonesia of China's Change in Growth Pattern

11. **Going forward, a change in China's growth rate could have significant implications for Indonesia**. A slowdown in China's growth would impact on Indonesia

through both direct trade and commodity price effects. Given the importance of commodity exports to China in recent years, lower commodity earnings could significantly influence companies' investment decisions and possibly Indonesia's own aggregate consumption through income effects. A slowdown in China would also have an impact on Indonesia's other major trading partners, adding to the export volume effects for Indonesia.

12. **As regards the direct trade channel, previous studies have identified a significant relationship between Indonesian exports and China's domestic demand.** According to IMF (2012), while Chinese exports seem to be a significant determinant of manufacturing export from countries linked closely to the manufacturing chain with China (Japan, Korea and other ASEAN countries), commodity exporters (Australia, Indonesia, and New Zealand) exhibit a more significant relationship to Chinese domestic demand. Estimates from IMF (2012) indicate that a 1 percent increase in Chinese domestic demand translates into 0.7 percent increase in Indonesia's exports. In other words, the estimated elasticity with respect to Chinese growth of Indonesian exports is about 0.7 percent, lower than for Australia and New Zealand (around 1.7–1.8 percent).

13. **China also has an impact on Indonesia indirectly through the global commodity price channel.** Recent papers have provided empirical evidence of the relationship between China's growth and some commodity prices**.** Yu (2011) documents the demand for metals and emphasizes the importance of high investment growth in China. Using VARs, Roach (2012) shows that a shock to real activity in China has a large and statistically significant impact on global oil and copper prices, with less of an effect for other metals. A one-time 1 percentage point shock to the real month-on-month growth rate of China's industrial production leads to an increase in the real price of oil and copper by about 2.5 and 2.25 percent respectively after four quarters.

14. **More recent studies also suggest that slower Chinese investment could have some impact on Indonesia, although the exact magnitude remains uncertain.** Using a factor augmented VAR, Ahuja and Myrvoda (forthcoming) suggest that a 10 percent decline in China's real estate investment would shave about 1 percent off Chinese growth. They, however, find a negligible impact on Indonesia's growth (similar to Australia) while they find some impact on other G-20 emerging market commodity producers such as Argentina (1 percent), Brazil (0.5 percent) and South Africa (0.4 percent). Another analysis employing panel data (Nabar and Ahuja, forthcoming) suggests that a 4 percent slowdown in China's fixed investment (which would be equivalent to a 10 percent decline in China's real estate investment according to Ahuja and Myrvoda) would lead to a 0.4 percentage point decline in Indonesia's growth.

15. **Ahuja and Myrvoda (forthcoming) also find a significant impact of China's real estate investment on many commodity prices.** They find that a 10 percent decline in China's real estate investment would bring down world prices of metals (14 percent), nonfueled primary commodities (7 percent), and rubber (8 percent). They do not find

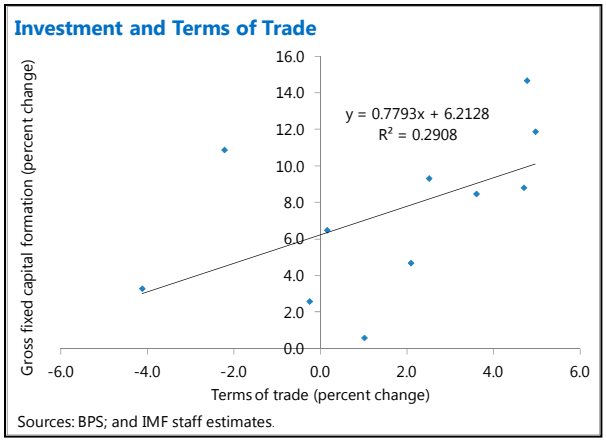
significant impacts on oil or coal prices, however. It is likely that as China has only started to affect the global coal market in the last three–four years, the VARs—which are based on longer-term historical relationships—may not pick up this latest trend.

16. **Using current trade projections and assuming similar global price effects on coal and other commodities, as well as spillovers to other trading partners' demand as in Ahuja and Myrvoda (forthcoming), suggest significant effects on Indonesia's growth.** This exercise aims to present an alternative partial equilibrium analysis of the possible effects assuming price impacts on all of Indonesia's important commodities, including, in particular, coal. It also aims to complement the FAVAR and panel data analysis. The total effects are computed as the sum of individual effects on exports, consumption, investment and imports:

- ***Main assumptions:*** The exercise assumes a 10 percent decline in China's real estate investment; this is equivalent to 1 percent decline in China's growth. Derived from Ahuja and Myrvoda (forthcoming), it assumes estimated price impacts of aluminum (11 percent), nickel (19 percent), copper (16 percent), and rubber (8 percent). The exercise also assumes a price impact on coal and palm oil of 7 percent (average impact on nonfuel primary commodities in Ahuja and Myrvoda's study); and also includes the estimated growth impact on Indonesia's main trading partners (including China) to take into account both the direct and indirect external demand effects on Indonesia. The price changes result in a deterioration of the terms of trade (TOT) (from 1.4 percent in the baseline to -0.2 percent).[5]

- ***Exports.*** Using the team's export projection framework, Indonesia's export earnings as well as real exports would fall by 0.4 percentage point of GDP as a result of lower commodity prices and lower trading partners' demand (from China and others).

