

Indonesia: Selected Issues

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INDONESIA

Selected Issues

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Approved by the Asia and Pacific Department

July 10, 2006

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I. OVERVIEW¹

1. **In 2005, Indonesia recorded the highest growth rate in nine years despite financial market volatility in August/September and high international oil prices.**

Although growth has entered a “soft patch” this year, financial markets and the rupiah have strengthened and Indonesia has been able to make early repayments to the IMF. This suggests that Indonesia’s resilience to withstand shocks has increased since the late 1990s. Looking forward, some interesting questions arise about Indonesia’s macroeconomic vulnerabilities: How resilient is the corporate sector and what are the lingering vulnerabilities? Have sovereign and banking sector vulnerabilities been declining over time and how susceptible is Indonesia to changes in the external environment? Has SOE performance been improving and do the same rules of the game apply to SOEs as to the private corporate sector? In addition, two macroeconomic issues that came up during the Article IV discussions were—do leading indicators suggest that the current slowdown in growth is temporary? And, can Indonesia converge to trading partner inflation rates over the medium term? The chapters in this Selected Issues paper address these questions.

2. **The second chapter analyzes the performance of the Indonesian nonfinancial corporate sector in recent years and discusses remaining challenges and vulnerabilities.**

The corporate sector in Indonesia has been recovering in recent years from the financial crisis of 1997–1998. Based on data for listed companies, the paper finds that leverage ratios have declined, currency mismatches have decreased substantially, profitability has improved and capacity to repay obligations has improved. However, the share of short-term borrowing is higher for domestic corporations relative to foreign firms and the profitability of the top 100 largest firms is still weak.

3. **The third chapter looks at sovereign and banking sector vulnerabilities using the contingent-claims approach**—a relatively new approach that combines balance sheet information with finance and risk management tools. The analysis shows that risk indicators for the sovereign and the banking system both show a steady improvement since mid-2001. The results for the sovereign show a modest increase in default probabilities and credit spreads as a result of market volatility in May/June, followed by declines toward the end of June.

4. **The fourth chapter reviews developments in the nonfinancial public enterprise sector.** The analysis finds that the overall profitability of this sector has risen quite substantially in the last few years and leverage ratios are low, except in the airlines and energy sectors. Public enterprises are, in general, subject to the same regulations as private sector enterprises—managers are independent and can make decisions based on commercial interests. However, the government determines prices in some sectors, notably energy sector, which affects profitability of the sector.

¹ Prepared by Nita Thacker (APD).

5. **The fifth chapter develops coincident and leading indicators of private domestic demand in Indonesia.** BI has recently adopted the OECD methodology to build some coincident and leading economic indicators of economic activity. The staff's study complements BI's work by the use of econometric methods to test indicators of private consumption like retail sales, credit growth and consumer confidence indices, and of investment like capital goods imports. The composite indicators track private domestic demand quite adequately and suggest that growth is likely to recover from the second half of this year.

6. **The last chapter investigates the reasons for Indonesia's inflation rate remaining consistently higher than in the neighboring countries.** The study finds that in addition to the expansionary monetary policy and pass-through from currency depreciations, structural factors such as strong inflation inertia, and political instability, explain the difference in inflation performance. On the other hand, structural features such as the degree of economic openness, the public debt burden, and the level of price regulation played no role in explaining the higher inflation rate in Indonesia. To reduce inflation to regional levels will require maintaining a consistent monetary framework and asserting the credibility of the central bank's new inflation targeting framework.

II. CORPORATE SECTOR IN INDONESIA: FINANCIAL PERFORMANCE AND UNDERLYING VULNERABILITIES¹

A. Introduction

1. **The corporate sector in Indonesia has been recovering in recent years from the financial crisis of 1997–98.** Prior to the crisis, high growth rates were spurred by rapid corporate borrowing, in many cases by groups with ownership links to banks providing financial resources. Poor risk management in banks and firms explained sizable and largely unhedged bank financing (uncovered maturity and currency risk). Once the crisis hit, the sharp rupiah depreciation and accompanying high interest rates led to severe and prolonged financial instability. In recent years, progress toward macroeconomic stability and the gradual recovery of economic growth have contributed to improved corporate sector performance.

2. **This paper analyzes the performance of the Indonesian nonfinancial corporate sector in recent years and discusses remaining challenges and vulnerabilities.** The analysis looks at the overall financial condition of firms, as well as relevant changes in the regulatory framework that are likely to have contributed to the improved performance of the corporate sector. The paper also assesses lingering vulnerabilities, which may become more evident in the face of the recent slowdown in economic activity.

3. **Based on data from nonfinancial companies listed in the Jakarta Stock Exchange (JSX), the main findings of the paper are:**²

- **Financial indicators of nonfinancial firms show stronger balance sheets.** Leverage is now in line with pre-crisis levels and similar to other countries in the region. Firms show strengthened capacity to repay obligations and improved profitability. Currency mismatches on bank loans have declined substantially. Corporate bond financing, although still moderate, has doubled in the last four years to \$6 billion in 2005.
- **Regulations aimed at enhancing governance have been incorporated into the institutional environment.** Partly as a result of this, risks of over-borrowing, misreporting, and abusing related-party lending, have diminished. However, there are many areas for improvement: courts are reportedly still ineffective, adequate provisions for corporate debt restructuring are lacking, and minority shareholders are not adequately protected.

¹ Prepared by R. Armando Morales and Wiwit Widyastuti (IMF Jakarta Office).

² Nonfinancial companies listed in the JSX (279 companies out of a total of 341 in 2005). For these companies, market capitalization is only slightly above 20 percent of GDP, but it is estimated that sales of listed companies are equivalent to 50 percent of sales by major domestic private companies (Okuda and Take, 2005).

- **Remaining corporate vulnerabilities explain the lingering reluctance of banks to lend to riskier corporate borrowers.** The share of short-term borrowing is higher for domestic corporations relative to foreign; coverage of interest payments is relatively low for Indonesian corporations, partly explained by higher interest rates in recent years; and the profitability of the top 100 largest firms is still weak.
4. **The decline in corporate leverage may have resulted to a large extent from supply-side constraints.** Because of the gap between the regulatory environment for banks and firms, banks have been reluctant to lend to avoid risks associated with eventual difficulties in loan recovery and execution of collateral. Thus, at least in part, declining leverage reflects reduced availability of financing to an important segment of the corporate sector. Foreign creditors, the main source of financing to the corporate sector until 2004, also seem to have been more reluctant to lend directly to firms recently, so that in 2005 banks were once again the main source of corporate financing. To the extent that the financing needs of the corporate sector are partially unattended in an environment of increased caution, this means that the level of investment and economic activity may be running below potential.
5. **This chapter is organized as follows:** in the next section, background is provided on the financial evolution of the corporate sector since the crisis, as well as on the corporate governance environment. Next, indicators on leverage, liquidity, solvency, and profitability are discussed, with an emphasis on latest developments, trying to differentiate the evolution for different types of corporations. Finally, the paper discusses conclusions and policy implications. Four types of data are used for the analysis of financial indicators (see Section C): information from an IMF database drawing on financial statements of firms listed in the JSX, information on individual firms from Thompson Watch to obtain the distribution around the mean, information from Worldscope updated to September 2005 for the same sample of firms to analyze recent trends of selected financial ratios, and information from Worldscope and the JSX for the top 100 firms to differentiate financial indicators based on the ownership structure.

B. Background

Financial Evolution of the Corporate Sector

6. **Indonesia was the country most severely affected by the Asian financial crisis, with GDP declining by 13 percent in 1998.** The financial system suffered severe simultaneous shocks.³ The impact on the cost of borrowing for the corporate sector was substantial, unmasking the low quality of the bank portfolios in the context of widespread currency and maturity mismatches. Massive defaults caused the banking system to collapse. The subsequent recovery of financial intermediation has also been slower than in the rest of the region. Bank intermediation, defined as the credit-to-GDP ratio, has declined from a peak

³ Shocks included a depreciation of the rupiah by about 300 percent between 1997 and 1998 and an increase in the central bank interest rate from 12.5 percent to 70.5 percent in the same period.

of 61 percent of GDP in 1997 to 18 percent in 2001, to recover to just 25 percent of GDP in 2005 (the lowest ratio in emerging Asia).

7. **The condition of the corporate sector has been made more difficult by the modest development of capital markets.** Stock market capitalization for the nonfinancial corporate sector declined from 35 percent of GDP in 1996 (40 percent for all listed companies) to about 11 percent in 2002. The increase in the number of listed companies has been meager, from 269 to 279 between 2001 and 2005. The recent recovery in stock market capitalization to 22 percent of GDP in 2005 was driven mainly by higher stock prices.⁴ Also, the lack of long-term liquidity in the financial market has constrained the development of the corporate bond market. Although issuance of corporate bonds increased from \$3 billion to \$6 billion between 2001 and 2005, it is equivalent to just 10 percent of stock market capitalization.

8. **Despite modest bank intermediation, bank financing has regained prominence as a source of corporate financing in recent years.** Corporate borrowing from domestic banks in 2005 surpassed external borrowing as the main source of corporate financing. This has contributed to a reduction of currency mismatches, since bank intermediation is chiefly conducted in domestic currency. However, this development has contributed to a shortening of the maturity profile of corporate borrowing, since bank loans are typically concentrated in short-term loans (equivalent to 72.6 percent of the total loans in 2005, against 19.4 percent for external loans) (Figure 1).

Evolution of the corporate governance environment

9. **Severe governance problems had to be addressed following the crisis.** During the 1990s, corporate groups linked to banks, operating in a weak institutional environment, were able to borrow beyond what was economically justified at a low cost of funds. In this period, concentration of ownership was highest in the region, with ten families controlling more than half of the corporate sector.⁵ Firms were able to disguise their actual financial position, overstate profitability, and continue to operate even after they were no longer financially viable.⁶

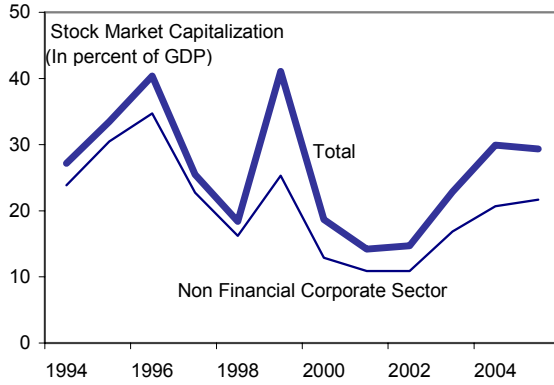
⁴ Compared to stock market capitalization of 154 percent of GDP in Malaysia and 68 percent in Thailand.

⁵ Moreover, 17 percent of the market capitalization was traced back to a single family and 417 companies belonged to one family (Claessens, Djankov, and Lang, 1999).

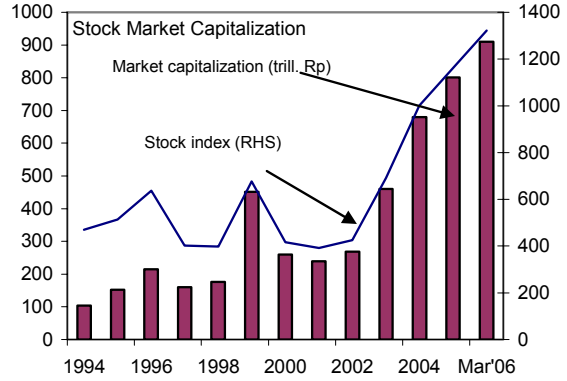
⁶ Return on equity and operational margin for Indonesian corporations were reported to be the highest in the region, together with Thailand and the Philippines (Claessens, Djankov, and Xu, 2000).

Figure 1. Indonesia: Composition of Corporate Financing

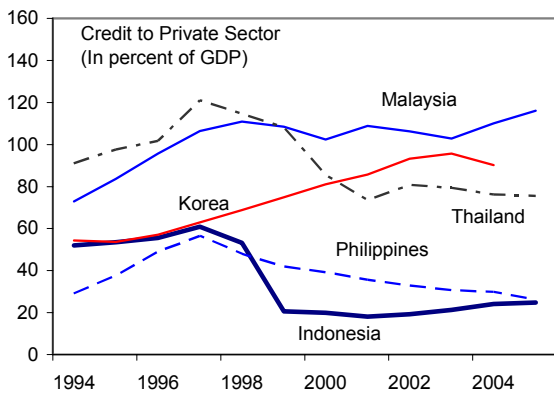
Stock market capitalization remains modest and ...



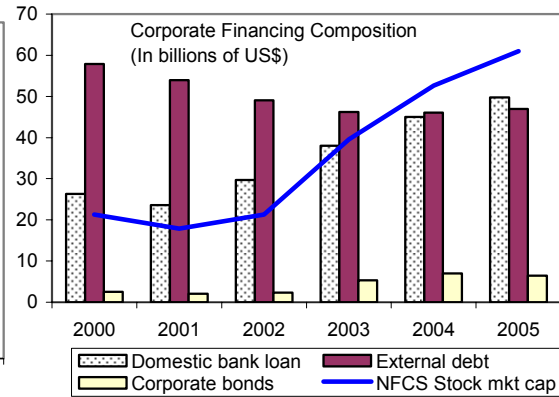
... recent gains have been driven by prices.



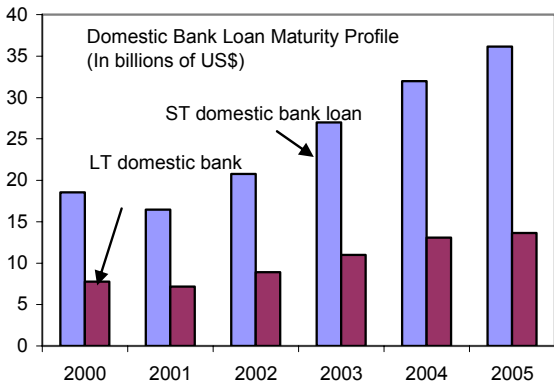
Although bank intermediation remains moderate ...



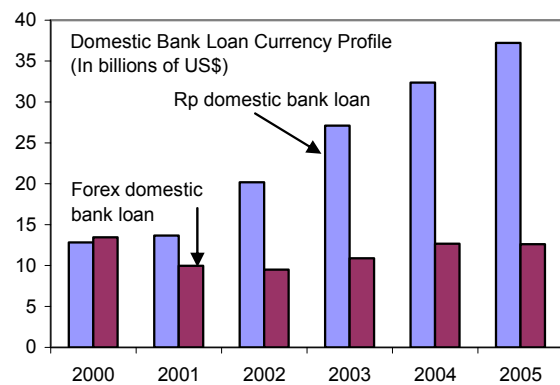
... bank financing has recovered prominence.



Bank loan maturity is still short term ...

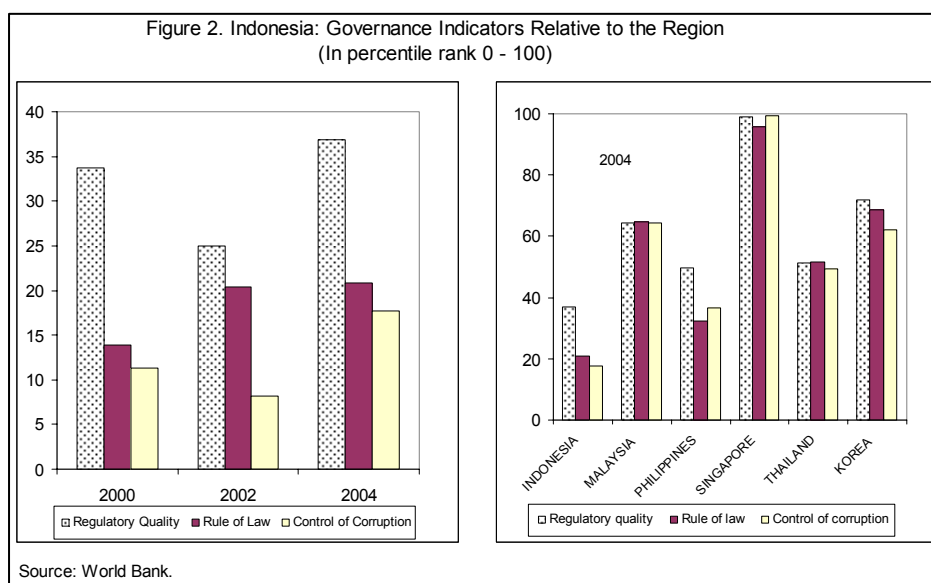


... and improved hedging explains declining currency mismatches.



Sources: CEIC database; IMF, *International Financial Statistics*; and Bank Indonesia.

10. **Corporate governance regulations and practices have been upgraded since the crisis.** Widespread bank-corporate ownership ties were broken as a result of bank restructuring, facilitated by the removal of restrictions on ownership structure of firms. Financial reporting has become more transparent following the adoption of basic international financial reporting standards. The excessive degree of ownership concentration observed prior to the crisis has moderated significantly. A Code of Good Corporate Governance was published in March 2001 by the National Committee on Corporate Governance (founded in 1999). The upgrade of corporate governance has also found support in the ongoing anti-corruption drive by the government, as well as from better banking regulation and supervision.



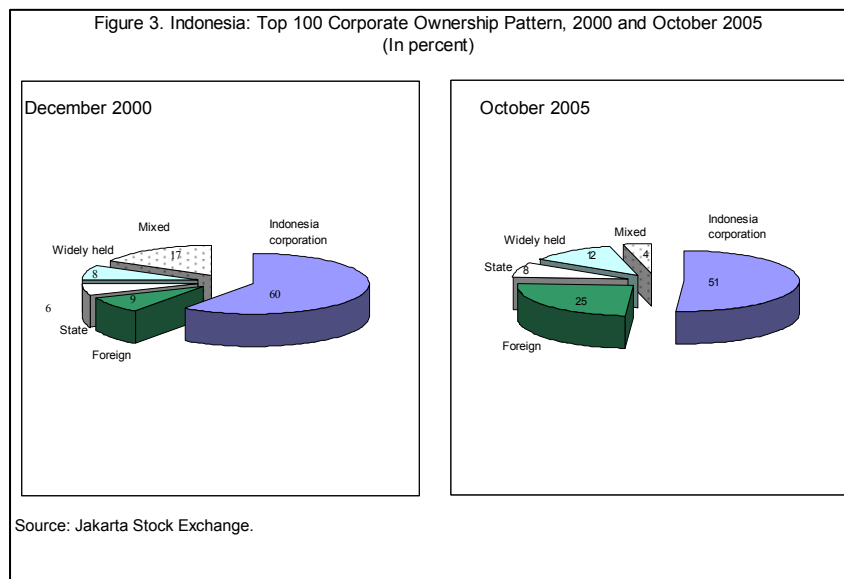
11. **Despite gains in the quality of the institutional framework, corporate governance could still be significantly improved.** According to indicators compiled by the World Bank up to 2004,⁷ there is a trend toward improved regulatory quality, compliance with the rule of law, and control of corruption. However, governance indicators still compare unfavorably with neighboring countries (Figure 2). Priority areas for improvement include legal and judicial reform, the full adoption of international financial reporting standards, the introduction of adequate mechanisms for corporate debt restructuring; and further improvements in capital market surveillance.

12. **More specifically, a World Bank Report on the Observance of Standards and Codes (ROSC) in the corporate sector, completed in 2004, found the following problems:**

⁷ The World Bank constructed six aggregate governance indicators for four periods based on several hundred individual variables measuring perceptions of governance, drawn from 37 separate data sources constructed by 31 different organizations.

- **Insufficient disclosure of cross-ownership.** Pyramidal structures remain and family-based groups are still significant, despite some dismantling of widespread bank-corporate groups. Disclosure is required by the Capital Market Supervisory Authority (*Bapepam*) for shares in ownership of 5 percent or more for listed companies, but detection of cross-ownership is difficult because of deficient reporting procedures. In an environment where separation of shareholders and management is not clear, this may result in the abuse of power by controlling shareholders to pursue group/family interests above those of the firms.
- **Quality of financial statements not fully consistent with international standards and practices.** Despite significant progress since the crisis, inconsistencies between the Indonesian accounting standards and International Financial Reporting Standards (IFRS) remain, particularly as some standards have been modified to suit local requirements. However, one of the main reasons why the number of firms listed in the JSX has increased only slowly, according to stock exchange analysts, is because of the reluctance of firms to comply with more stringent disclosure and financial reporting standards.
- **Weak legal basis for related-party transactions.** Regulations have been introduced to limit related-party transactions (transactions with firms and individuals belonging to shareholders), but their full implementation is still pending. *Bapepam* requires the approval of independent shareholders for any related-party transactions. However, the Capital Market Law apparently does not provide adequate powers to officials, beyond some administrative sanctions, to enforce the regulations.

13. **A classification of firms by ownership type shows that changes in the governance framework have had a moderate impact on the corporate ownership structure** (Figure 3). In this paper, a classification by ownership type is made following Sato's (2000) methodology for the 100 largest nonfinancial corporations. The top 100 companies were determined based on the value of assets of nonfinancial companies listed in the JSX as of



December 2000 and September 2005. Private domestic corporations were divided between “Indonesian corporations” (those for which a single shareholder or group held more than 40 percent of equity) and corporations with “widely-held” shares (the largest shareholder holding 40 percent or less of equity). Additional categories comprise foreign corporations and state-owned corporations, using the same criterion. Borderline cases were classified as “mixed” companies. A clear trend is observed away from family-based structures to more widely-held ownership following the crisis. Nevertheless, “Indonesian corporations” remain predominant, in many cases using ownership structures that are not fully transparent.

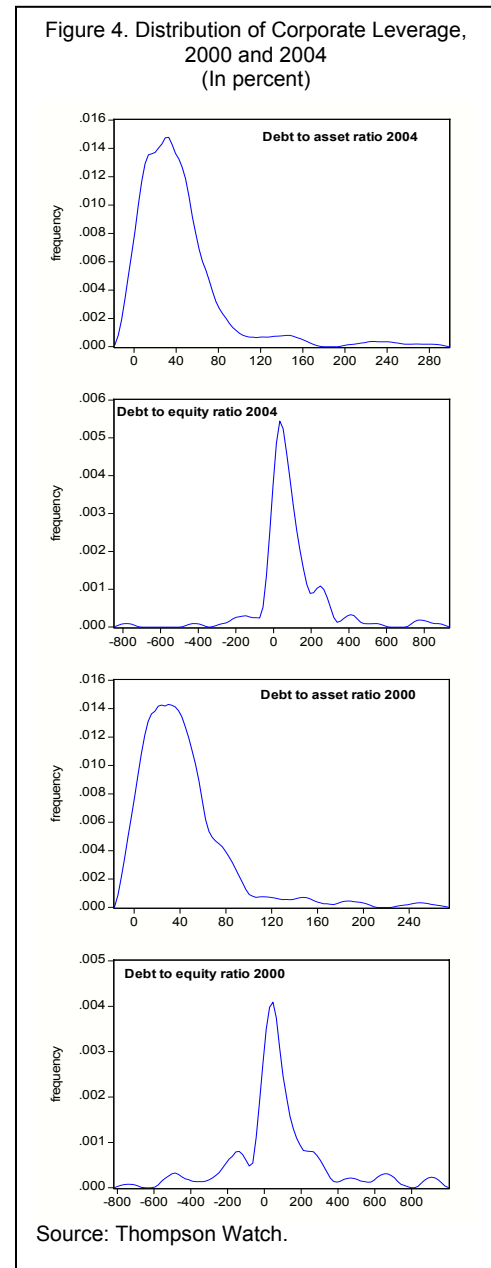
C. Recent Corporate Financial Performance

14. **Most indicators on leverage, liquidity, solvency, and profitability show significant improvement since the crisis.** For the overall analysis of financial performance, financial ratios are calculated using data from nonfinancial companies listed in the JSX. However, it should be noted that the sample is less representative than for other countries, since market capitalization is low. Two kinds of ratios are calculated: the capital-weighted mean and the median. While the former gives more weight to larger firms, the latter serves as a proxy to assess the behavior of medium-size firms. Although only information up to 2004 was available for this exercise for the whole sample of firms, some indicators were updated up to the third quarter of 2005 for the same sub-sample of firms using information from Worldscope.

Leverage Indicators

15. **Leverage has returned to pre-crisis levels.** A decline in leverage is observed relative to assets, equity, and sales. The more even distribution of leverage around the value of equity rather than assets seems to suggest that supply rather than demand factors shape the leverage structure (Figure 4). The decline in leverage relative to equity is influenced by the recent increase in stock valuation (Figure 5). A change in the sectoral composition of firms listed in the JSX, including the de-listing of a few highly-leveraged nonfinancial firms following the crisis (10 out of about 100)⁸ could also have played a role in the

⁸ In the same period, 21 financial firms were de-listed.



observed reduction of leverage, since highly-indebted firms belonging to the basic industries sector experienced a reduction in their share in market capitalization relative to services and manufacturing of consumer goods.

16. Some differences in leverage patterns between large and medium-sized firms are revealing (Figure 5). Large firms resort more intensively to financing through retained earnings. Leverage relative to assets seem to be higher for less asset-intensive medium-sized firms compared to larger firms, while the opposite is true for the debt-to-equity ratio. The share of short-term debt does not show a significant decline, especially for smaller firms as they are likely to have had more difficulties in obtaining long-term financing.

Liquidity, profitability, and solvency

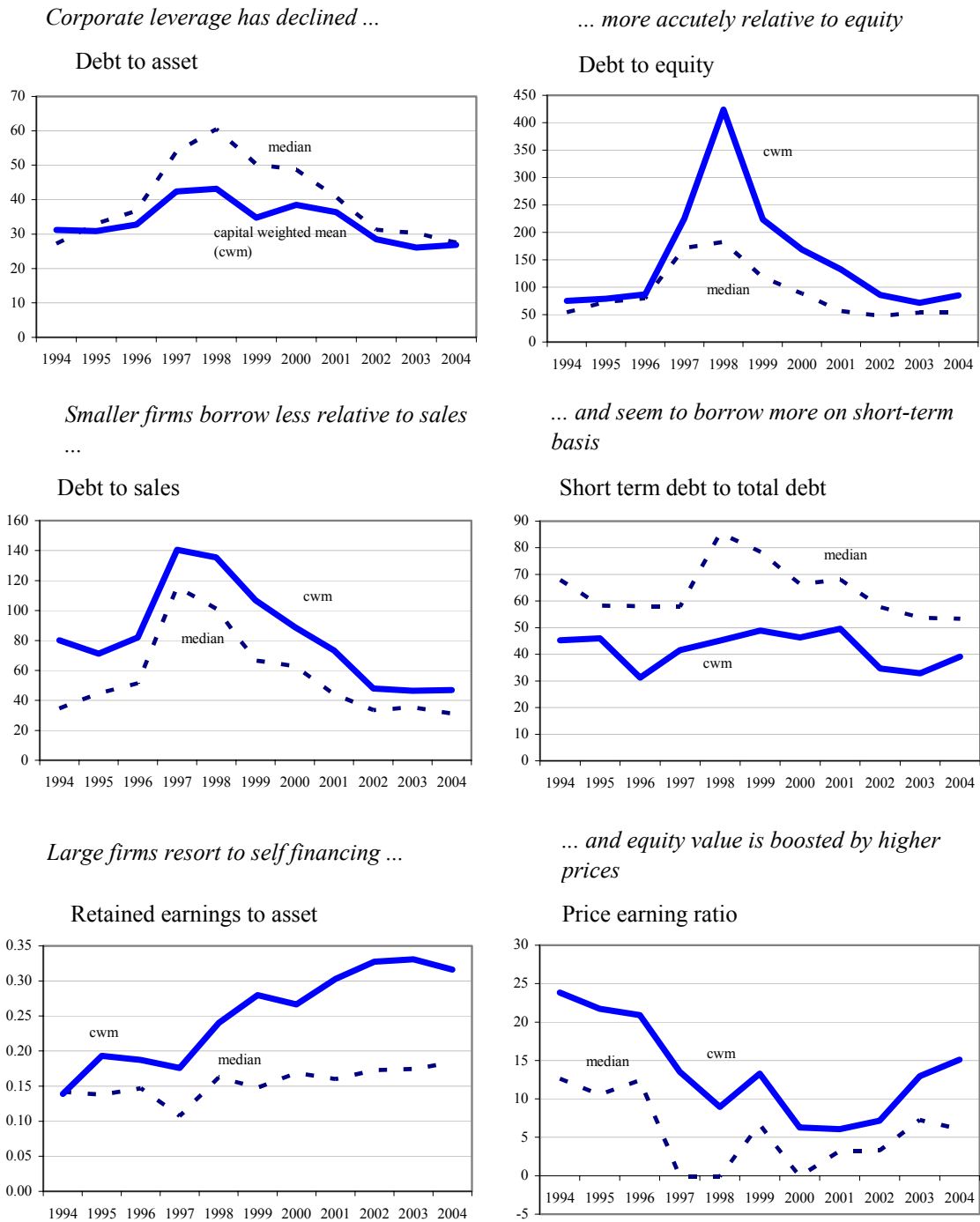
17. Liquidity ratios have improved, especially for larger firms. The ratio of working capital over assets has steadily increased (Figure 6). Inventories appear to have contributed significantly to the improvement in liquidity, since the liquidity ratio excluding inventories (Quick ratio) has risen at a more measured pace. Interest payments are covered comfortably by earnings (interest coverage ratio), although less for medium-size than large firms, the former having been more adversely affected by higher interest rates.

18. The recovery of profitability ratios is impressive, which contributes to a lower probability of default. However, it should be noted that this result may be influenced by Indonesian accounting standards not being fully in line with IFSR. Both the return-on-assets (ROA) and return-on-equity (ROE) ratios have improved strongly, with the latter exceeding the average levels prevailing before the crisis. The distance-to-default ratio (a reverse measure of the probability of default based on Merton-Scholes valuation of equities as a call option) has recovered to about precrisis levels.

Comparative performance and recent financial trends

19. The financial performance of the Indonesian corporate sector is comparable to that of the other countries in the region for 2000–04 (Figure 7). The average debt-to-assets and debt-to-equity ratios, of about 30 percent and 100 percent, respectively, are similar to most countries in the region except for Thailand. The share of short-term debt, at about 40 percent of total debt, is lower than in Korea and not much higher than other countries in the region. Liquidity, as measured by the Quick ratio, is broadly comparable to other countries in the region, except for the Philippines. Profitability of Indonesian firms is higher than in other countries, with ROE exceeding 27 percent.

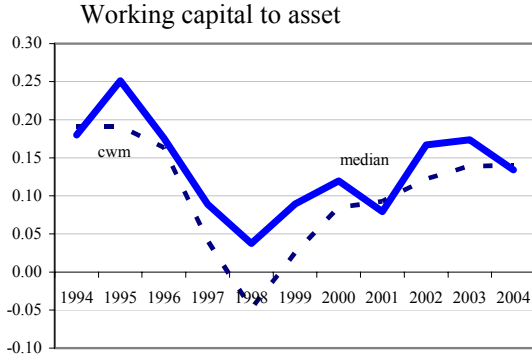
Figure 5. Indonesia: Corporate Leverage Indicators, 1994-2004



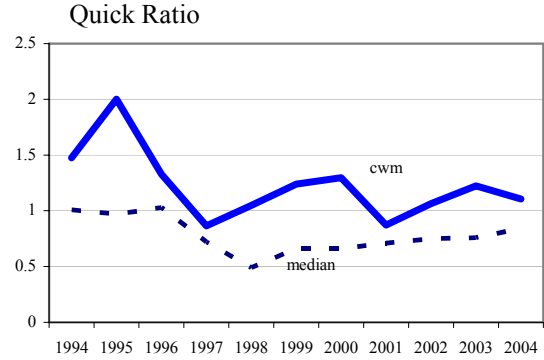
Source: IMF database (sample of firms from an IMF database using information from companies listed in the Jakarta Stock Exchange).

Figure 6. Indonesia: Corporate Liquidity, Profitability and Solvency, 1994-2004

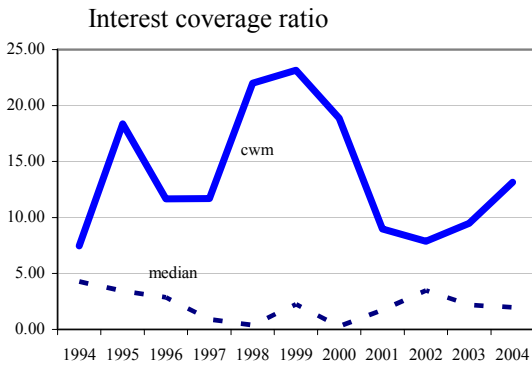
Overall liquidity shows a steady improvement ...



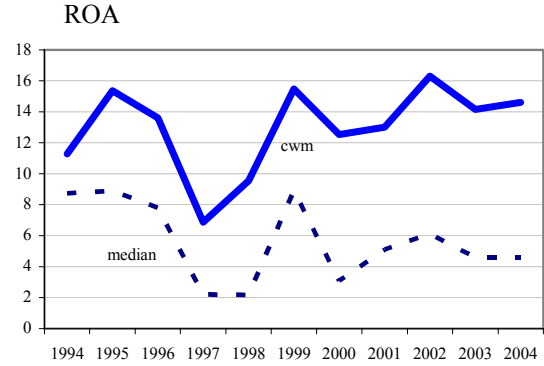
... but less pronounced net of inventory



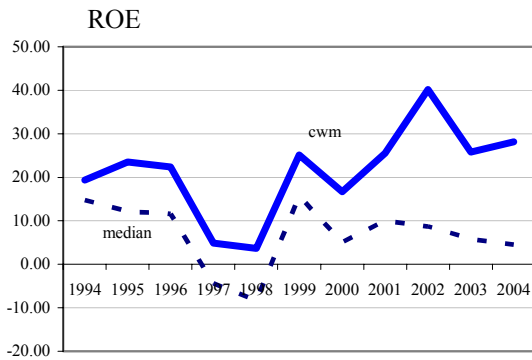
Large firms earnings cover interest payment comfortably ...



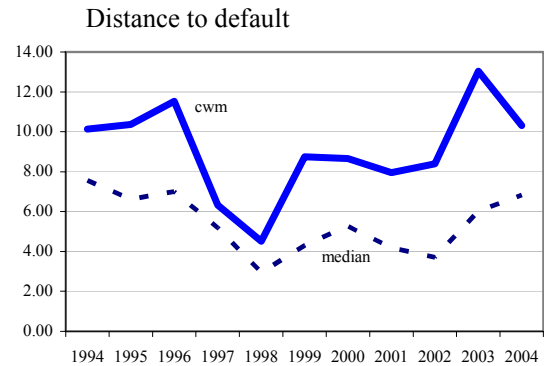
... and show much higher return on asset ...



... and also higher return on equity relative to smaller firms ...