- ***Investment.*** The effects on Indonesia's investment are estimated using a linear relationship between the TOT and investment, using an investment regression for Indonesia. A simple bilateral estimate using annual data suggests that the impact on investment of the change in the TOT could be around 0.3 percent of GDP. However, the effects seem to be much more diluted once other variables are controlled and quarterly data are used (see short-run aggregate investment equation in Chapter II). It appears that short-run dynamics of investment growth are mainly governed by momentum (lag investment) and the deviation from



Sources: BPS; and IMF staff estimates.

[5] The exercise is based on April 2012 WEO baseline.

its long-run relationship. However, the longer-term effects on investment are persistent as shown by the annual data. The effects on investment therefore could be between 0–0.3 percent of GDP.

- ***Consumption.*** The estimates of the effects on Indonesia's consumption are based on a simple regression (an error correction model, similar to the investment regression).[6] Assuming a one-to-one relationship between export decline and the decline in real income, the effect of China's slowdown (through the income effect of lower exports) on consumption is estimated at 0.2 percent.

Private Consumption Growth Determinants		
Real GDP growth	0.9115	***
Real lending rate	-0.0002	
Error correction term (-1)	-0.7206	***
Adjusted R-squared = 0.63		

Source: IMF staff estimates.

1/ Error correction term =
Log (Real private consumption)
- 0.83*Log(Real GDP)
+ 0.0003*Real Lending Rate.

2/ An * indicates significance at 10 percent, ** at 5 percent, and *** at 1 percent.

- ***Imports.*** The effects on imports are also based on an import regression. Short-run dynamics of imports in Indonesia is mainly driven by domestic demand and export dynamics.[7] Applying the decline in exports and domestic demand due to a 1 percent decline of Chinese growth (as in the main assumptions above) in the equation and holding everything else constant, imports could fall by about 0.3–0.4 percent of GDP. The range indicates the range of the estimated effects on investment.

Import Growth Determinants		
Real domestic demand growth (-1)	0.623	***
Real export growth	0.705	***
Real exchange rate change (-1)	-0.125	***
Error correction term (-1)	-0.259	***
Adjusted R-Squared = 0.63		

Source: IMF staff estimates.

1/ Error correction term =
Log (real imports)
- 0.25*Log(real domestic demand)(-1)
- 0.76*Log (real exports)(-1) - 0.27 *Log (real exchange rate)(-1)

2/ An * indicates significance at 10 percent, ** at 5 percent, and *** at 1 percent.

- ***Summary.*** Putting each piece of the estimate together (the sum of the effects on exports, investment, and consumption minus the effect on imports), the exercise suggests that the total impact could be around 0.3–0.5 percentage points of Indonesia's GDP. The higher estimate reflects the view that the TOT has a stronger relationship with investment (as in the simple linear relationship shown above) while the lower estimate reflects negligible impact of TOT on investment. The estimates could also be higher if the real exchange rates move in response to the change in TOT, leading to lower imports.

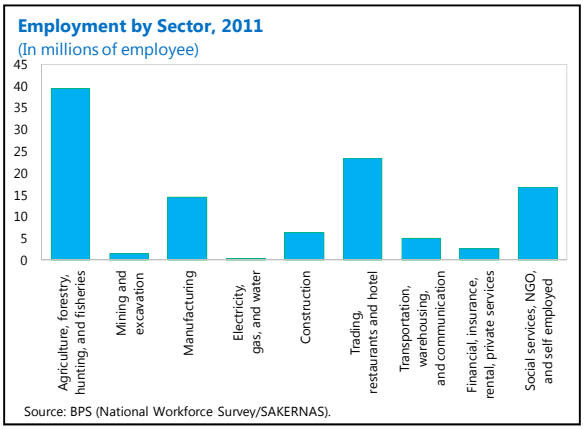
[6] Consumption regression was run using quarterly seasonal adjusted data from 1997Q4 to 2011Q4.

[7] Import regression was run using quarterly seasonal adjusted data from 1993Q3 to 2011Q4.

17. **These estimates are subject to many uncertainties.**

- ***Permanent versus transitory change.*** In theory, the impact of lower commodity prices on domestic demands depends on whether consumers and investors believe that the price decline is going to be permanent or not. Transitory price drop may have little impact on investment, for example, if economic agents believe that there is still intrinsic demand for their commodities over the medium- to long-term due to population growth and higher food and energy needs in developing countries.

- ***Spillover of commodity sector activities into other sectors.*** Direct effect on consumer spending of the workers in the coal sector may likely be small as it is not so labor intensive. Plantation (rubber and palm oil), on the other hand, employ more labor.



- ***Policy responses.*** Policy responses either from China, Indonesia, or the rest of the world, could help cushion the impact. Looser monetary policy at home, for example, would help cushion the impact on domestic demand. At the same time, China's fiscal stimulus could also help maintain the demand volume for imports.

- ***Competitiveness of Indonesian commodity sector.*** If Indonesia has a cost competitiveness compared to other producers, its producers' margins may still be high enough to continue investing even when prices have declined from a high level. This seems to be the case for Indonesian coal.

- ***Technological changes and substitution.*** For coal, in the short run, power plants or other coal consumers may not be able to switch out of their specific mix of fuel use, helping to maintain the volume of demand. Therefore, Indonesia's export volumes may not fall as much. In the medium and long run, however, changes in technology and preference for greener power could be a threat to the coal sector.

18. **Over the medium term, if China's growth pattern becomes more consumption-led, Indonesia with its resource-based exports would likely not gain much benefit from increases in Chinese consumption.** IMF (2012) indicates that the benefits to trading partners of China's rebalancing toward higher consumption may be small as China remains marginal as an importer of consumer goods. Rebalancing toward lower investment-led growth could be thought of as a permanent shift in China's demand for some of these investment related resources. These include energy fuels and metals. For other more

consumption-related commodities, the effects are not clear. Demand for palm oil and rubber, for example, may be supported by growth in consumption of processed food and durable goods (i.e., vehicles).

D. Conclusion

19. **A slowdown in China could have a significant impact on Indonesia.** The trade relationship between China and Indonesia is dominated by the commodity sector. This development has only been accelerating in the past decade, with China's rapid increase in commodity demand affecting global prices and import volumes. Given the dominant role of commodities in Indonesia's export basket, lower commodity prices and demand would have an immediate impact on Indonesia's export earnings. Subject to many uncertainties, this chapter shows that the impact on domestic demand and imports could also be significant.

REFERENCES

Ahuja, A., and A. Myrvoda (forthcoming working paper), "The Spillover Effects of a Downturn in China's Real Estate Investment on G20 Economies and Global Commodity Prices" (Washington: International Monetary Fund).

Coates, B., and N. Luu, "China's Emergence in Global Commodity Markets," *Economic Roundup*, Issue 1, 2012, Australian Treasury.

International Monetary Fund, 2011, "Changing Patterns of Global Trade," IMF Policy Paper (Washington).

———, 2012a, *Regional Economic Outlook*: *Asia and Pacific*, *April 2012*, "Is China Rebalancing? Implications for Asia" (Washington).

———, 2012b, People's Republic of China, IMF Country Report 12/195 (Washington: International Monetary Fund).

Nabar, M., and A. Ahuja (forthcoming working paper), "Investment-Led Growth in China: Global Spillovers," (Washington: International Monetary Fund).

Roach, S.K., 2012, "China's Impact on World Commodity Markets," IMF Working Paper 12/115 (Washington: International Monetary Fund).

World Bank, 2009, *Global Economic Prospects 2009: Commodities at the Crossroads*, (Washington: World Bank).

Yu, Yongzheng, 2011, "Identifying the Linkage between Major Mining Commodity Circle and China Economic Growth: Its implications for Latin America," IMF Working Paper 11/86 (Washington: International Monetary Fund).

IV. MINERAL TAXATION IN INDONESIA[1]

Indonesia has substantial mineral wealth, contributing significantly to GDP and government revenues. The mix of natural resource tax instruments is in line with international practice and the tax rates, as set out in the new 2009 Minerals Law, comparable to other countries (but higher for older Contracts of Work.)[2] The 2009 Mining Law increased the transparency and stability of the mining regime, but uncertainties remain around details due to delays in the issuance of some of the implementing regulations. This is reflected in the generally lower ratings given by investors to Indonesia's mineral policy regime. Further progress in improving the overall business environment and in ensuring transparency and stability of tax and divestment requirements for mineral extraction would help assure that future investment remains strong.

A. General Principles of Natural Resource Taxation

1. **Natural resource extraction has four generic features that make it distinctive from other productive economic industries** (Collier, 2009). The ultimate owners of natural resources are the citizens; the extraction is a process of asset depletion rather than production using renewable inputs; investment in extraction has high sunk costs and long payback periods; and minerals have high price volatility. A distinguishing characteristic of the mining industry is that the amount of economic rents (defined as the excess profit above the "normal" rate of return to capital) generated vary from mine to mine. Those with low exploration costs and rich endowments generate high rents, while others far from developed infrastructure or operating with high costs might be at the margin.

2. **A key issue for many countries, including Indonesia, is how mineral wealth can best be translated into socio-economic development.** The rationale for putting in place a special natural resource taxation regime is the existence of large potential economic rents in the industry. In principle, governments want to tax away these economic rents, to be used for development purposes, and leave the appropriate after-tax return required by investors.

3. **However, several trade-offs characterize the design of mineral fiscal regimes.** These include the costs and benefits of different types of regimes, definition and measurement of "normal" profits, the pros and cons of different specific tax instruments, and the timing of revenue receipts. These issues are taken up in the following nine paragraphs.

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[1] Prepared by Dora Benedek. Indonesia has substantial natural resource wealth of oil and gas, forestry, and fisheries as well. This chapter discusses mineral taxation of Indonesia in the context of broad principles. A more comprehensive and detailed set of recommendations would require very specifics of individual mining operations to be taken into account that are beyond the scope of this chapter.

[2] This reflects a simple comparison of rates across countries and is not an assessment of the tax burdens (in either absolute or relative terms) as the latter reflect various country-specific and individual mining operation specific factors.

4. **There are broadly two types of fiscal regimes to tax mineral resources: contractual-based system and concessionary regimes.** While concessionary regimes provide companies full control of the production process, contractual-based regimes usually leave control over at least a share of output to governments. While developed countries usually regulate fiscal terms in legal codes, many developing countries regulate details in individual agreements. The accepted best practice is to establish generally applicable fiscal terms in the law and avoid case-by-case negotiation of terms.