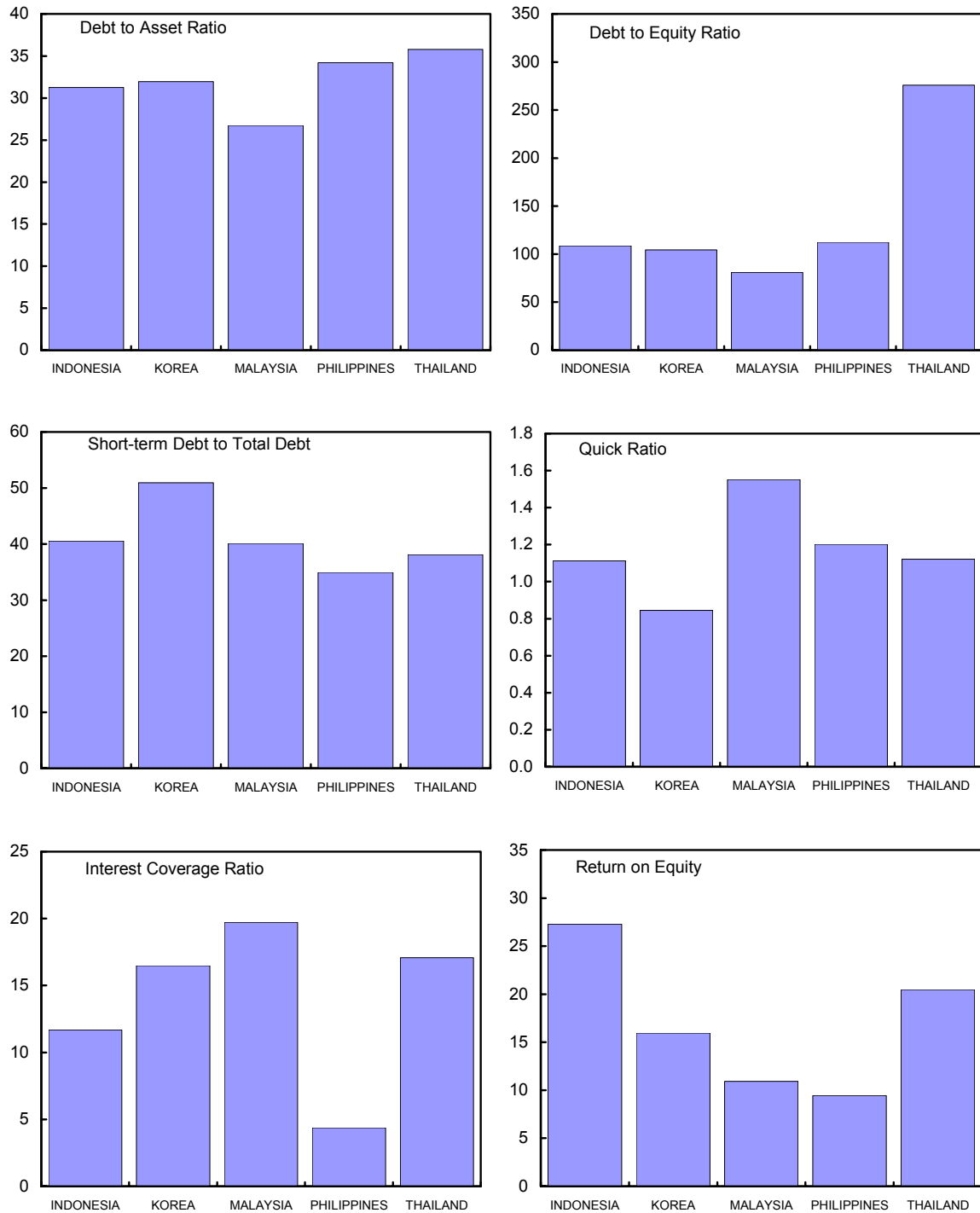


... but likelihood of default declines for all firms



Source: IMF database

Figure 7. Indonesia: Corporate Financial Indicators in Selected Asian Countries, 2000-2004 (In percent)



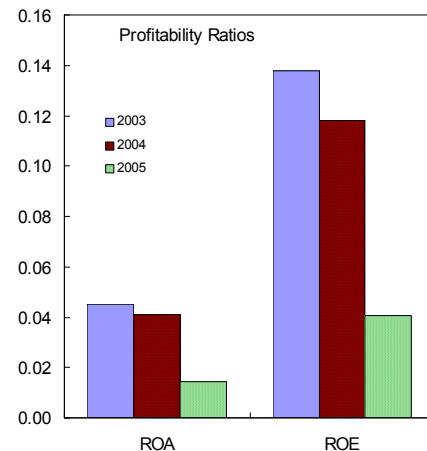
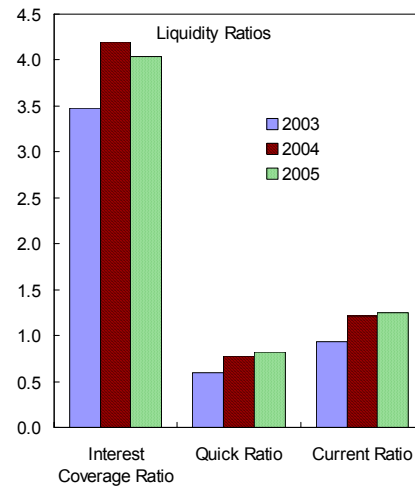
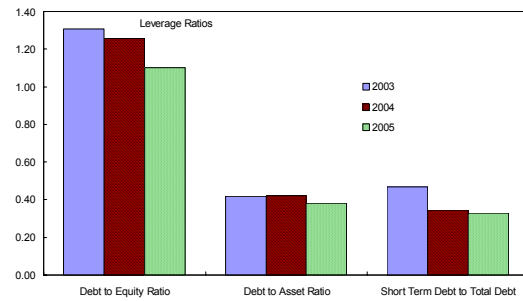
Source: IMF database.

20. **The evolution of key financial indicators through September 2005 shows some weakening.** Overall, continuing de-leveraging, higher preference for liquidity, and declining profitability may reflect the fact that the restricted availability of financing is becoming a binding constraint for some firms. Based on information available from Worldscope for listed nonfinancial firms,⁹ debt-to-asset and debt-to-equity ratios continue to show declines, with a slightly lower share of short-term debt. Firms also continue to increase their “liquidity buffer.” However, such an improvement is not observed for the interest coverage ratio, because of high interest rates. Profitability ratios declined markedly in the period, right at the outset of the recent slowdown of economic activity (Figure 8).

21. **Financial performance shows marked differences between “Indonesian corporations” and other categories** (Figure 9). Although all firms show a decline in leverage, “Indonesian corporations” maintain higher leverage than other types, especially in recent times. Also, the share of short-term debt is higher for “Indonesian corporations,” while their liquidity position and interest coverage ratio are less comfortable. Profitability is higher in foreign firms relative to domestic firms.

22. **“Indonesian corporations” appear to have more limited access to financing and this is reflected in their weaker financial position.** Banks are reluctant to lend to companies that have had a poor track record in terms of loan recovery, especially given the difficulty to execute collateral by resorting to the courts. Also, banks are reluctant to increase loan exposure to

Figure 8. Recent Trends in Selected Corporate Financial Indicators, 2003–2005



Source: Worldscope.

⁹ Ratios were calculated for 2003 and 2004 for firms for which the same ratios were available up to September 2005.

“Indonesian corporations” that keep ownership structures that are not transparent (based on pyramidal schemes). Some of these groups still have substantial obligations on earlier loans, which explain their higher leverage ratios, and are therefore reportedly having problems accessing new financing.

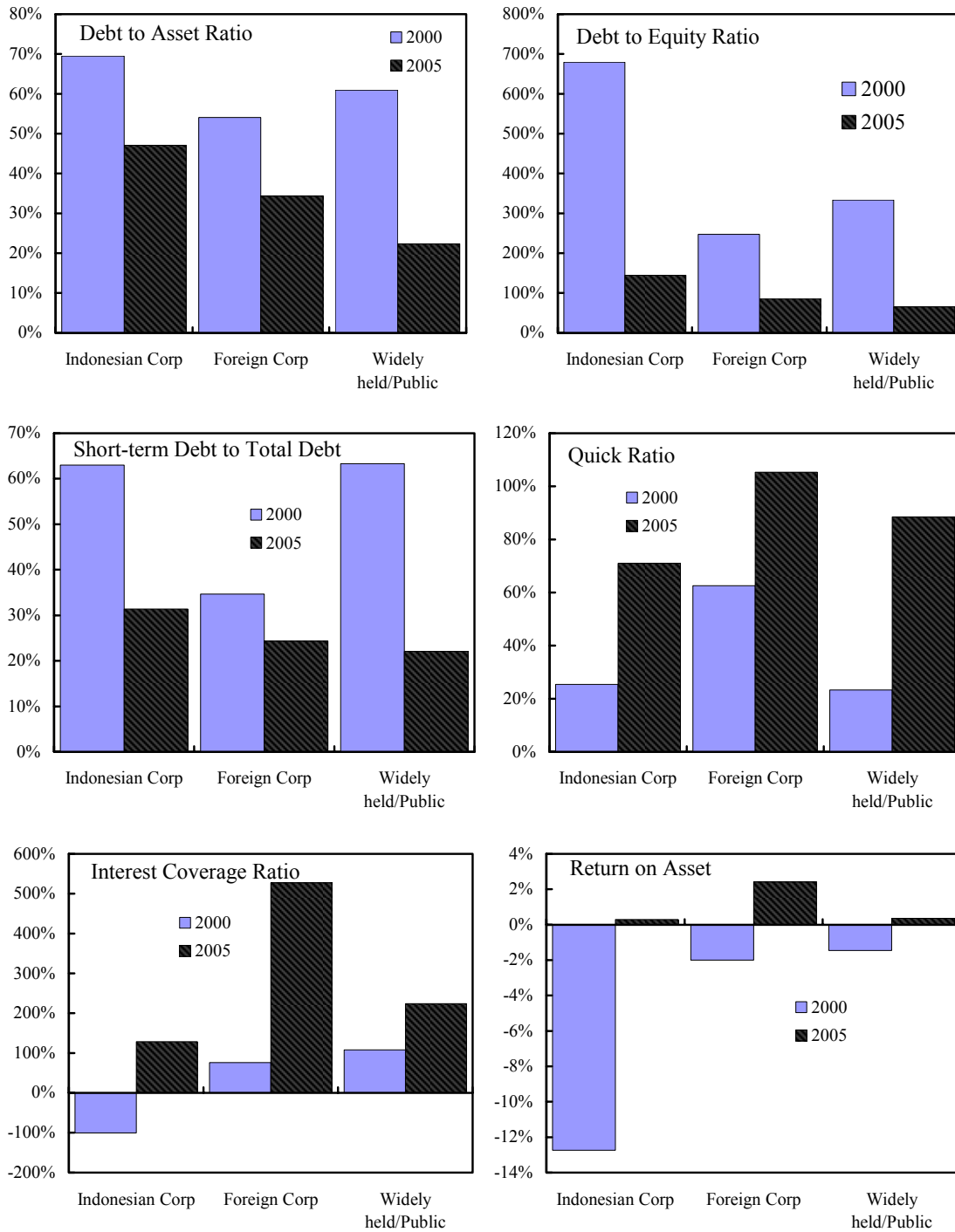
D. Conclusions and Policy Implications

23. **The financial performance of the corporate sector is promising.** The improvement in solvency has helped them to weather the recent slowdown in economic activity and, going forward, should help them to cope with shocks. Firms show improved “financial fundamentals” and their pursuit of nonbank sources of funding has led to some development of corporate bond financing, although this market is still too small to meet their needs. Further improvement of banking supervision would ensure a more appropriate channeling of financial resources from banks to the corporate sector.

24. **The development of capital markets is crucial to strengthening corporate capital financing and investment.** Bank financing has become dominant in spite of increased caution because alternative sources of financing have not kept pace with the growth in companies assets and equity. Additional investment to support the expansion of the capital base to achieve higher growth can only be possible with decisive progress in capital market development.

25. **“Governance imbalance” between the financial and the nonfinancial sector may also be hampering long-run growth.** The availability of bank financing to “Indonesian corporations” has remained limited. Bank lending to these groups entails uncertainties regarding the capability of banks to fully exercise their creditor rights in courts in the event of difficulties in loan recovery. To resolve such an imbalance, further progress on legal and judicial reforms, the full adoption of international financial reporting standards, appropriate mechanisms for corporate debt restructuring, and further improvements in market surveillance is needed.

Figure 9. Indonesia: Top 100 Corporate Financial Indicators, 2000 and 2005



Source: Worldscope

REFERENCES

- Allen, Franklin, 2001, "Financial Structure and Financial Crisis," *International Review of Finance*, Vol. 2:1/2, pp. 1–19.
- Claessens, Stijn, Simeon Djankov, and G. Ferri, 1999, "Corporate Distress in East Asia: The Effect of Currency and Interest Rate Shocks," *World Bank Public Policy Journal No. 172*.
- Claessens, Stijn, Simeon Djankov, and Larry H. P. Lang, 1998, "East Asian Corporates: Growth, Financing and Risks over the Last Decade," World Bank, mimeo.
- Claessens, Stijn, Simeon Djankov, and Larry H. P. Lang, 1999, "Who Controls East Asian Corporations-and the Implications for Legal Reform," *World Bank Public Policy Journal No. 195*.
- Claessens, Stijn, Simeon Djankov, and Lixin Colin Xu, 2000, "Corporate Performance in the East Asian Financial Crisis," *The World Bank Research Observer*, Vol. 15, pp. 23–46.
- Driffield, Nigel, Vidya Mahambare, Sarmistha Pal, 2005, "How Ownership Structure Affects Capital Structure and Firm Performance? Recent Evidence from East Asia," Aston Business School, Cardiff Business School, Brunel University.
- Fitzpatrick, Daniel, 2003, "Tinkering Around the Edges: Inadequacy of Corporate Governance Reform in Post-Crisis Indonesia," *Business in Indonesia: New Challenges, Old Problems* (Singapore: Institute of Southeast Asian Studies).
- Husnan, Saud, 2001, "Indonesia," *Corporate Governance and Finance in East Asia*, Vol. 2 (Manila: Asian Development Bank).
- Kagda, Shoeb, May 13, 2006, "Large Indonesian Firms Change with the Times," *Business Times* Singapore.
- Kawai, Masahiro, 2000, "The Resolution of the East Asian Crisis: Financial and Corporate Sector Restructuring," *Journal of Asian Economics*, Vol. 11, pp. 133–68.
- Okuda, Hidenobu, and Yasushi Take, 2005, "Economic Reforms and Financing Structure of Indonesian Listed Companies after the Asian Crisis: Corporate Finance Issues and the Solutions," *Japan Bank for International Cooperation Review*, Vol. 12, pp. 1–31.
- Pomerleano, Michael, 1998, "Corporate Finance Lessons from the East Asian Crisis," *World Bank Public Policy Journal No. 155*.
- Rosser, Andrew, 2003, "Coalitions, Convergence and Corporate Governance Reform in Indonesia," *Third World Quarterly - Journal of Emerging Areas*, Vol. 24, pp.319–37.
- Sato, Yuri, 2000, "Corporate Ownership and Management in Indonesia: Does It Change?" *Business in Indonesia: New Challenges, Old Problems* (Singapore: Institute of Southeast Asian Studies).
- World Bank-International Monetary Fund, 2004, *Corporate Governance Country Assessment Republic of Indonesia*. Report on the Observance of Standards and Codes (ROSC).

III. MEASURING SOVEREIGN AND BANKING SECTOR RISK IN INDONESIA: AN APPLICATION OF THE CONTINGENT CLAIMS APPROACH¹

A. Introduction

1. **The *balance-sheet approach* is a tool developed by economists to help understand the evolution of risks in an economy-wide setting.**² This approach collects information on the size and structure of assets and liabilities of key sectors of an economy, in order to assess the extent of currency and maturity mismatches, or imbalances in the debt and equity structure (such as an excessive reliance on debt). However, balance sheet data do not provide a full picture of all the risks facing a country, because of the contingent nature of many risks. Accounting balance sheets, particularly at the economy-wide level, are also typically valued at full face value (or book value), and are not adjusted to reflect fluctuations in market prices or changes in the likelihood of default. Valuing assets using marked-to-market prices and incorporating contingent liabilities can provide a more complete picture of the risks inherent in a balance sheet.

2. **The contingent-claims approach (CCA) provides a methodology to combine balance sheet information with widely used finance and risk management tools to construct marked-to-market balance sheets that better reflect underlying risk.** It can be used to derive a set of risk indicators that can serve as barometers of risk and financial sector vulnerability. The CCA has been widely used in financial markets to derive risk indicators for corporations, and its use has been recently extended to sovereign balance sheets and industry-wide balance sheets.³ To date, the CCA has been applied at the sovereign or industry level for illustrative purposes only, since there are numerous challenges in calibrating the methodology without extensive cross-sectional or historical databases like there are for models of the corporate sector.

3. **This paper examines the evolution of sovereign and banking-sector risk in Indonesia using the CCA.** The first section outlines the methodology and constructs a set of risk-adjusted balance sheets for the period 2000-2005. The second section of the paper assesses the impact of the recent market turbulence in May and June 2006 on risk indicators. The third section of the paper considers the sensitivity of current balance sheets to potential shocks and changes in the structure of debt.

4. **The results show a steady improvement in the health of sovereign and bank balance sheets since mid-2001.** The recent market volatility has caused risk indicators for the sovereign to show a modest deterioration, with improvements towards the end of June returning indicators to end-2005 levels. For the banking system, risk indicators for state-

¹ Prepared by Matthew T. Jones and Dale Gray, with assistance from Yingbin Xiao.