5. **In theory, the perfect tax system from the government's viewpoint would tax away all economic rents above the "normal" profit.**[3] Although economic rent is a clear theoretical concept, it is difficult to define in practice. It is impossible to know how much rent exists in advance, and even ex post there are difficulties in measuring it. The key issues with measuring rents are that: (i) the extent and profitability of a particular mine cannot be known with certainty; (ii) rent should be measured over the entire project lifecycle, including by taking into account the costs of failed explorations; and, (iii) economic rent may be difficult to differentiate from managerial rents for special expertise, technology, etc.

6. **The taxation instruments for mining projects can be classified as profit-, production-, or input-based** (ICMM, 2009). Profit-based taxes include income tax, profit tax, royalty based on profit or income measures, resource rent tax, and withholding taxes on dividends. Production-based taxes include unit-based or ad valorem royalties, import and export duties, VAT, etc. Input-based taxes are duties (for a detailed discussion of taxes and tax incentives (see Otto, 2000 and ICMM, 2009). Besides taxes imposed by the central government, local authorities may also collect other taxes and charges, most commonly property tax.

7. **Theory suggests that taxation should be neutral with respect to investment and production decisions in order to maximize economic efficiency.** This means that the regime should be such that producers do not have incentives to shift their investment or production as a result of the tax. That purpose is served by profit-based taxes, but not by production based royalties. The latter increases per unit cost of production, therefore investors will have an incentive not to explore investments with high production cost (closer to the margin) that would otherwise be commercially viable. Unit-based taxes have a distorting effect on investment decisions and are therefore not efficient (see following figures).[4]

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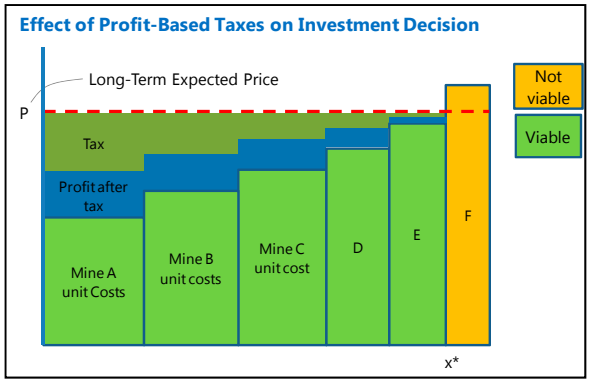
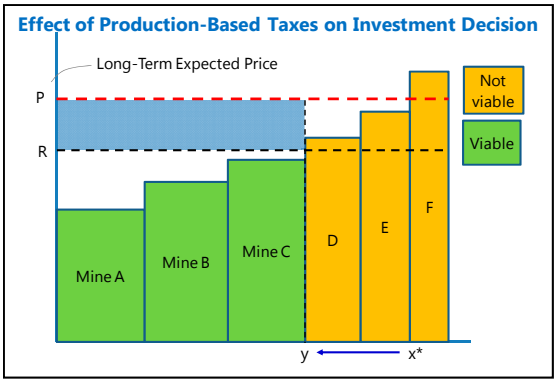
[3] There are also arguments that in order to maintain incentives for investment and economic efficiency some share of the economic rent might be left with the producers.

[4] For a more detailed assessment of mineral taxation options see Hogan and Goldsworthy, 2009.





8. **Taxing based on profitability versus production also has implications for the timing of revenue receipts.** Natural resource investments generate positive profits only with a great time lag because of the substantial investments required before production can begin. However, in many countries these revenues constitute a large share of government income and, therefore, there are significant incentives for governments to seek to realize these sooner rather than later. Thus while profit-based taxes are more investment neutral and economically efficient, and hence usually preferred by investors, production-based taxes are preferred by governments. The latter are more attractive to governments because they do not tie budget revenues to profits and instead ensure revenues in all production periods, even in the absence of profits.

9. **In the case of profit-based taxes, the two key elements are the tax rate and the tax base.** Tax rates are usually flat or slightly increasing with profit, but the tax base is often influenced by governments through the provision of tax incentives. Although the types of tax incentives provided to the mining sector are similar to those provided to other sectors, their rules can be specific. For the most common types of tax incentives, see table below.

Tax Incentives in the Mining Sector	
Tax Incentive	Description
Accelerated capital cost allowances	Allows accelerated payback; allows firms a higher level of real discounted profits after tax; shifts risks to governments by delaying income tax; could be trade off with higher tax rate.
General and reinvestment tax credits	Based on annual extraction rates, tax payments are decreased; may be based on cost or volume.
Tax holidays	Moratorium on income tax and other payments for a set number of years.
Source: ICMM, 2009.	

10. **Another key feature affecting the tax base is the approach to ring-fencing.** This relates to the question of whether there is separate treatment of different investment projects with regard to tax calculation purposes or a consolidated treatment. With ring-fencing, project revenues of a profitable project cannot be offset by losses suffered on other

investments. Project ring-fencing is more common in countries where tax regimes are negotiated for individual projects (contract-base regimes), for example in Indonesia where several generation of Contracts of Work (CoW) exist for mining companies.

11. **To summarize, there are several contradictory objectives in designing a tax regime.** It should provide a revenue stream for governments in all production periods, and with an increasing share of revenues as profitability increases (progressivity); provide minimal disincentives for production and investment; and remain robust amid changing circumstances (stability). The optimal tax regime in practice is a mix of several elements, a combination of royalty, some rent capture mechanism and the corporate income tax (CIT).

12. **Each of these instruments has benefits and costs and their choice is best determined by broad principles.** Rent taxation is most efficient in principle, but hard to calculate and administer. Royalties distort extraction and exploration, but assure some revenues from the start of production. The regular corporate income tax provides consistent treatment with other sectors. Overall, discretionary elements should be minimized and special treatment and incentives avoided as they create incentives for aggressive tax planning and rent-seeking.[5] The appropriate tax regime should be also designed with attention to other considerations besides potential tax revenues, such as investment and production incentives, cost of collecting revenues, and cost of compliance. In the case of a complex tax system, multiple elements are in interaction, therefore detailed modeling using project-level data is critical in understanding the overall impact of the system on both the producers and the budget.

B. Nontax Factors, Company Perspective

13. **Turning from the government to mining companies, it is important to note that factors apart from the tax regime are important determinants of their behavior.** Companies have limited resources and usually multiple alternative projects in which to invest, and they consider a range of factors in arriving at their decisions. Based on interviews conducted with mineral companies, the elements identified in the following table play decisive roles in companies' investment decisions (Otto et al, 2006). In the table below, the factors that are tax related are in bold, with the other important determinants related to the general investment climate. This broad pattern reflecting the importance of non-tax factors is confirmed by other interviews with mining companies (see for example ICMM, 2009).

[5] Another important aspect (not discussed in this chapter) is that the tax administration should have the capacity to administer the fiscal regime and profit-based taxes generally have higher administrative costs.

Mining Company Ranking of Investment Decision Criteria (Out of 60 possible predetermined criteria)		
Exploration Stage 1/	Mining Stage 1/	Investment Decision Criteria
1	n.a.	Geological potential for target mineral
n.a.	**3**	**Measure of profitability**
2	1	Security of tenure
3	2	Ability to repatriate profits
4	9	Consistency and constancy of mineral policies
5	7	Company has management control
6	11	Mineral ownership
7	6	Realistic foreign exchange regulations
8	4	Stability of exploration and mining terms
9	**5**	**Ability to predetermine tax liability**
10	8	Ability to predetermine environmental obligations
11	**10**	**Stability of fiscal regime**
12	12	Ability to raise external financing
13	16	Long-term national stability
14	17	Established mineral titles system
15	n.a.	Ability to apply geologic assessment techniques

Source: Otto and others, 2006.
1/ n.a. = not applicable.

14. **Companies emphasize stability and predictability as the most important aspect of fiscal regimes.** Tax incentives and low tax rates are only attractive if there is a credible commitment to maintain them in the longer term. Companies perceive a greater uncertainty if fiscal terms are negotiated bilaterally and not set in a statute. Companies value the stability of the tax system more than low levels of taxes, particularly because very low tax levels can often meet with high political pressure to change them, undermining predictability. Contracts of works are designed to provide stability for the individual companies, but in general they create instability in the sense that the individual terms are exposed to the discretion of the government. Any contract can be varied at any time by mutual agreement, while changing a law requires parliamentary approval.

15. **Companies value simplicity and consistency of the tax system.** When making an investment decision, future tax obligations have to be taken into account and the complexity of the tax system makes the comparison of investment projects difficult for companies. Tax administration is also a very important factor for mining companies. Good tax administration means effective application of laws and regulations, the existence of a fair and efficient legal system for dispute resolution, well-working tax refund mechanisms, and low compliance costs. Delayed tax refunds usually have substantial financial costs for companies. Other important factors mentioned by companies were transparency by governments of the use of extractive revenues. They also value the capacity of governments to spend mineral tax revenues effectively.

C. Mining Fiscal Regime in Indonesia

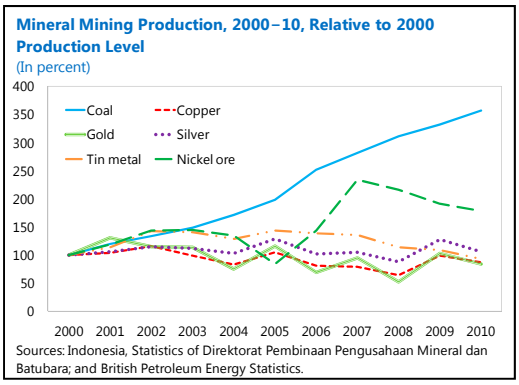
Tax system

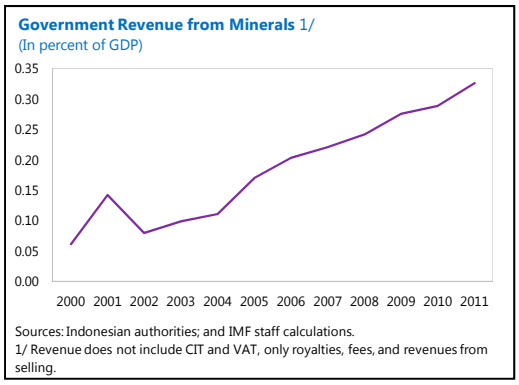
16. **The oil and mining sector is large in Indonesia.** Over the last decade, the sector has accounted for about 8–10 percent to GDP, of which minerals account for 2–4 percentage points. The most important mineral commodities are coal, copper, gold, tin, nickel, and silver, with Indonesia having non-negligible shares in world production of these minerals. For most commodities, production has been very stable in the last decade with coal being the only exception. Coal production has been steadily increasing; in 2010 it was about 3.5 times the 2000 level. In line with increasing production, the revenue take of government has also been steadily increasing.