² See Allen et al. (2002), IMF (2004), and Mathisen and Pellechio (2006) for an overview of the balance sheet approach.

³ See McQuown (1993) and Crosbie and Bohn (2003) for details of the application to corporations, and Gray, Merton, and Bodie (2002) and Gapen et al. (2004, 2005) for application to the sovereign and industry-wide balance sheets.

owned banks deteriorated modestly as a result of recent volatility, reversing some of the gains of 2005.

B. Constructing Risk-Adjusted Balance Sheets for Indonesia

5. **To understand changes in the overall level of risk facing a balance sheet, an estimate of the value of total assets and their volatility is needed, since they are typically not observable directly.** Because many of the assets on the balance sheet are not traded, and are observed only at infrequent intervals, it is difficult to derive marked-to-market balance sheets. In contrast, many liabilities are traded, and thus can be valued more readily using methods from finance theory to impute the value and volatility of assets using the liability side of the balance sheet. Merton's (1974) key insight in option pricing theory was that liabilities are contingent claims on total assets, with each liability having a different priority and maturity structure. The most junior liability on the balance sheet can be valued as an implicit call option on total assets. When the value of assets declines relative to the face value of debt, the value of the junior claims declines. Since the liability structure is observed, and many of the liabilities are traded, market prices of different liabilities can be used to derive information on the evolution of total assets. The framework can be applied to individual firms, or at a more aggregated level for an industry or for the sovereign.

The Sovereign Balance Sheet

6. **We can use the CCA to estimate the risks to the combined balance sheet of the Indonesian central government and Bank Indonesia,**⁴ following the process in Gray, Merton, and Bodie (2002), and Gapen, et. al (2005). The main elements on the asset side of the public sector balance sheet include international reserves, the net present value of primary surpluses, and the public sector's monopoly on the issuance of money. These assets are net of any guarantees the public sector may implicitly or explicitly provide to the private sector. The main elements on the liability side of the public sector balance sheet are domestic currency liabilities (domestic currency debt and base money), and foreign currency debt. Thus, the balance sheet of the public sector can be described in the following highly-stylized manner:

7. **Estimating the observed value and volatility of sovereign assets directly is difficult, since only international reserves are directly observable on the asset side of the public sector balance sheet.** In contrast, each entry on the liability side of the balance sheet is directly observable on a high-frequency basis for Indonesia.⁵ The CCA uses observed liabilities together with well-known option pricing techniques to derive implied estimates for sovereign asset value and asset volatility. Figure 1 illustrates the different stages of this process.

⁴ This paper combines balance sheet information from the central government and the central bank. Data on regional governments are not readily available on a timely basis, and their stock of debt is minimal.

⁵ Domestically-issued debt prices are available daily, debt stocks are available monthly. Base money is available daily, and foreign currency debt is available quarterly.

Table 1. Stylized Sovereign Balance Sheet

Assets	Liabilities
<ul style="list-style-type: none"> ▪ International Reserves ▪ Net Fiscal Assets (Discounted Value of Primary Fiscal Surpluses) ▪ Value of Monopoly over Issue of Money ▪ Other Assets less Guarantees 	<ul style="list-style-type: none"> ▪ Domestic Currency Debt ▪ Base Money ▪ Foreign Currency Debt

8. **Domestic currency liabilities of the sovereign can be modeled as junior claims,⁶ whereby holders of these liabilities have a residual claim on sovereign assets above what is necessary to service foreign currency debt.** If sovereign assets fall to a level where foreign currency debt payments cannot be made, then default is the result. This level is referred to as the distress barrier (DB), and is equivalent to the default-free value of debt.⁷ Therefore, the value of domestic currency liabilities can be viewed as a call option on sovereign assets with a strike price equal to the level of the distress barrier. Holders of such liabilities receive the maximum of either sovereign assets minus the distress barrier, or nothing in default. The Black-Scholes option pricing formulae can be used to estimate sovereign asset value and volatility with only a few select variables: the value and volatility of domestic currency liabilities (V_L and σ_L , respectively), the distress barrier (DB), the risk-free interest rate (r_f), and time (t).⁸ Once the implied asset values and volatilities are calculated, a range of risk indicators can be derived, including the distance to distress (the number of standard deviations away from the distress barrier), the probability of default, and the credit spread on sovereign assets.

The banking sector balance sheet

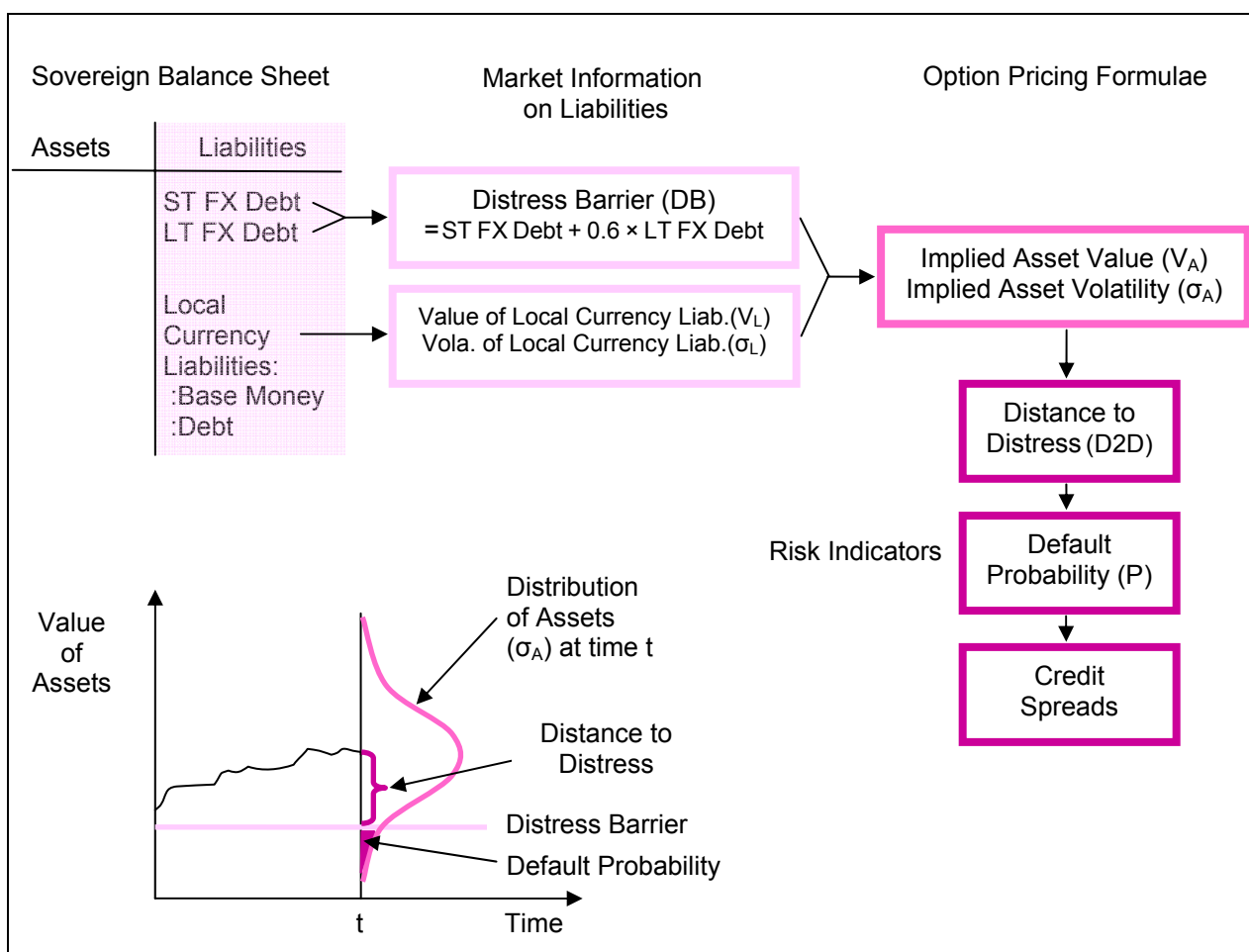
9. **The process of estimating total assets and their volatility for the banking system is similar to that for the sovereign.** However, instead of focusing on the value of domestic currency liabilities, the market value of equity (i.e., total market capitalization from stock price data) and its volatility, together with the distress barrier, can be used to calculate implied assets and their volatility.

⁶ The CCA assumes foreign currency debt is senior to local currency debt, i.e., governments in distress situations are more likely to first “dilute” the holders of local currency debt (e.g. through inflation), or restructure part of such debt, before defaulting on foreign currency debt. See Gapen et al. (2005). The methodology can be applied with a different seniority structure (e.g., to permit equal seniority for foreign and domestic debt).

⁷ This analysis assumes foreign currency debt includes both external debt and domestic currency dollar-linked debt. The distress barrier is equal to short-term foreign currency debt and 60 percent of long-term foreign currency debt plus interest due up to time t (one year). Research by KMV provides empirical evidence that the fraction of long-term debt for corporates averages around 0.5 to 0.6, and 0.6 to 0.8 for banks. For banks, a value of 0.8 is used for this study, while for the sovereign a value of 0.6 is used. This adjustment is done because assets can fall below total debt for long periods without default if most of the debt is long term, so an adjustment is made to reduce the weight of long-term debt in the distress barrier.

⁸ See Merton (1974).

Figure 1. Overview of CCA for the Sovereign



10. For Indonesia, the largest private and public banks are included in the analysis.

Two groups of banks are defined: the 3 large majority state-owned banks (Bank Mandiri, BNI, and BRI), and the 9 largest private banks.⁹ The daily market capitalization based on traded stock prices is used to calculate the volatility of bank equity for all 12 banks. The book value of short- and long-term obligations¹⁰ are used to calculate the distress barrier for the bank. The distress barrier, market capitalization, and volatility of market capitalization can be used to calculate the implied asset value and implied asset volatility. This is then used to calculate the distance-to-distress, the probability of default, as well as the expected losses of the individual banks.¹¹ Aggregated figures for all private banks and for the state-owned banks are then derived by summing the respective balance sheets and calculating the risk indicators for the two groups of banks.

⁹ Three additional banks have data available for some of the period under consideration, but were excluded because they were not available continuously through the period.

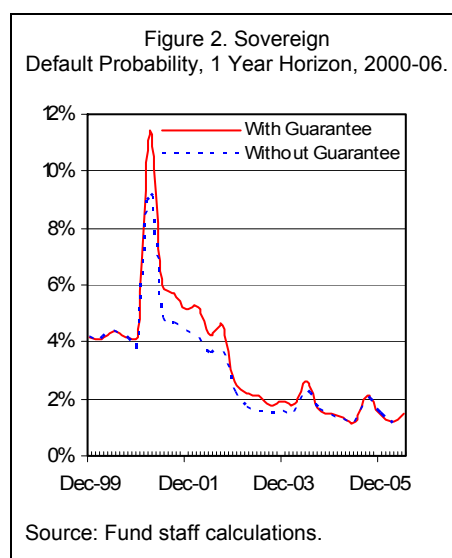
¹⁰ Short-term liabilities include Giro liabilities, other current liabilities, savings deposits, and interbank deposits. Long-term liabilities include time deposits, CD deposits, promissory notes, other long-term loans, and other liabilities. Quarterly balance sheet data were provided by Bank Indonesia.

¹¹ Expected losses can be used as a proxy for the value of the “implicit” government guarantee of the banking system.

Baseline results

11. **The first step in implementing the CCA for Indonesia is to calibrate the baseline, which was set to June 30, 2006.** The estimated stock of local currency liabilities (reserve money and domestic debt) on that date was converted to U.S. dollars, then combined with the U.S. dollar value of external liabilities to derive a distress barrier (in dollars).¹² In turn, this was used to solve for implied assets and their volatility plus a range of risk indicators, including the distance to distress, risk-neutral default probabilities, and sovereign credit spreads over U.S. dollar risk-free assets. The same procedure was applied for the 9 private and 3 public banks, using stock market capitalization data to solve for implied assets.¹³ Then, using the historical data available for Indonesia, a time series of the various risk indicators for the sovereign and the banks were produced from 2000 through to June 30, 2006.¹⁴

12. **The results show a steady improvement in sovereign balance sheets since mid-2001,** with a modest deterioration in risk indicators during the turbulence of August/September 2005, and more recently since May 15, 2006. Figure 2 shows the estimated default probability when 100 percent of expected losses of the banks are assumed to be guaranteed by the sovereign (solid line) and when expected losses are excluded (dashed line). The figure shows a gradual decline in default probabilities, with the exception of a spike in March 2001. This spike was caused by heightened volatility in financial markets in Indonesia and abroad.¹⁵ For the later period for which daily information is available, the sovereign spread and default probability move in line with the downward trend in CDS and EMBIG spreads on Indonesian government debt quoted by the market (Figure 3).¹⁶



¹² Data on the stock of domestically-issued debt was available monthly through June 15, 2006, while the stock of external debt was only available quarterly through March 31, 2006, so this figure was used as a proxy for June 2006 data. External debt levels for Indonesia are relatively stable, so this assumption is unlikely to make a material difference for the results.

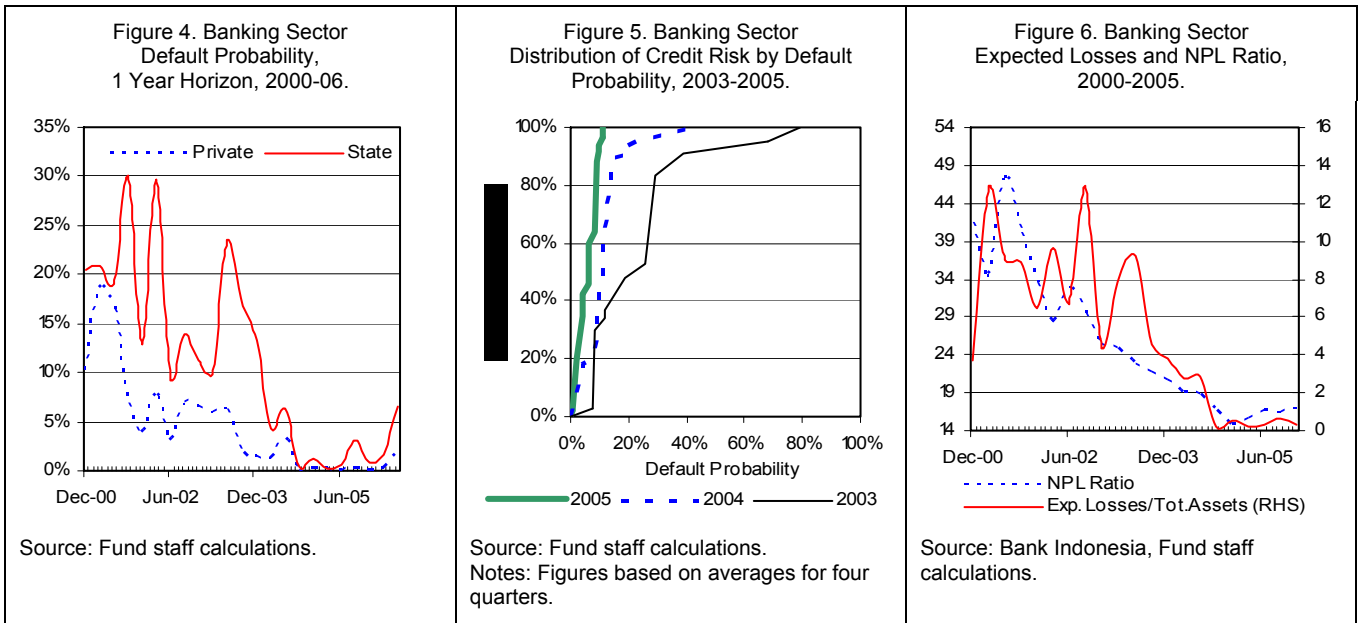
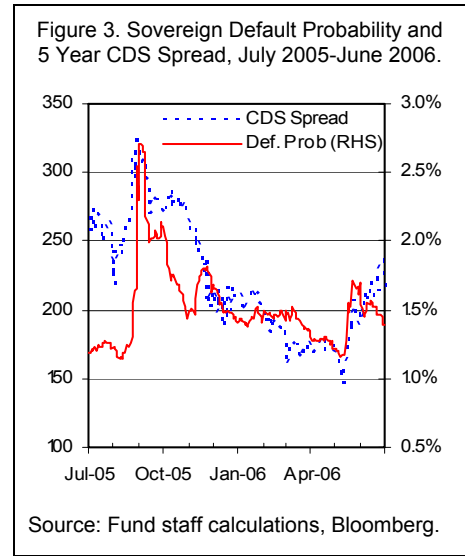
¹³ All calculations for the banks were done in rupiah. In the absence of balance sheet data for banks during 2006, end-2005 figures were used to calibrate the distress barrier (short-term debt plus $0.8 \times$ long-term debt). Since debt levels are fairly stable over time, this assumption is unlikely to have a material effect on the results.

¹⁴ Quarterly data were used from December 2000 to June 2005, then daily data were used through June 30, 2006.

¹⁵ The volatility of Indonesian and U.S. interest rates rose, together with a rise in forward exchange rate volatility and the volatility of reserve money. The levels of debt did not change much (the distress barrier declined slightly), but a weaker exchange rate caused a decline in the dollar value of liabilities and implied assets. This, together with greater volatility reduced the distance to distress by 25 percent, causing a rise in default probabilities by over five percentage points.

¹⁶ The correlation between the 1 year default probability and CDS spreads and EMBIG spreads is 0.66 and 0.67, respectively.