Indonesia: Share of World Production in Some Minerals, 2009

	Copper Cu kT	Gold kOz	Nickel KT	Tin Tin	Coal 1/ MT
Indonesia	610	65	203	55	190
Total Asia and Pacific	2,870	439	679	192	3,320
World	15,300	2,010	1,580	275	5,140
Indonesia					
Share of Asia and Pacific (in percent)	21	15	30	29	6
Share of world production (in percent)	4	3	13	20	4

Source: U.S. Geological Survey, 2009.
1/ Bituminous: 95 percent of world anthracite production from China.





17. **Investment projects before 2009 were regulated in bilateral Contracts of Work.** There are seven generations of CoWs, all with somewhat different terms. In 2009, a new mining law was enacted to bring a fundamental reform to the system, moving away from the case-by-case basis. Subsequently some implementing regulations have been issued, but the reform process is still ongoing, with finalization of other implementing regulation still pending.

18. **The mining tax regime in Indonesia contains multiple elements.**[6] Companies pay royalty, CIT, VAT, and withholding tax on dividends and interest. Under the new mining law, royalty rates on production vary between 2–7 percent of sales proceeds depending on the mining scale, production level, and commodity price. The royalty base is not always clearly defined and differs by type of mineral. Companies with a Special Mining Business License under the new law (IUPK) pay an additional royalty of 10 percent of their net profit (thus it is similar in effect to an additional income tax). Royalty rates under CoWs are usually higher than under the mining law, in many cases 13.5 percent. Nevertheless, IUP holders can be subject to the new 20 percent export tax, which essentially acts as an additional royalty (see later section on trade barriers). Overall, the base royalty applied by Indonesia in the Mining Law is in line with international practice, but the 10 percent additional tax is not. Royalty rates of 2–7 percent are in the typical range of comparable countries (see table), in case of some minerals (e.g., coal) toward the lower end. However, the rate of 13.5 percent for some CoWs is very high in international comparison. Furthermore, without sufficient detail about individual mining operations, however, it is difficult to form any judgment about whether they are excessive, low, or the right level.

Royalty Rates by Commodities in Indonesia, Set Out in the 2009 Mining Law

Coal	
Open pit	3–7 percent
Underground	2–6 percent
Nickel	4–5 percent
Zinc	3 percent
Tin	3 percent
Copper	4 percent
Iron	3 percent
Gold	3.75 percent
Silver	3.25 percent
Iron sand	3.75 percent
Bauxite	3.75 percent

Source: PWC, 2011.

19. **The corporate income tax rate differs between companies with CoWs and those falling under the new mining law.** The latter pay the CIT according to the standardized tax regime, where the tax rate is set at 25 percent (20 percent for publicly listed companies) of net taxable profits. The allowable depreciation rate depends on the nature of the capital asset and can be amortized over 4–20 years. Exploration and mine development expenses are generally capitalized and amortized upon spending. The loss carry forward period is five years; there is no loss carry-back possibility. Reclamation reserves are deductible. Provisions on mine closure costs are unclear.[7] No thin capitalization rules are in place, but there is increasing audit of related party transactions. Investment projects are ring-fenced, thus every company can only apply for one license. The CIT rules and most deductions are in line with common international practice. The standard CIT rate of 25 percent is in the range of comparable countries (see following table).

[6] For a detailed description of the mining tax regime see PWC, 2011.

[7] Reclamation costs are incurred through project life while closure costs are incurred after production stops.

Mineral Taxation Regime: Selected Countries

	Royalty 1/	CIT	Additional Minerals Tax	Export Tax on Minerals
Australia	State royalties apply in the range of 1.25–7.5 percent. New resource rent tax credits state-level royalties	Federal tax: 30 percent	Mineral resource rent tax	No 2/
China	Ad valorem and per unit resource taxes varying by types of minerals	25 percent		Yes
India	Ad valorem or unit based royalties, varying by types of minerals, between 0.2 and 20 percent	30 percent for residents, 40 percent for foreign	No	Yes
Indonesia	Royalties of 2–7 percent depending on type of mineral, or as regulated by contract. Under CoWs royalties are usually higher.	25% (20% for listed companies) or depending on CoW.	No	Yes
Kazakhstan	Royalty was replaced with mineral extraction tax levied upon the cost of produced volumes of minerals, fixed rates depending on mineral.	20 percent	Progressive excess profit tax with rates 0–60 percent	Yes
Philippines	Royalties of 2–5 percent	30 percent	Royalty to indigenous people and local business on extraction of minerals	No, but excise tax on minerals equivalent to export tax for exporters
Russia	Mineral resources extraction tax at the rate of 3.8–8 percent (rates depend on the type of mineral) based on the value of extracted mineral	20 percent	No	Yes
South Africa	Variable rate depending on EBIT; max rate for refined minerals: 5 percent, for unrefined minerals: 7 percent	Standard CIT of 28 percent and STC of 10 percent	No	On diamonds, but not yet applied
United States	State specific	35 percent plus state income tax	No	No

Sources: Hogan and Goldsworthy, 2010; PWC, 2010; national regulations; and IMF resources.