13. Balance sheet indicators for the banking system also show a strong improvement in the underlying health of banks over the past five years (Figure 4). The distribution of default risk by assets shown in Figure 5 confirms the general improvement in banking system indicators, with the riskiest banks (those with the highest default probability) accounting for a smaller percentage of total assets over time. Expected losses for the banking system have declined steadily, with sharp falls since end-2003 (Figure 6). This positive trend reflects rising equity valuations and declining volatilities, as balance-sheet structures have improved and non-performing assets have declined. The measure of expected losses for the 12 largest banks moves quite closely with the overall NPL ratio,¹⁷ and tends to lead changes in the NPL ratio by as much as two quarters.¹⁸



¹⁷ NPL ratio \equiv (Substandard + Doubtful + Loss Loans + Foreclosed Equities + Foreclosed Real Estate + Restructured Loans Classified as Pass and Special Mention)/(Total Loans + Foreclosed Equities + Foreclosed Real Estate).

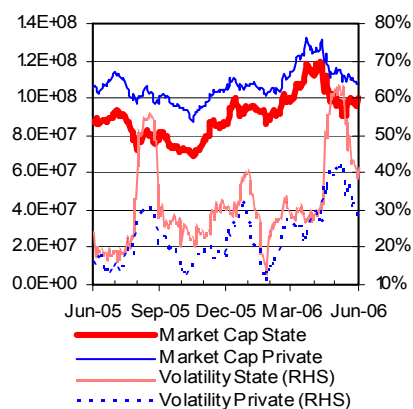
¹⁸ The correlation between contemporaneous values is 0.67, but rises to 0.82 with expected losses leading by one quarter, and 0.73 with expected losses leading by 2 quarters.

C. May-June 2006 Global Market Turbulence

14. **Having calibrated the set of risk-adjusted balance sheets, they can be used to understand the impact of recent market turbulence on sovereign and banking sector risk.** The estimated sovereign spreads and cumulative default probabilities from the model can be used as the basic metric for comparing and analyzing sensitivities. Spreads provide a valuable and real-time measure of the cost of new borrowing or refinancing. The cumulative probability of default can also be directly related to various rating categories, providing an intuitive benchmark for comparisons. For the banking sector, expected losses provide a convenient measure of the impact of a change in the market environment.

15. **The recent volatility experienced by emerging markets since mid-May 2006 provides a natural experiment to illustrate the impact of increased volatility on a variety of risk indicators.** Figure 7 shows the market capitalization and volatilities for banks, while Figure 8 shows the recent jump in volatilities for key Indonesian asset markets (overnight interest rate volatility and the bid-ask spread on the rupiah/dollar rate, along with a developed market indicator—the VIX—often used as a proxy for global risk aversion).¹⁹ These figures show the increases in volatilities beginning in mid-May, and the subsequent declines in late June, albeit to modestly more elevated levels.

Figure 7. Banking Sector Capitalization and Volatilities, June 2005-June 2006.

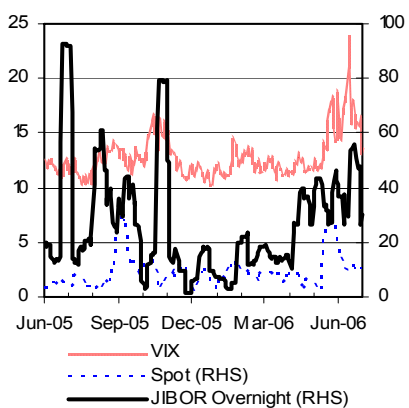


Source: Bloomberg, Fund staff calculations.

16. **Risk indicators for the sovereign show a modest increase in default probabilities and credit spreads as a result of recent market volatility, then declines toward the end of June.**

Figure 9 shows the estimated default probabilities for the sovereign on May 8, 2006—just prior to the increased turbulence in emerging markets—which coincided with the low-point for Indonesian default probabilities. The figure also shows the default probabilities on June 15, and then on June 30. As expected, this figure shows that default probabilities increased by about 3 percentage points since the turbulence began (to June 15), but then settled down to around 1¼ percent above the May 8 level. Figure 10 shows the model spreads for Indonesian sovereign debt for the baseline on June 30, 2006, as well as the estimated spreads at their low point on May 8, together with their level on June 15. Again this figure

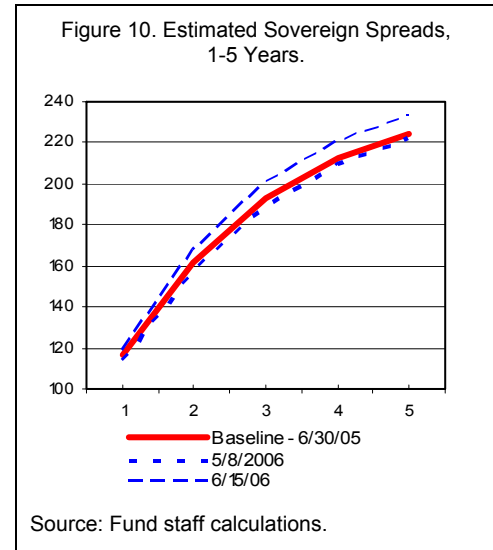
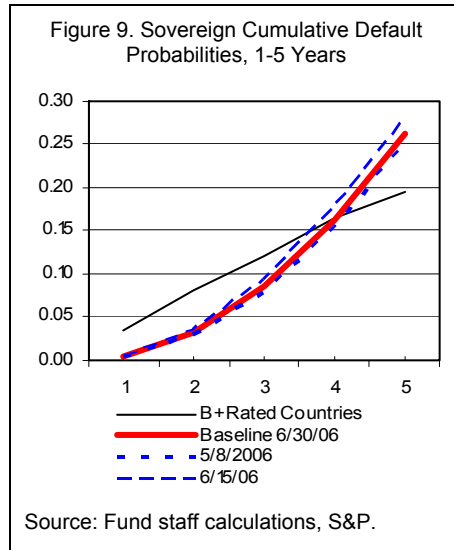
Figure 8. Key Volatilities, 2005-2006.



Source: Fund staff calculations, Bloomberg.

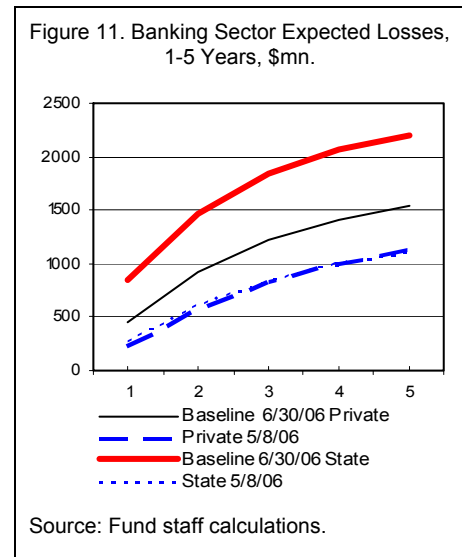
¹⁹ The VIX is a volatility index for the Chicago Board Options Exchange, known by its ticker symbol VIX. It is calculated by taking a weighted average of the implied volatility from eight calls and puts on the S&P 100 index.

shows how the estimated spreads increased across the maturity spectrum for Indonesian sovereign debt by a cumulative 10 basis points to June 15, but then returned to close to their May 8 level by end-June. The actual increase in 5-year CDS spreads observed from May 8 to June 15 was 61 basis points, while EMBIG spreads rose by 44 basis points. On June 30 CDS spreads remained about 76 points above their May 8 level, while EMBIG spreads remained about 44 basis points above May 8 levels. This suggests that the model may underestimate the extent of deterioration in underlying credit risks from May to



June. Another explanation may be that CDS and EMBIG spreads overestimate the extent of deterioration in underlying risk, or that they were too low relative to fundamentals in early May, and the recent increase in spreads simply reflects a market correction to more normal levels.

17. **The global market turbulence experienced since May 15 also caused an up-tick in risk indicators for the banking system.** Bank capitalization declined by around 15 percent for private banks and 17 percent for state-owned banks (to June 30), while volatilities increased from 29 percent to 33 percent for private banks (reaching as high as 42 percent) and from 34 percent to 46 percent for state-owned banks (reaching as high as 63 percent).²⁰ The reduction in market capitalization and increase in its volatility (particularly for state-owned banks—Figure 7) decreased implied assets and increased their volatility, leading to a decline in distance-to-distress measures and increases in expected losses. These developments reflect increases in interest rate volatilities, as well as a softening of bank earnings for the first quarter of 2006 in the wake of weaker growth and rising NPL ratios. As shown in Figure 11, the recent market turbulence had a larger impact on state-owned banks, reflecting a larger increase in asset volatility (Figure 7). One possible explanation for this result is that state-owned banks have higher NPL ratios, which may imply greater sensitivity of earnings to



²⁰ Based on the standard deviation taken over the previous 20 business days of the log difference of daily stock market capitalization, annualized by multiplying by $\sqrt{260}$.

future growth prospects and interest rate volatility. As uncertainty rises, the volatility of projected earnings is likely to rise more for state-owned banks. Furthermore, the higher debt levels of state-owned banks would imply that higher interest rate volatility would have a greater impact on future debt-servicing costs relative to private banks.

D. Understanding Sensitivities

18. **The risk-adjusted balance sheets produced with the CCA can be used to illustrate the sensitivity of Indonesian balance sheets to changes in key parameters and balance sheet structures.** Table 2 summarizes the effects of changing different parameters or balance sheet components on the overall distance to distress (D2D) and default probabilities (DP). The previous section demonstrated the impact of increased volatility on a variety of risk indicators, while this section focuses on the impact of changes in exchange rates and the currency composition of sovereign debt.

Table 2. The Effects of Changing Key Variables in the CCA Framework

Change in Input:	Effect in Model:	Change in Output:
Primary Surplus ↑	$A_{Sovereign}$ ↑	D2D ↑, DP ↓
Reserves ↑	$A_{Sovereign}$ ↑	D2D ↑, DP ↓
Nominal Ex. Rate ↑	$A_{Sovereign}$ ↑	D2D ↑, DP ↓
Dom. Interest Rate ↓	$A_{Sovereign}$ ↑	D2D ↑, DP ↓
DB (Foreign) ↓	DB ↓	D2D ↑, DP ↓
Ex. Rate Vol. ↑	σ_A ↑	D2D ↓, DP ↑
Other Vol. ↑	σ_A ↑	D2D ↓, DP ↑
Stock Mkt. ↓	A_{Corp} ↓ ⇒ A_{Banks} ↓ ⇒ <i>Guarantee</i> ↑ ⇒ $A_{Sovereign}$ ↓	D2D ↓, DP ↑

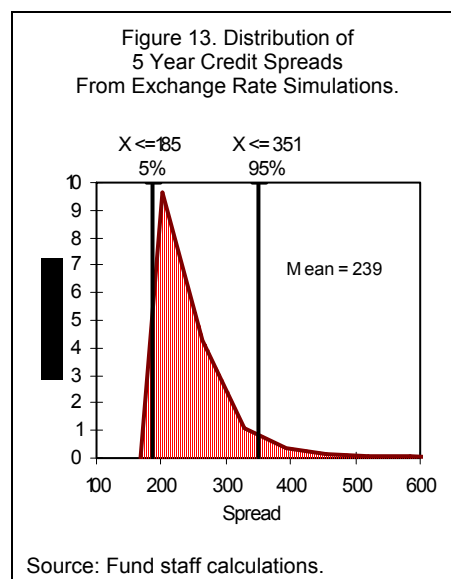
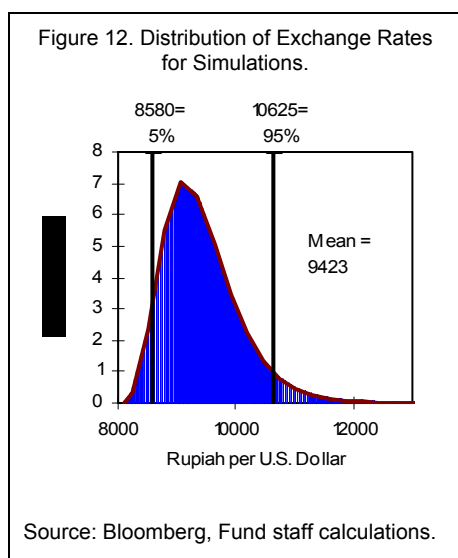
Source: Gray, Lim, and Malone (2006, forthcoming).

19. **Exchange rate sensitivity can be considered by revaluing the balance sheets for a distribution of different exchange rates to show how the risk indicators might vary with a change in this parameter.** This is equivalent to assessing the “partial derivative” of the risk-adjusted balance sheet with respect to the exchange rate.²¹ Conceptually, the exchange rate is a key price in marking-to-market the sovereign balance sheet, because of the importance of external assets and liabilities in the overall balance sheet. When the exchange rate depreciates, its volatility rises, and the cost of servicing foreign debt increases, increasing the overall level of risk. The distress barrier (measured in dollars) also decreases, as the stock of domestic debt declines in dollar terms, decreasing the overall level of risk. There is thus a non-linear relationship between the level of the exchange rate and the level of implied assets as these two factors (higher volatility and a lower distress barrier) move in

²¹ This distribution was derived by revaluing the balance sheets for each “draw” from the distribution of exchange rates, and deriving the associated risk indicator (such as sovereign spread). The volatility of the exchange rate was estimated using the historical relationship observed between the level of the exchange rate and its volatility over the past 5 years.

different directions, with sovereign assets declining with higher levels of the exchange rate (i.e., a more depreciated exchange rate).

20. **Credit spreads are quite sensitive to variations in the exchange rate.** Figure 12 shows the distribution of exchange rates that were used to revalue the baseline balance sheet, centered on Rp. 9,263 per U.S. Dollar, with a 95 percent confidence interval from 8,580 to 10,625. This distribution is centered on the exchange rate level at the baseline on June 30, 2006, and is calibrated according to the observed distribution of exchange rates over the last 5 years. Figure 13 shows the associated distribution of credit spreads. For each value of the exchange rate distribution in Figure 12, there is an associated level of credit spread estimated by the model. Plotting all of these combinations together provides a distribution of credit spreads. The 95 percent confidence interval of credit spreads ranges from 185 to 351 basis points, with a mean of 239. Thus, there is a 5 percent chance that spreads could rise above 351 basis points under this exchange rate distribution, and a 5 percent chance that spreads could fall below 185 basis points.



21. **The next balance sheet sensitivity to be considered is the sensitivity to changes in the structure of debt.** The risk-adjusted balance sheets can be used to show the impact of a debt reduction of \$10 billion on default probabilities and sovereign spreads, under two different states of the world. First, a reduction in external (dollar-denominated) debt is considered under the conditions prevailing in the baseline, then with a more depreciated and volatile rupiah. The results of this scenario can be compared to an alternative of repaying an equivalent amount of domestic (rupiah-denominated) sovereign debt under the baseline conditions, and then with a higher level and volatility of the exchange rate.²² The impacts of these two scenarios are shown in Table 3.

²² The foreign debt is assumed to be repaid out of long-term fixed-rate debt, which carries a low average interest rate. The domestic debt is assumed to be repaid out of long-term fixed rate debt, which carries a higher average interest rate.

Table 3. Impact of \$10 billion Sovereign Debt Reduction on Risk Indicators

	5 Year Default Probability	5 Year Credit Spreads
Baseline 6/30/06	18.6%	224.3
<i>Impact of:</i>		
Repayment of \$10bn External	-0.1%	0.0
Repayment of \$10bn External, Higher Volatility	1.6%	12.4
Repayment of \$10bn, Domestic	-0.7%	-10.9
Repayment of \$10bn, Domestic, Higher Volatility	0.6%	- 6.6

Source: Fund staff calculations.

Notes: Higher volatility scenario assumes the level and volatility of forward and spot exchange rates rise by 25 percent over the baseline.

22. **Repaying the more costly domestic debt brings a greater benefit to the overall sovereign balance sheet.** Table 3 shows that sovereign spreads and default probabilities are largely unchanged when long-term foreign debt is repaid, but a reduction in domestic debt has a larger impact. This is because the average interest rate on foreign liabilities is lower than the interest rate on domestically-issued debt, due to the high proportion of external debt that is on concessional terms. Reducing the more expensive liabilities reduces the level of risk in the sovereign balance sheet, as the remaining creditors are more likely to be repaid. This will be reflected in higher values for the remaining liabilities, and lower spreads. In a less favorable state of the world (where volatilities and the level of the exchange rate are 25 percent higher), domestic debt reduction reduces sovereign spreads and default probabilities relative to the baseline and relative to the repayment of external debt.

E. Summary and Conclusions

23. **This paper has developed a set of risk-adjusted balance sheets for Indonesia using the CCA.** Using data from the liabilities side of the balance sheets of the sovereign and banking sectors, it has been possible to impute the value and volatility of assets and produce a range of risk indicators. These risk indicators are based on forward-looking, marked-to-market balance sheets, and provide information about the distribution of risks and sensitivities to different shocks.

24. **Risk indicators for the sovereign and banking system show a steady improvement in balance sheets since mid-2001, with a modest deterioration during the turbulence of August/September 2005.** The risk-adjusted balance sheets were also used to assess the impact of recent market volatility since mid-May 2006 on sovereign and banking sector risk indicators. The results for the sovereign show a modest increase in default probabilities and credit spreads as a result of recent market volatility, followed by declines toward the end of June. For the banking system, risk indicators suggest a more significant, though still relatively modest deterioration in expected losses, particularly for state-owned banks. Finally, the paper examined the sensitivity of sovereign risk by considering the impact of changes in exchange rates and debt levels. The results show that credit spreads are quite sensitive to changes in the exchange rate, and that reducing domestic debt levels has a more beneficial impact on risk indicators than reducing foreign debt levels.

REFERENCES

- Allen, Mark, Christoph Rosenberg, Christian Keller, B. Sester, and N. Roubini, 2002, *A Balance Sheet Approach to Financial Crisis*, IMF Working Paper 02/210 (Washington: International Monetary Fund), available on the web at: <http://www.imf.org/external/pubs/ft/wp/2002/wp02210.pdf>.
- Crosbie, Peter J. and Jeffrey R. Bohn, 2003, *Modeling Default Risk*, December (San Francisco: Moody's KMV), available on the web at: <http://www.moodyskmv.com/research/whitepaper/ModelingDefaultRisk.pdf>.
- Currie, Elizabeth and Antonio Velandia, 2002, *Risk Management of Contingent Liabilities Within a Sovereign Asset-Liability Framework*, mimeo (Washington: World Bank Group), available on the web at: http://treasury.worldbank.org/web/pdf/currie_velandia_cl.pdf.
- Gapen, Michael T., Dale F. Gray, Yingbin Xiao, and Cheng Hoon Lim, 2004, *The Contingent Claims Approach to Corporate Vulnerability Analysis: Estimating Default Risk and Economy-wide Risk Transfer*, IMF Working Paper No. 04/121, July (Washington: International Monetary Fund), available on the web at: <http://www.imf.org/external/pubs/ft/wp/2004/wp04121.pdf>.
- Gapen, Michael T., Dale F. Gray, Cheng Hoon Lim, and Yingbin Xiao, 2005, *Measuring and Analyzing Sovereign Risk with Contingent Claims*, IMF Working Paper No. 05/155, August (Washington: International Monetary Fund), available on the web at: <http://www.imf.org/external/pubs/ft/wp/2005/wp05155.pdf>.
- Gray, Dale F., Cheng Hoon Lim, and Samuel Malone, 2006, "A New Debt Sustainability Framework: Incorporating Balance Sheets and Uncertainty," mimeo (Washington: International Monetary Fund).
- Gray, Dale F., Robert C. Merton, and Zvi Bodie, 2002, *A New Framework for Analyzing and Managing Macrofinancial Risks*, MF Risk Working Paper 1-03, available on the web at: <http://www.iafe.org/upload/GrayMertonBodieMFRiskWPAugust2003.pdf>.
- International Monetary Fund, 2004, *Debt-Related Vulnerabilities and Financial Crises—An Application of the Balance Sheet Approach to Emerging Market Countries*, Policy Development and Review Department, July (Washington: International Monetary Fund), available on the web at: <http://www.imf.org/external/np/pdr/bal/2004/eng/070104.pdf>.
- Mathisen, Johan and Anthony Pellechio, 2006, *Using the Balance Sheet Approach in Surveillance: Framework, Data Sources and Data Availability*, IMF Working Paper No. 06/100, April, (Washington: International Monetary Fund), available on the web at: <http://www.imf.org/external/pubs/ft/wp/2006/wp06100.pdf>.
- McQuown, John Andrew, 1993, *A Comment on Market vs. Accounting-Based Measures of Default Risk*, September (San Francisco: KMV), available on the web at: http://www.moodyskmv.com/research/files/wp/A_Comment_on_Market_vs_Accounting_Based_Measures_of_Default_Risk.pdf.
- Merton, Robert C., 1974, "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates," *Journal of Finance*, vol. 29 (May), pp. 449-70.

IV. PUBLIC ENTERPRISES IN INDONESIA¹

A. Introduction

1. **Over the past five decades, public enterprises have played an important role in Indonesia's economy.** The number of State-Owned Enterprises (SOEs) increased dramatically after independence in 1945 as the new constitution stipulated that “sectors of production which are important and affect the life of the people shall be controlled by the State.” By 1980, some 70 percent of total investment was made by the public sector and SOEs accounted for about 70 percent of overall economic activity. A substantial shift in economic policy has taken place since the 1980s, with deregulation resulting in the growing role of the private sector. Nonetheless, the SOE sector remains important, and is estimated to account for up to 40 percent of GDP,² reflecting its key role in the oil and gas and electricity sectors, as well as its continued presence in industry (cement, fertilizer, steel, mining), agriculture (plantations), and transport.³

2. **This paper provides a brief overview of the public enterprise sector and attempts to assess any fiscal risks that may arise from its operations.** To this end, Section B provides information on the size of the sector, and its key financial characteristics. Notwithstanding data constraints, some possible fiscal risks are then discussed in Section C using a new framework being developed by the Fund's Fiscal Affairs Department.⁴ Finally, the paper draws some conclusions and provides recommendations to further limit risks.

B. An Overview of the Public Enterprise Sector

3. **There are public enterprises in many sectors of the economy, although they dominate in only a few industries.** As of August 2005, there were 158 SOEs spread over most business sectors, including financial services, insurance, services, construction, manufacturing, telecommunications, airlines, electric power and oil and gas. These companies vary in size from monopolies to relatively small service

	No. of SOEs (In level)	Asset Equity Sales Net Profit (In trillions of rupiahs)			
		Asset	Equity	Sales	Net Profit
TOTAL SOEs	158	1183.0	388.0	505.0	33.1
Of which: 10 largest 1/	10	772.5	180.9	336.3	26.6
Of which: 22 largest	22	1069.4	354.0	426.8	31.6
		(In percent of total)			
Banks and financial institutions	12.7	50.5	15.9	13.4	39.2
PLN	0.6	17.9	36.7	12.3	-6.1
Pertamina	0.6	12.3	22.9	42.9	26.8
Telkom	0.6	4.8	5.2	6.7	18.5
Fertilizer company (Pupuk)	0.6	1.6	1.9	2.6	2.3
Garuda (airlines)	0.6	0.7	0.3	2.2	-2.4
Other SOEs	84	7.9	11.9	13.9	16.7

Sources: Indonesian authorities, Ministry of State-owned Enterprises, and Ministry of Finance.

1/ Bank Mandiri (bank), PLN (electricity), Pertamina (oil and gas), BNI (bank), BRI (bank), Telkom (telecommunications), Jamsostek (insurance), BTN (bank), PUSRI (fertilizer), and Bulog (logistics).

¹ Prepared By Amine Mati (FAD).

² Little information is available on the contribution of SOEs to the economy. Both the AsDB progress report on SOE reforms in 2005 and a 2003 report by the Ministry of State-Owned Enterprises give figures as high as 40 percent for the share of SOEs in GDP. An earlier study (Pangestu, 1996) quotes only 15 percent.

³ SOEs also represent about 35 percent of the value of all listed securities. This reflects the sales of shares in a number of public companies to the private sector.

⁴ See “Public Investment and Fiscal Policy: Lessons from Pilot Country Studies” (see Public Investment and Fiscal Policy – Lessons from the Pilot Country Studies, www.imf.org). The framework was first developed to assess which public enterprises should be covered in national fiscal accounts.

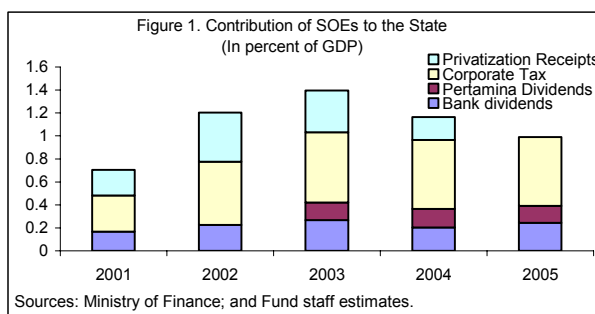
companies, with the 22 largest SOEs accounting for more than 90 percent of assets, equity and net income (Table 1). SOEs are most heavily represented in the following sectors of the economy:

- **Banking and finance.** Twenty public financial institutions account for about 50 percent of total SOE assets, as well as about 40 percent of the SOE sector net profits.
- **Electricity:** The state-owned electricity company (PLN) is the largest of the nonfinancial public corporations, accounting for about 20 percent of public assets.
- **Oil and Gas:** The state-owned oil company (Pertamina), holds about 12 percent of public assets and recorded 30 percent of the net profits by the public enterprise sector.
- **Telecommunications:** The government has a 51 percent share in Telkom, which generates about a fifth of SOE net profits.

The remaining 135 public companies generate less than 20 percent of all SOE net profits, with the fertilizer, gas, cement and airline companies having the largest assets.

4. **The contribution of the public enterprise sector to the central government budget has increased substantially in the last five years.**

Receipts in the form of corporate taxes have increased by more than 140 percent to about Rp 13 trillion (0.5 percent of GDP) in 2005, while dividends⁵ have averaged about 0.3 percent of GDP in the last four years (Figure 1). Most of these revenues have come from the banking sector, Pertamina and Telkom. The improved performance reflects the return to profitability following the Asian financial crisis of SOEs due to higher growth in the economy and higher commodity prices. Privatization receipts were equivalent to 0.2 percent of GDP in 2004, with divestment from some state-owned banks through IPOs and the sale of strategic stakes in a few companies being the main contributors.



5. **Data on financial accounts of individual SOEs are available at the Ministry of State-Owned Enterprises (MSOE).**⁶ However, the government does not publish statistics for the consolidated public sector. Information on publicly listed companies is available on the MSOE website, but there is little dissemination of information on other enterprises. Using

⁵Under current regulations 50 percent of profits are paid as dividends although this sometimes depend on the company and budget needs.

⁶ Financial statements on SOEs' performance have to be submitted quarterly to the Ministry of State-Owned enterprises (MSOE) and to the appropriate line ministry.

data on publicly listed companies, and that provided by the MOF on some other key companies, an analysis of the performance of nonfinancial public corporations⁷ indicates that:

- **The balance sheets of nonfinancial SOEs have strengthened.** Total assets grew by 61 percent during 2001–04, largely because of higher retained earnings and, to a lesser extent, asset revaluation (including for PLN and Pertamina). On the other hand, there was only a small increase in liabilities. The debt to asset ratio therefore declined to about 43 percent in 2004, from 66 percent in 2001. The equity position of many SOEs increased significantly, as profits were retained in the business.
- **The overall performance of nonfinancial SOEs has been improving.** While SOE revenues have almost doubled in the last four years, net profits, which depend to a large extent on the state-owned oil company, were volatile and only increased by 10 percent in the last four years, reaching Rp 20 trillion in 2004. This was nonetheless equivalent to the entire overall surplus of the nonfinancial SOE sector of about 0.6 percent of GDP in 2004.⁸ Excluding Pertamina, net profits increased by 20 percent during 2002–04 to about Rp 11 trillion. Return on assets improved in 2004, but return on equity continues to remain below its 2001 level.
- **Losses were equivalent to about 0.3 percent of GDP in 2004,** with PLN accounting for one-half of the total (after taking into account subsidy payments from the government). About one-fifth of the total number of non financial SOEs reported losses in 2004, with some such as PLN and the state-owned airlines company (Garuda) experiencing losses in each of the past three years. The number of companies experiencing losses has been broadly unchanged since 2001.

Table 2: Key statistics for Nonfinancial SOEs
(In trillions of Rupiahs)

	2001	2002	2003	2004
Total assets	363.0	488.8	599.0	585.0
Total liabilities	237.7	226.0	254.0	253.0
Total equity	124.0	258.9	340.0	326.0
Sales	242.7	300.7	391.0	438.0
Profit before tax	25.6	26.0	18.4	35.4
Net profit	18.2	17.4	6.9	20.0
Losses	-1.7	-9.4	-8.5	-5.1
Number of loss-making companies	32.0	55.0	52.0	30.0
	Financial Ratios (in percent)			
Return on assets	2.9	3.6	1.1	3.4
Return on equity	14.7	6.7	2.0	6.1
Debt ratio	65.5	46.2	42.4	43.2

Sources: Indonesian authorities and Fund staff estimates.

C. Assessment of Fiscal Risks

6. **Public enterprise operations pose fiscal risks in many countries.** In some cases, quasi-fiscal activities (QFAs) are not appropriately compensated through the budget, leading to losses. In other cases, excessive borrowing has undermined profitability. Companies that

⁷ Banks and financial institutions were excluded from the analysis as the financial sector is monitored and regulated by Bank Indonesia and the capital market supervisory unit.

⁸ A measure of the nonfinancial SOE cash balance from the financing side shows an overall surplus of 0.5 percent of GDP in 2004 when looking at changes in bank loans and deposits (main source of information). Preliminary information for 2005 shows a deficit of 0.3 percent of GDP.

consistently run losses and/or accumulate excessive debt often need to be rescued by the government. As the quantification of QFAs and contingent liabilities pose significant methodological challenges, the key issue becomes: how to identify the companies that represent the main sources of fiscal risk and that therefore should be monitored more closely?

7. **A framework developed by the Fund's Fiscal Affairs Department⁹ is aimed at assessing the fiscal risks posed by the public enterprise sector.** The main motivation for its development was to assess which public enterprises should be covered by the fiscal indicators and targets on which national fiscal policies are based. Such a framework uses criteria related to four broad areas of performance: (i) managerial independence (pricing and employment policies); (ii) relations with the government (subsidies and transfers, quasi-fiscal activities, and regulatory and tax regime); (iii) financial conditions (profitability, market access, creditworthiness); and (iv) governance structure (periodic audits by external auditors, publication of comprehensive annual reports, shareholders' rights).

8. **This next section uses the above framework to help identify possible sources of fiscal risk for Indonesia's SOEs.** The overall fiscal risk in Indonesia in the short-run remains limited, as SOE losses are small and a sound legal framework is in place. The main risks are the existence of public service obligations for which enterprises need to be adequately compensated by the government and slippages in the implementation of the existing corporate governance framework.

Criterion 1: Managerial Independence

This criterion helps determine if there is government interference in employment and wage policies, and through price setting at below cost.

9. **Appropriate mechanisms have recently been put in place to strengthen managerial independence.** First, the SOE law (UU 19/2003) sets a clear ownership policy as the state is not allowed to become involved in the day-to-day management of SOEs and must allow them full operational autonomy. Second, the same law clearly states that SOE employees are not part of the civil service, implying that the government cannot set wages for nonfinancial SOEs nor affect the hiring decisions by the Board of Directors. Finally, clear rules on conflict of interest for members of the Board of Directors and Board of Commissioners have been established through a ministerial regulation.¹⁰

10. **However, the existence of Public Service Obligations (PSOs) can weaken managerial independence.** A number of SOEs have been used by the government to provide public goods and services to the public. These include the provision of electricity or water supply to remote rural areas and infrastructure investment in poor areas. The state also

⁹ This framework is presented in (see Public Investment and Fiscal Policy – Lessons from the Pilot Country Studies, www.imf.org).

¹⁰ Of the 158 SOE registered, Board of Commissioners in only 6 companies had a representative from the relevant line ministry. This greatly reduces the possibility of conflicts of interest.

regulates prices in many sectors, especially in the energy and transport industries. The provision of such services has on occasion adversely affected the finances of the supplying company, as PSOs are not always adequately costed by the government, even when explicit subsidies are provided (see section below).¹¹

Criterion 2. Governance Structure

This criterion focuses on whether a basis for accountability to the public is in place. This requires effective outside audits and the dissemination of information to enable the public and minority shareholders, when applicable, to monitor operations of the SOE.

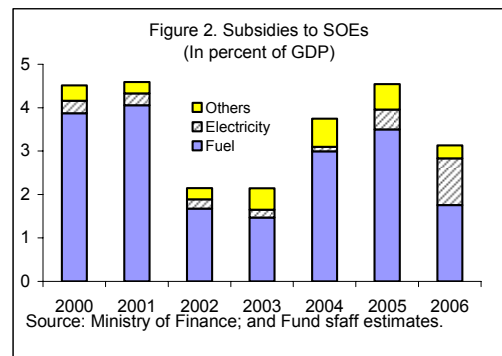
11. **Indonesia has a sound corporate governance framework.** A 2002 Ministerial decree detailing the corporate governance responsibilities of SOEs conforms broadly with OECD guidelines in this area. Key provisions include: (i) the preparation of annual financial statements that must be audited internally and by an independent auditor (not necessarily the Supreme Audit agency); (ii) publication of SOE annual reports in a timely manner; and (iii) equal treatment for all shareholders, including consideration of minority shareholders' rights in managing the SOE.

12. **However, delays can occur in auditing and publishing financial statements.** Over 20 of the 151 public companies, including the state-owned oil company, have not yet had their 2004 financial statements audited. SOE annual reports are made public in the case of publicly listed companies, or if the companies are about to issue corporate bonds (as was the case for PLN). However, when applicable, minority shareholders are being provided the necessary information.

Criterion 3: Government Relations

This criterion tries to ascertain whether the government maintains an arm's length relationship: are SOEs subject to the same regulations and taxes as private firms in the industry? If subsidies exist, are transactions transparent and fully compensated by the budget? Do SOEs perform uncompensated functions or costs not directly related to their business objectives?

13. **Public enterprises are subject to the same tax provisions as private firms.** All firms must pay VAT and corporate income taxes. VAT exemptions are applied to all sales to which they are subject, regardless of whether they are from a public or private enterprise. However, when tax arrears occur, the government may, on occasion, not impose late payment penalties on SOEs.



¹¹ However, steps are underway to improve the costing methodologies of POSs and to ensure that SOEs are adequately compensated.

14. **Subsidy payments to a few SOEs remain important.** Subsidies have averaged 4 percent of GDP in the last three years (Figure 2). Subsidy payments have essentially been made to Pertamina (as domestic fuel prices have not always been adjusted to reflect fully changes in international prices), as well as PLN and the fertilizer company (tariffs/prices have remained fixed in recent years). But, payments have often been subject to delays. For example, fuel subsidies are paid late in the year and are subject to an end of year reconciliation exercise, with the government examining in detail the recoverable costs and allowable margins.