1/ Royalty rates are not directly comparable as rules regarding the tax base may be different.
2/ In 2011.

20. **The standard VAT rate is 10 percent.** Supplies of gold bars, coal and natural resources taken directly from source are exempt from VAT. For mining projects, pre-production purchases are substantial; therefore VAT overpayment in the early periods is a general problem. VAT refunds are somewhat problematic, especially for long-term mining projects with several years of pre-production period. Withholding taxes are applied on dividend, interest (at a rate of 15 percent) and services (at a rate of 2 percent).

21. **The new mining law also has several other provisions with fiscal consequences.** Companies are obliged to meet domestic market obligations (DMO), providing authority to the central government to control production and export. The purpose of DMO is to

guarantee the supply for domestic demand. It creates perceived risk of government interference; therefore the assurance of market price would be critical. There is a price benchmarking system in place for coal producers that serves as a basis for royalty calculations if the actual price is below the benchmark. Foreign capital owners have a divestment obligation; Indonesian nationals must own at least 20 percent of shares by the fifth year of production (this has recently been augmented with an additional divestment requirement—see below—and under the changes announced in early 2012, companies are also required to carry out in-country processing and refining by 2015). Production limits can also be set up if regarded necessary by the central government.

22. **The new mining tax system is similar to those of other natural resource rich countries, both regarding the tax mix and tax rates.** While the CIT rate is toward the lower end of the scale, royalty rates set by the Mining Law are in the range of other countries, except the additional 10 percent royalty of Companies with a Special Mining Business License under the new law (IUPKs). Royalties set by CoWs, on the other hand, are more toward the higher end but again, in the absence of data on individual mining operations, it is difficult to form a view about whether they are excessive or still too low. The 2 percent withholding tax rate of services is low in international comparison. Table 5 shows that some countries still apply export taxes on minerals, but the international trend is to move away from such taxes.

23. **In summary, the mineral tax regime in Indonesia as set out in the new 2009 Mineral Law is in line both with theoretical recommendations and international practice.** Mineral revenues are taxed with royalties and CIT. Considering both royalties and CIT, the overall system is regressive. The basis for royalties differs by minerals and are also different for CoW and IUP holders. Specific royalties should be replaced with ad valorem royalty to increase efficiency and improve transparency. In the medium term, moving toward a resource rent tax would enhance economic efficiency. Distortions introduced by the newly enacted export tax on minerals will be discussed in a later section.

Non-tax factors

24. **Indonesia does not score very well in non-tax factors affecting investment.**[8] Based on a survey conducted by the Fraser Institute in 2011/12, Indonesia came out in the bottom 10 of 93 jurisdictions, among Honduras, Guatemala, Bolivia, Venezuela, India, the Philippines, Kyrgyzstan, Ecuador, and Vietnam. Indonesia's relative perception has been deteriorating in recent years. Indonesia scores second highest when considering room for improvement, suggesting that the current policy framework is perceived as an obstacle for

[8] The Fraser Institute conducts a survey of about 5,000 mining companies to assess the public policy framework for investment of 93 jurisdictions. Based on the survey answers a Policy Potential Index (PPI) is composed to measure overall policy attractiveness (McMahon and Cervantes, 2012).

investors. Investors note that they experience high uncertainty concerning the stability of the tax regime, administration and enforcement of existing regulations, and lack of fair legal processes. They consider regulatory duplications and inconsistencies as a strong deterrent to investment. Lack of infrastructure and community development is viewed as a negative factor. Indonesia is further viewed as a highly corrupt jurisdiction. Security issues are also cited as important concerns. Taxation regime, trade barriers,[9] and political stability received somewhat better scores with many investors only seeing these as mild deterrents to investment in Indonesia.

25. **Indonesia, however, scores in the middle range when considering policy and mineral potential together.** This is due to the fact that most investors consider its geology very favorably and policy factors as deterrents, but not to the extent to prevent them from investing. Therefore, by improving the policy framework, most importantly non-tax factors, Indonesia could become a lot more attractive as an investment target.

26. **In summary, investors see non-tax factors as the obstacles to investment.** This is especially the case for administration, simplicity, and predictability of the fiscal regime, providing significant room for improvement. The negative perceptions are currently counterbalanced by the great geological opportunities of the country, but frequent changes and uncertainty about the tax system might have a negative impact on future investments.

D. Trade Barriers

27. **In the spring of 2012, Indonesia announced several measures to control mineral ore exports.** Most importantly, the government announced that it would impose a 20 percent export tax on the total value of raw mineral exports from May 2012. It also requires foreign shareholders of Indonesian mining companies to divest 51 percent of their shares (as opposed to the earlier 20 percent) after the fifth, but before the tenth year of production, and to carry out in-country processing and refining by 2015. These only apply to companies under the new mining law, not to CoW holders.[10] Although some countries apply similar tax policy instruments, theory suggests that the effects of these measures might be adverse to the whole economy.