15. **The inadequate costing of PSOs results in QFAs.**¹² While it is difficult to assess the magnitude of existing QFAs, some preliminary data on the energy sector in 2005 show two main sources for QFAs:¹³

➤ **Lack of compensation of PSOs :** A comparison of the actual sales prices for retail fuel products in 2005 with the actual market prices for fuel (including the retail margin) show that subsidy costs of about 0.3 percent of GDP have been absorbed by Pertamina, as Pertamina was reimbursed for only the imported cost of fuel plus a standard fee per barrel¹⁴ According to a new regulation on Pertamina's PSOs, the government's subsidy payments to Pertamina in 2006 would now include a 15 percent margin. Based on PLN's calculations, the company would have needed an additional 0.1 percent of GDP to fully recover its operating costs.

➤ **Payment arrears.** Little information is available on inter-enterprise arrears, although these were sizable in the energy sector at end-2005. Pertamina implicitly subsidized other public enterprises, such as PLN and Garuda, which were not able to pay for their fuel supply (about 0.6 percent of GDP)¹⁵. On the other hand, this also led to Pertamina accumulating tax arrears to the government, which according to the Ministry of Finance reached 0.8 percent of GDP by end-March 2006.

Criterion 4. Financial Health of Companies

This criterion is meant to provide a perspective on the magnitude of risks of specific companies. It can help identify whether a firm's finances are sustainable and profitable.

¹² An activity is designated as a QFA if it is of a fiscal nature but financed by a public, or in some cases, private corporation rather than the budget. Subsidies not fully covering the operational costs or investment required to meet a social target imposed by the government would constitute a QFA.

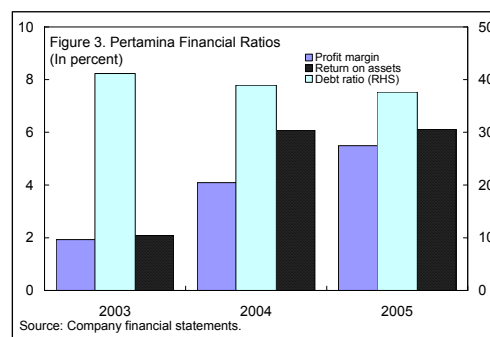
¹³ This does not include QFAs reported in the transportation sector (loss making terminals and rail network, low passenger fares); and infrastructure (low cost housing, or toll roads (tariff caps and building of non commercial roads) as information on the cost of such operations is not available.

¹⁴ Pertamina estimates that it should be refunded for the standard 15 percent retail margin shown in the industry.

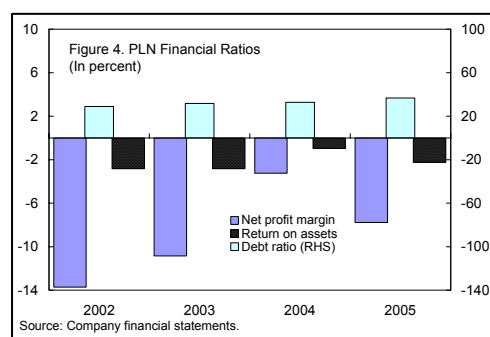
¹⁵ Estimates from Pertamina. This is continuing in 2006 as PLN is reportedly accumulating about 0.1 percent of GDP a month in debt as it is currently functioning by not paying for its fuel supply.

16. **The overall financial performance of SOEs has strengthened during the last four years, although the improvement was uneven across sectors, as discussed above.** Thirty SOEs experienced losses in 2004, with total losses reaching about 0.3 percent of GDP. Some of the largest and most sustained losses were observed in the electricity sector (e.g., PLN) and the airlines industry (e.g., Garuda). While the highest profits in the SOE sector in 2004 were observed by Pertamina, its performance is hampered by partial compensation of its costs. A look at these three key companies' financial ratios¹⁶ shows (Figure 3).

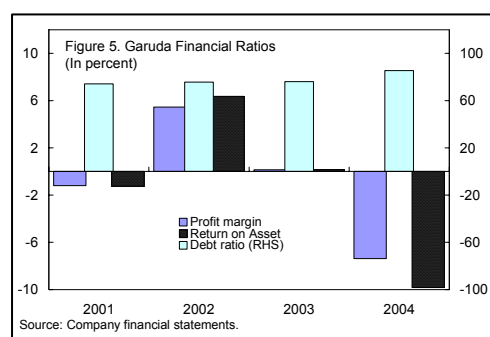
- **Pertamina:** Net profit margins increased during 2003–05 as revenues from higher oil prices outpaced the growth in operating expenses. The debt-to-asset ratio has remained relatively stable at slightly below 40 percent, as net borrowing has been flat.



- **PLN:** The company experienced losses in the last three years¹⁷ reflecting only partial compensation for tariffs set below cost (see above), the high cost of fuel and gas inputs, and significant transmission losses. The return on investment is low as shown by average returns on assets and equity that are close to zero. Its debt ratio has increased reflecting: (i) a high proportion of two-step loans¹⁸ to finance the company's operations and long term investments; and (ii) deferred tax payments. Nevertheless, recent corporate bond issues show that PLN can still access the market on terms that are comparable to the sovereign.



- **Garuda:** Losses during the last three years reflect lower demand and higher fuel costs. Garuda has been unable to pay Pertamina fully for its fuel, and has a debt ratio of close to 77 percent despite having restructured its debt in 2001. High debt service payments have left Garuda unable to renew its fleet and it has reportedly postponed delivery of new aircraft.



¹⁶ These ratios are net profit margins (measured as net profit over total sales), return on assets (measured as net profits over total assets), and debt ratio (measured as total liabilities over total assets).

¹⁷ PLN actually had for the first time in four years a positive operational profit, but still had an overall net loss following interest on the tax for asset reevaluation and tax expenses.

¹⁸ These are long term multilateral and bilateral loans to the Indonesian Government that are then re-lent to the company to finance its projects. There is no collateral for these loans.

17. **The financial position of the energy companies could be improved with a better risk management strategy.** PLN should consider adopting a foreign exchange risk management program since at least 50 percent of its input costs are in foreign currency (including fuel, lubricants, spare parts, and power purchased from independent power producers), while its revenues are in domestic currency. Pertamina should consider hedging purchases and/or sales of crude and petroleum products to reduce its exposure to commodity price fluctuations and exchange rate risk.

D. Conclusions and Policy Recommendations

18. **The overall solid financial health of the public enterprise sector and a sound corporate governance framework limit short-term fiscal risks.** An overall operating surplus in 2004, combined with a low overall debt ratio and relatively few loss-making companies has allowed public enterprises to increase significantly their contributions to the government budget. A large increase in budget transfers to SOEs is therefore unlikely in the near-term. Risks are also mitigated by a sound regulatory framework that should ensure that SOE financial accounts are regularly audited by an independent auditor and subsequently provided to MSOE.

19. **However, the existence of QFAs and inadequate compensation of PSOs by the budget has weakened the financial position of some public enterprises.** The competitiveness of these companies has therefore been undermined, as they have had to limit maintenance expenditures and postpone needed investments. In addition, the lack of regular independent audits of some large companies, along with the lack of consolidated information on SOE financial operations and liabilities hinders fiscal management.

20. **The announced creation of a fiscal policy office is a good step towards systematic monitoring of SOE operations and risks.** The immediate priorities should be to:

- Collect a database on SOEs with information on the number of employees, the legal status, the share of government ownership, the annual turnover, the operating balance, total liabilities, and arrears over the last three years.
- Identify loss-making or vulnerable enterprises which may need closer monitoring.
- Enforce the requirement that SOEs should submit quarterly data on their liabilities.
- Require all SOEs, including Pertamina, to be audited by reputable private auditors and to publish their annual reports in a timely manner.

21. **Finally, the following measures could help improve SOE profitability:**
 (i) implementing financial performance contracts, with managers held accountable if targets are not met; (ii) taking steps to prevent SOEs from accumulating arrears towards suppliers, other SOEs or the tax authorities; and (iii) ensuring that PSOs are adequately identified, costed, and fully compensated in a timely manner.

REFERENCES

- Asian Development Bank, 2004, Indonesia SOE Corporate Governance, Manila (September).
- , 2005, Progress Report on the State-Owned Enterprise Governance and Privatization Program, Manila (September).
- , Privatisation and Restructuring of State-Owned Project, Manila (April).
- Pangestu, Mari, 1993, The Role of the State and Economic Development in Indonesia; *The Indonesian Quarterly*, Vol. XXI, Vol. 3, pp. 253–283.
- Pangestu, Mari, 1996, “The Role of the Private Sector in Indonesia,” Jakarta: Centre for Strategic and International Studies.
- McLeod, Ross, 1997, Survey of Recent Developments; *Bulletin of Indonesian Economic Studies*, Vol. 33, pp. 3–44.

V. DEVELOPING ECONOMIC INDICATORS FOR INDONESIA¹

A. Introduction

1. **The purpose of this paper is to develop and test coincident and leading indicators of economic activity for Indonesia.** Research at Bank Indonesia (BI) is ongoing to develop indicators for overall growth trends using the OECD approach. But for now, the authorities and staff have tended to depend on several variables available on a monthly basis—for example credit growth, motor vehicle sales, cement production—to assess the current state of the economy and to conjecture where the economy is headed. However, these variables have often given mixed signals, which underscore the importance of identifying more reliable indicators for tracking and predicting overall economic trends. This analysis is intended to complement BI's work by introducing a model-based approach for selecting better performing indicators.
2. **Compared with industrialized countries, where indicators are often used to predict turning points in the business cycle, the objective of this paper is more modest.** The aim is to construct composite indicators that focus on near-term forecasting and are simple enough to be easily updated every month, and then used by policy makers. Given the difficulty of forecasting overall GDP (see below), the focus in the paper is on developing indicators of private domestic demand, which constitutes about 85 percent of overall GDP.
3. **The rest of the paper is organized as follows.** Section B provides a brief overview of the literature on economic indicators. Section C describes the approach adopted for Indonesia, including data descriptions and basic clean-up procedures. Section D discusses selected coincident indicators for private consumption and investment and their in-sample performance. Section E covers leading economic indicators. Section F discusses out-of-sample forecasts and Section G provides some conclusions.

B. A Brief Overview of the Literature

Pioneering research

4. **Burns and Mitchell (1946) initially pioneered the research on economic indicators for the US economy.** Later, Moore and Shiskin (1967) added a formal weighting scheme by scoring variables in terms of their economic significance, statistical adequacy, cyclical timing, and business cycle conformity. Based on this method, the Conference Board in New York City currently produces leading and coincident indices for the US, and the OECD produces leading indicators for its member countries, as well as indices for six major country groupings.

¹ Prepared by Hiroko Oura (EP, APD).

5. **This approach has some shortcomings, notably:** (1) the lack of a theoretical basis establishing a relationship between indicators and activity; and (2) the use of an ad hoc weighting mechanism in constructing composite indices from individual indicators.

6. **In response to the second criticism, Stock and Watson (1989, 1991) introduced time-series econometric analysis for deriving leading and coincident indices for the US economy.** Their initial work utilizes dynamic factor models using a Kalman filter to estimate and evaluate the relationship between indicators and target variables. Subsequently, they introduced factor models with principal components (Stock and Watson (2002)), as these are easier to estimate, and can incorporate a much larger set of underlying variables than the models with the Kalman filter. Furthermore, the development of Markov-switching models by Hamilton (1989) and their application to business cycle forecasting introduced flexibility to let a model pick up potentially different relationships between activity indicators and a target variable for different phases of a cycle, which is an important advantage for a business cycle forecasting model. Altogether, these studies have set benchmarks for subsequent model-based analysis of economic indicators that attempt to capture and evaluate the relationship between indicators and target variables. Marcellino (2005) provides a comprehensive survey of the literature.

C. Strategy for Indonesia

Target variables for forecasting

7. **The aim of this paper is to develop leading and coincident indicators for private consumption and investment.** While in most studies the standard target variables are quarterly real GDP or monthly industrial production (IP), estimates of these for Indonesia showed a very poor fit (as shown by their low R-squares) and also had poor in-sample performance. The poor fit may reflect the weak quality of the historical GDP series – the series has a large statistical discrepancy due to data problems, including from the lack of timely statistics capturing government activities.² The IP series reflects developments in only a small share of the economy, as secondary non-oil industrial production accounts for only 35 percent of GDP. Therefore, this paper resorts to forecasting the two major GDP components which account for 85 percent of overall GDP - private consumption, which constitutes about 65 percent of GDP and gross fixed investment, which is over 20 percent of GDP. In addition, these components better reflect underlying trends in private sector domestic demand than overall GDP, which, in some sub-periods, showed contrasting trends to private demand owing to strong government spending.

Type of forecasting

8. **The paper focuses on identifying coincident and leading (two quarters ahead) indicators that explain movements in target variables for the whole sample under**

² While revenue and expenditure data are available on a monthly basis for the central government, statistics measuring local government activities have a lag of two years.

consideration. This is somewhat different from the OECD methodology that focuses more on identifying a turning point, and then searches for variables that predict turning points well. Moreover, predicting turning points generally requires long time series data that include several business cycles, as well as the ability to date peaks and troughs accurately, both of which would be difficult for an economy like Indonesia. For these reasons, several studies on emerging markets undertaken at the Fund (Simone (2001), Leigh and Rossi (2002), and Mongardini and Saadi-Sedik (2003)) chose to identify indicators that can effectively provide near-term forecasts of economic activity, rather than forecasting turning points.

Selection of indicators and time horizon

9. **A reasonable number of monthly indicators are available for Indonesia via CEIC, although they differ in terms of the period for which they are available.** The choice of indicators, therefore, involves a trade-off between having a wider variety of candidate indicators for a shorter horizon and having a smaller set of candidate indicators over a longer horizon. In the end, the shorter data set was used, as many indicators most relevant for assessing activity, including the retail sales index, the consumer confidence index, consumer credit, and business activity index, are only available from 2000. In addition, our preliminary analyses over the longer horizon (since 1993) confirmed a structural break in the series in 1997/98 due to the Asian financial crisis.

10. **Monthly indicators representing both domestic and external developments were also used in the paper.** Table A.1 provides the full list of available variables that were used in the paper and their starting dates.³ In addition, given that Indonesia is a relatively open economy, several indicators from developed markets were analyzed in order to capture developments in the world economy, an approach similar to Mongardini and Saadi-Sedik (2003).⁴ As for most of the nominal variables, both of the original nominal series and a real series deflated by headline CPI were tested.⁵

Basic data clean-up: seasonal adjustment for Islamic holidays and unit root

11. **Data were deseasonalized.** Following Mongardini and Saadi-Sedik (2003), a combination of Census X12 and dummy variables for Islamic holidays is used to make seasonal adjustment. First, X12 is applied to all the variables. Second, each X12-seasonally

³ Real sector and trade data are chosen from CEIC. Data are picked if they are available (1) on monthly basis and (2) with a few months lag (usually 2–3 months).

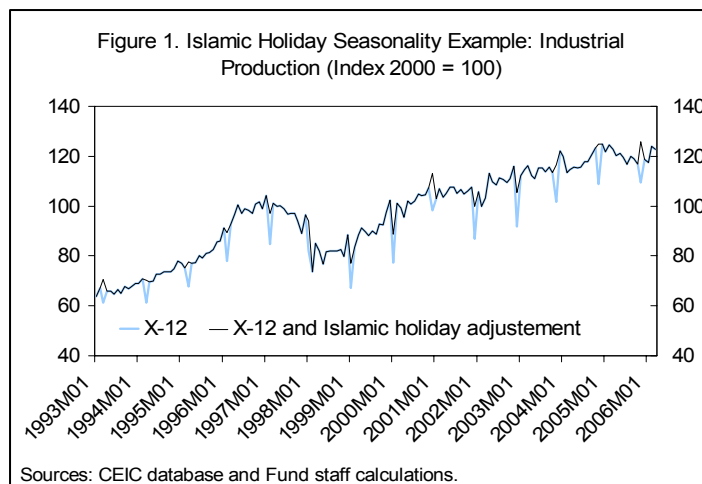
⁴ They included the U.S. and Euro area producer price indices and composite leading indicators from the OECD.

⁵ As discussed later in the paper, nominal series often produce more stable estimates than real series, which are often affected by noise in their deflator. For instance, the artificial spike in headline CPI in 4Q 2005 owing to domestic fuel price hikes distorted the deflated real series. In addition, volume data for trade were not used because: (1) import and export deflator estimation in Indonesia is known to be weak; and (2) there are longer lags with respect to the release of data on trade volumes.

adjusted variable is tested to detect the potential impact of “Eid-ul-Fitr,” corresponding to the end of Ramadan by estimating Equation (1). The summary of the result is given in Table A.2.

$$V_t = \alpha + \beta D_{Eid-ul-Fitr,t} + U_t \quad (1)$$

12. Islamic holiday seasonality is found to have a limited impact on the majority of the variables that were tested. However, statistically significant Islamic holiday seasonality is shown by production-related variables, including IP and cement sales. Figure 1 shows the X12 adjusted series and the X12 and Islamic holiday adjusted series for IP. In what follows, Islamic holiday adjustment is applied only for the variables that show statistically significant estimate for β in Equation (1).



13. As in most studies involving time-series data, the different series are tested for unit roots. Table A.2 summarizes the result of the unit root tests. Most of the variables, except interest rates, do not reject the null hypothesis of a unit root. Therefore, first differenced data were used (after taking the logarithms of seasonally-adjusted series).