28. **The impact of export taxes varies depending on whether or not they affect world prices.** A WTO study (Piermartini, 2004) argues that if a country is a big producer, then export

[9] The survey was taken before the introduction of recent trade and investment related measures were announced.

[10] For CoW holders all taxes are regulated in the contract and export taxes are not included. Nevertheless the government has announced that it will initiate the renegotiation of some CoWs.

volume changes will affect world prices.[11] For a major producer, the export tax decreases exports and in turn supply will fall, causing an increase in the world price and thus reduction in aggregate demand. The price difference between domestic price and world price increases domestic demand and causes a positive terms-of-trade effect. However, in case of a country with a small share in world production, such as the case with Indonesia, changes in export volume will not meaningfully affect the world price; therefore, only efficiency losses remain, making the effect of an export tax unambiguously negative. The export tax is absorbed entirely by domestic producers.

29. **The efficiency losses arise by reallocating resources toward areas where comparative advantage does not exist.** In effect, an export tax on raw commodities subsidizes inefficient domestic processing through the depressed domestic commodity price. This transfers welfare from the sector producing raw material to the sector processing it, but there is a net loss for the country. Raw commodity production might decrease causing employment and wages to fall in that sector, while the opposite would happen in the processing sector. In the long run, the cost of the export tax will be borne by those factors of production specific to the production of the taxed good that cannot move to another sector. An export tax may also lead to domestic inefficiency in downstream industries as the domestic prices remain unduly depressed. Foreign producers and consumers—facing higher costs—have an incentive to develop the technology or substitutes for the product in order to remain competitive (Bonarriva, Koscielski, and Wilson, 2009).

30. **Export taxes may also have negative environmental consequences.** They may encourage wasting by creating lower-than-equilibrium domestic prices. For example, in the case of Indonesia, imposing export taxes on lumber is estimated to have caused a wastage ratio of up to 50 percent (Piermartini, 2004).

31. **The immediate economic impact of the recently adopted measures are minimal, but could have indirect costs.** They are not expected to have a significant real impact on near-term exports, since larger producers are not affected as those are CoW holders. Smaller producers that will likely have to pay taxes will be negatively affected by the export taxes. However, these measures could send a negative signal to potential investors of potentially reduced profits and risk of further changes. Over the longer term, the proposed export ban as well as regulation for foreign investors to divest could adversely impact on investors' confidence and hence prospects for FDI inflows. As surveys of mining companies indicate, the predictability of the tax regime is a key issue for capital intensive resource projects and ad hoc policy measures can undermine that.

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[11] It is difficult to define the size of production which allows a country to influence world price, however based on the table in para. 16, Indonesia has a rather minor share of the world trade in case of most commodities, with tin being the only exception.

REFERENCES

Bahl, R., and B. Tumennasan, 2002, "How Should Revenues from Natural Resources be Shared in Indonesia?" International Studies Program Working Paper 02−24 (Atlanta, Georgia: Andrew Young School of Policy Studies, Georgia State University).

Bonarriva, J., M. Koscielski, and E. Wilson, 2009, "Exports Controls: An overview of Their Use, Economic Effects, and Treatment in the Global Trading System," Office of Industries Working Paper No. ID-23 (Washington: Office of Industries, U.S. International Trade Commission).

Collier, P., 2009, "Principles of Resource Taxation for Low-Income Countries," in *The Taxation of Petroleum and Minerals: Principles, Problems and Practice*, eds. by P. Daniel, M. Keen and C. McPherson (London and New York: Routledge).

Hogan, L., and B. Goldsworthy, 2009, "International Mineral Taxation, Experience and Issues," in *The Taxation of Petroleum and Minerals: Principles, Problems and Practice*, eds. by P. Daniel, M. Keen and C. McPherson (London and New York: Routledge).

International Council on Mining & Metals (ICMM) and Commonwealth Secretariat, 2009, "Minerals Taxation Regimes: A Review of Issues and Challenges in Their Design and Application," February (London: ICMM and Commonwealth Secretariat).

McMahon, F., and M. Cervantes, 2012, *Fraser Institute Annual Survey of Mining Companies 2011/2012* (Vancouver: The Fraser Institute).

Otto, J., 2000, "Mining Taxation in Developing Countries," a study prepared for UNCTAD. Available via the Internet: http://r0.unctad.org/infocomm/diversification/cape/pdf/otto.pdf.

Otto, J., C. Andrews, F. Cawood, M. Doggett, P. Guj, F. Stermole, J. Stermole, and J.Tilton, 2006, *Mining Royalties, A Global Study of Their Impact on Investors, Government, and Civil Society* (Washington: The World Bank).

Piermartini, R., 2004, "The Role of Export Taxes in the Field of Primary Commodities," WTO Discussion Papers No. 4 (Geneva: World Trade Organization).

PwC, 2010, *Income Taxes, Mining Taxes and Mining Royalties, A Summary of Selected Countries* (Available via the Internet: www.pwc.com.

PwC Indonesia, 2011, *Mining in Indonesia, Investment and Taxation Guide*. Available via the Internet: www.pwc.com/id/en/index.jhtml.