Estimation

14. In this paper, simple reduced form estimation models were used, similar to that in Mongardini and Saadi-Sedik (2003), to construct coincident and leading indicators. There were two main reasons for this. First, the attempt to use factor models with principal components (Stock and Watson, 2002) or using error-correction models (Simone, 2001) both presented difficulties given the limited number of series available for Indonesia and the shorter time horizon over which they are available.⁶ Second, reduced form estimation has several advantages. In particular:

- **Operational value:** the model is simple enough to be updated every month and can be used to evaluate underlying trends and near-term prospects.
- **Intuitive interpretation:** it can be ensured that the relationship between the target and explanatory variables are intuitively plausible. In contrast, dynamic factor models and Markov-switching models are often considered “black boxes.”

⁶ Principal component estimates using 54 candidate variables (Stock and Watson, 2002, used 130), showed that more than 9 principal components would have to be included with data available only for 20 quarters this would not give meaningful results.

- **Providing benchmark results:** the model identifies economically plausible and statistically significant indicators and evaluates their statistical performance.

D. Developing Coincident Indicators

15. **Each candidate for a coincident indicator is screened and chosen on the basis of its relationship with a target variable.** Following Mongardini and Saadi-Sedik (2003), the following model is estimated for each candidate indicator:

$$\begin{aligned}\Delta y_t &= \alpha + \beta \Delta x_t + u \\ u_t &= \varepsilon_t + \theta \varepsilon_{t-1}\end{aligned}\tag{2}$$

where Δy_t = quarter-on-quarter growth rate, measured as the difference of the logarithm of the target variable,

Δx_t = standardized quarter-on-quarter first difference of the logarithm of a candidate variable, and

u_t = error term with a moving average component MA (1).

16. **A standard error and covariance matrix is estimated using the Newey-West heteroskedastic-consistent procedure.** An indicator is chosen as a coincident indicator when the estimation shows a statistically significant coefficient for the variable, reasonably higher R-square compared to benchmark estimation only with constant and MA-term, and an intuitively plausible causal relationship with the target variable. In addition, the stability of the results was checked by estimating the model excluding the last 1-3 quarters.

17. **Once promising individual indicators are identified, a composite coincident index is constructed using some or all of the selected candidate indicators.** In the literature, composite indicators are considered to be superior to individual indicators, because they can cover wider aspects of the economy and are less affected by noise in individual series. The paper assesses both composite indices with equal weights and estimated optimal weights, and compares their performance.⁷

⁷ One benefit of the model-based approach over earlier “ad hoc” studies is to let the econometric model decide which indicators should be combined into a composite index and with what weights. However, more recent studies have found that model based composite indices are very similar to the equal weighted ones (Marcellino (2005)), and that the estimation of economic conditions are rather robust to the choice of method. In addition, estimated optimal weights might be strongly influenced by in-sample developments, especially when the sample is small, and produce relatively poor out-of-sample forecasts. Therefore, alternative indices are analyzed, some with optimal weights and others with equal weights, and compare their performances with our data.

Coincident indicators for private consumption

18. **The above procedure identifies three coincident indicators for consumption: consumer credit (nominal series), currency in circulation (nominal series),⁸ and the consumer confidence index.** The following table summarizes the in-sample performances of the individual indicators in explaining variations in the real growth of private consumption. The table also shows two composite indices. For some models, the MA term is dropped as its coefficient is not significant.

19. **Consumer credit explains about 40 percent of the variation in the growth of private consumption, with a statistically significant coefficient, followed by currency in circulation and the consumer confidence index.** While the finding that consumer credit and the consumer confidence index are good indicators of private consumption needs little explanation, the relevance of currency in circulation suggests that a significant part of the economy remains cash-based.

20. **Forecasting performance improves visibly when indicators are combined into a composite indicator.** Composite indicator models have much better significance of coefficients and R-square. This finding is in line with other studies, which show composite indicators are superior to individual indicators (Leigh and Rossi (2002), for instance). Also, composite indices are more robust and the results do not change even when a few quarters are excluded from the estimating equation, while models with single indicators tend to show large changes in estimation results when a few quarters are excluded. Furthermore, although composite indices with estimated optimal weights (model 5 and 6 in Table 1)⁹ have slightly better R-squares, equal-weight models perform comparably well and indeed benefit from having a smaller number of explanatory variables, which is critical for small sample estimation. In addition, with optimal-weights models, multicollinearity problems can arise during the estimation process.¹⁰ Moreover, weights can be strongly influenced by in-sample fit and the models might not have good out-of-sample performance. Therefore, use of equal-weight composite indices is preferable for operational purposes.

⁸ Nominal series are preferred over real series, because the estimation results are strongly influenced by the jump in the headline CPI in the fourth quarter of 2005, owing to a large domestic fuel price hike and subsequent weakening in consumption in the quarter.

⁹ The estimated coefficients in a multivariable regression provide weights on each included indicator in a straightforward manner. For instance, with model 6, an optimal weight composite index is constructed by adding standardized consumer credit growth and currency in circulation growth after each of them are multiplied by their respective estimated coefficients.

¹⁰ Indeed, serious multicollinearity problem appeared with Indonesian data in preliminary analysis in which efforts were made to estimate optimal weight models following Mongardini and Saadi-Sedik (2003), by starting from a general model including majority of the variables, and eliminating one by one based upon the t-statistics of coefficients. Using principal components for estimation instead of raw indicators is one way to avoid this multicollinearity issue; however, as discussed in section C, a relatively large number of estimated principal components are needed to capture a reasonable portion of overall variations with Indonesian data.

Table 1. Coincident Indicators for Consumption

Observation	24	19	20	18	18	19	19	18
Last quarter in estimation	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4
Model number	1	2	3	4	5	6	7	8
Consumer credit, nominal		0.0020 (2.30) **			0.0018 (2.88) **	0.0020 (2.90) **		
Currency in circulation, nominal			0.0015 (3.59) **		0.0014 (3.27) ***	0.0015 (3.57) ***		
Consumer confidence				0.0014 (1.39)	0.0005 (0.76)			
Composite index CA 1/							0.0034 (4.64) ***	
Composite index CB 2/								0.0037 (3.90) ***
Constant	0.01 (13.14) ***	0.01 (12.48) ***	0.01 (14.22) ***	0.01 (10.70) ***	0.01 (17.62) ***	0.01 (17.84) ***	0.01 (19.47) ***	0.01 (17.34) ***
MA(1)	-0.14 (-0.61)	0.26 (2.01) *		0.38 (1.77) *				
R square	0.01	0.39	0.17	0.23	0.57	0.53	0.53	0.52
Adjusted R square	-0.03	0.32	0.12	0.13	0.48	0.44	0.51	0.49

Note: All the variables are seasonally-adjusted, transformed into logarithm, and first differenced. All the candidate coincident indicators are individually standardized. Each model is estimated by OLS, with Newey-West adjusted standard error and covariance matrix estimation. t-values in parentheses. *** indicates significance at 1 percent level, ** indicates significance at 5 percent level, and * indicates significance at 10 percent level.

1/ Simple average of consumer credit and currency in circulation.

2/ Simple average of consumer credit, currency in circulation, and the consumer confidence index.

Coincident indicators for investment

21. **The same procedure identifies five coincident indicators: capital good imports, cement consumption, nominal total bank credit, nominal VAT revenue, and real M2.** Most of these variables have a plausible economic relationship to investment. VAT revenue is correlated with investment to the extent that investment is stimulated by signs of stronger consumption, as reflected in higher VAT revenues. The following table summarizes estimates for individual indicators, some equal-weighted composite indices based on all or some of the above indicators, and optimal-weight models.

Table 2. Coincident Indicators for Investment

Observation	24	24	24	24	24	24	24	24	24	24
Last quarter in estimation	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4
Model number	1	2	3	4	5	6	7	8	9	10
Import, capital goods, in USD		0.0274 (14.49) ***						0.0264 (15.29) ***		
Cement consumption			0.0136 (2.18) **					0.0145 (4.75) ***		
Bank credit, nominal				0.0114 (3.94) ***						
VAT revenue, nominal					0.0120 (2.78) **					
M2, real						0.0102 (3.10) ***				
Composite IA 1/								0.0450 (14.91) ***		
Composite IB 2/									0.0459 (12.79) ***	
Composite IC 3/										0.0507 (9.65) ***
Constant	0.02 (1.77) *	0.02 (39.55) ***	0.02 (1.83) *	0.01 (1.50)	0.02 (1.74) *	0.02 (2.14) **	0.02 (35.28) ***	0.02 (23.55) ***	0.02 (41.65) ***	0.02 (27.33) ***
MA(1)	0.65 (5.95) ***	-0.94 (-25.17) ***	0.94 (9.94) ***	0.96 (16.99) ***	0.95 (7.47) ***	0.68 (5.45) ***	-1.00 (-35.87) ***	-1.00 (-8.16) ***	-0.94 (-25.53) ***	-0.97 (-24.37) ***
R square	0.17	0.70	0.38	0.38	0.38	0.34	0.80	0.72	0.69	0.57
Adjusted R square	0.13	0.67	0.32	0.32	0.32	0.28	0.77	0.70	0.66	0.53

Note: All the variables are seasonally-adjusted, transformed into logarithm, and first differenced. All the candidate coincident indicators are individually standardized. Each model is estimated by OLS, with Newey-West adjusted standard error and covariance matrix estimation. t-values in parentheses. *** indicates significance at 1 percent level, ** indicates significance at 5 percent level, and * indicates significance at 10 percent level.

1/ Simple averages of capital good imports and cement consumption.

2/ Simple averages of capital good imports, cement consumption, and bank credit.

3/ Simple averages of capital good imports, cement consumption, bank credit, VAT revenue, and M2.

22. Capital good imports explain about 70 percent of the variation in investment growth.¹¹ It seems that business sector demand has a high import content, and, as a result, business sector expansion in Indonesia is reflected in higher demand for imported capital goods for investment. The explanatory power of capital goods import is about the same or higher than any of the estimated equal-weight composite indices. Perhaps reflecting the dominant relationship between investment and capital goods imports, the explanatory power of a composite index *decreases* when it includes other variables that have a weaker individual statistical relationship with the target variable. The only model that performs better than the simple capital good imports model is the optimal weights model that uses capital good imports and cement consumption.

¹¹ The importance of capital goods imports as an indicator of investment was confirmed during a series of meetings with the authorities and the private sector participants. The strong relationship between capital goods import and investment was detected by varieties of methodologies, including simple correlation analysis and the OECD methodology (BI), with different data clean-up procedures.

E. Developing Leading Indicators

23. **The same methodology as that for coincident indicators is used to find leading indicators of activity.** A model similar to Equation (2) is estimated with a lead of two quarters for the target variables (private consumption and investment), standard choice for leads with OECD indicators. The results are summarized in the following tables.

24. **As for consumption, the procedure highlights the importance of the retail sales index as a leading indicator.** Although the statistical relationship between any of the candidate indicators and the target variable is generally weaker than that for coincident indicators, as expected, the retail sales index can still explain about 40 percent of the variations in future consumption growth, and the estimation result is robust to the exclusion of up to two quarters (Table 3). It is somewhat unexpected to see the retail sales index as a leading indicator rather than a coincident indicator. However, the estimation results seem to indicate that the sales index covers consumption items that are more sensitive to changes in households' purchasing patterns, and hence has some forecasting power over future overall consumption.

Table 3. Leading Indicators for Consumption (+ two quarters).

Observation	22	18	16	22	16
Last quarter in estimation	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4
Model number	1	2	3	4	5
Retail sales index, real		0.0018 (2.30) **			
Consumer confidence index, present			0.0011 (1.47)		
1 month SBI rate, real				-0.0015 (-1.98) *	
Composite index LA 1/					0.0040 (2.43) **
Constant	0.01 (8.85)	0.01 (10.17) ***	0.01 (9.83) ***	0.01 (10.30) ***	0.01 (10.66) ***
MA(1)	0.52 (2.79) **	0.71 (5.23) ***	0.29 (0.68)	0.32 (1.45)	0.43 (1.60)
R square	0.08	0.39	0.16	0.16	0.41
Adjusted R square	0.04	0.31	0.03	0.07	0.32

Note: All the variables are seasonally-adjusted, transformed into logarithm, and first differenced. All the candidate coincident indicators are individually standardized. Each model is estimated by OLS, with Newey-West adjusted standard error and covariance matrix estimation. t-values in parentheses. *** indicates significance at 1 percent level, ** indicates significance at 5 percent level, and * indicates significance at 10 percent level.

1/ Simple average of the retail sales index, the consumer confidence index present condition, and real 1 month SBI rate (-).

25. **Unlike the analysis for coincident indicators, the fact that there is only one indicator that has a strong statistical relationship with future consumption cautions against drawing strong conclusions only from this one variable.** This is particularly the case when the R-square of the leading indicator of consumption is not as strong as that of

capital goods import and investment. Therefore, tracking a combined composite index including the retail sales index and a few of other economically plausible variables, in addition to a single indicator model, might be able to provide a cross check of the predictions. Table 3 also shows estimates with the consumer confidence index and the one month real SBI rate, as well as a composite index combining the three variables. Improvements in consumer confidence can stimulate households' purchasing plans a few months ahead and increase consumption. An easing of real monetary conditions can reduce financing costs for big ticket items and stimulate near-term consumption. While individually these variables do not perform as well as the retail sales index in forecasting consumption, the composite index has a larger coefficient than the retail sales index alone and the R-square improves marginally.

Table 4. Leading Indicators for Investment, two quarters ahead.

Observation	22	22	22	22	18	22	22	18	18
Last quarter for estimation	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4	2005Q4
Model number	1	2	3	4	5	6	7	8	9
Composite leading indicator, Japan		0.025 (5.42) ***							
Composite leading indicator, US			0.023 (3.78) ***						
Industrial Production				0.011 (4.41) ***					
Retail sales index					0.0066 (1.94) *				
Motor vehicle sales						0.014 (2.79) **			
JCI, real							0.013 (1.84) *		
Composite index A 1/								0.026 (4.46) ***	
Composite index B 2/									0.045 (13.05) ***
Constant	0.01 (1.47)	0.01 (1.93) *	0.02 (2.21) **	0.01 (1.23)	0.01 (1.00)	0.01 (1.33)	0.01 (1.60)	0.01 (1.22)	0.01 (1.17)
MA(1)	0.70 (5.52) ***	0.96 (9.56) ***	0.62 (3.79) ***	0.94 (23.91) ***	1.00 (5.59) ***	0.66 (4.04) ***	0.48 (2.70) **	1.00 (8.44) ***	1.00 (7.85) ***
R square	0.20	0.57	0.50	0.50	0.49	0.38	0.29	0.66	0.78
Adjusted R square	0.16	0.53	0.45	0.45	0.42	0.32	0.21	0.61	0.76

Note: All the variables are seasonally-adjusted, transformed into logarithm, and first differenced. All the candidate coincident indicators are individually standalized. Each model is estimated by OLS, with Newey-West adjusted standard error and covariance matrix estimation. t-values in parentheses. *** indicates significance at 1 percent level, ** indicates significance at 5 percent level, and * indicates significance at 10 percent level.

1/ Simple average of composite leading indicator for Japan and the US, industrial production, and the retail sales index.

2/ Simple average of composite leading indicator for Japan and the US, industrial production, the retail sales index, motor vehicle sales, and JCI index in real.

26. The procedure identified six leading indicators of investment: OECD composite leading indicators (CLI) for Japan and the US, IP, the retail sales index, motor vehicle sales, and Jakarta Composite Index (JCI) in real terms (Table 4). Most of the indicators have a clear economic relationship to investment, covering production (IP), demand for final

goods (the retail sales index, motor vehicle sales¹²), financial sector development (equity market index), and impact of developed economies (leading indicators for Japan and the United States). In fact, it is interesting to find CLIs for developed countries acting as leading indicators for investment. At a glance, activity in Indonesia does not seem strongly correlated with the rest of the world: the ratio of foreign investment in total investment is about 20 percent, and Indonesia's export share in GDP is about 35 percent, which is low compared to the regional average of 60 percent.¹³ However, the results suggest statistically strong ties of Indonesian investment cycles to the developed countries.

F. Forecasting Performance of Indicators

27. **In this section, out-of-sample performance of the indicators developed in the previous section is evaluated.** However, the limited sample period prevents rigorous testing of out-of-sample properties. Forecasting performance is therefore assessed based on performance for the first quarter of 2006, using data up to end 2005. The panel chart shows the results for consumption and investment of coincident/leading indicators.

28. **All the indicators track in-sample developments of the target series well.** Furthermore, coincident indicators for consumption predicted the further deceleration of this aggregate in the first quarter 2006. Moreover, coincident indicators for investment predicted the pickup of investment.

29. **In addition, leading indicators also predicted the *direction* of quarter-on-quarter growth for 2006 Q1.** Although the fall in consumption and the pickup in investment were much sharper than the predicted values, the models performed reasonably well given the uncertainties following the sharp rise in oil prices. Based on data up to the first quarter of 2006, the leading indicators of both consumption and investment forecast a recovery starting Q3. This is consistent with gradually declining interest rates envisaged by BI for the second half of the year assuming inflationary pressures remain subdued.

G. Conclusion

30. **This paper identified coincident and leading indicators of private consumption and investment in Indonesia.** The estimation approach is simple, easy to update, and provides an intuitive interpretation regarding the state of the economy. Although the scope for testing out-of-sample prediction by the model is limited, the forecasting results for the first quarter of 2006 based upon data up to the end of 2005 are reasonably good.

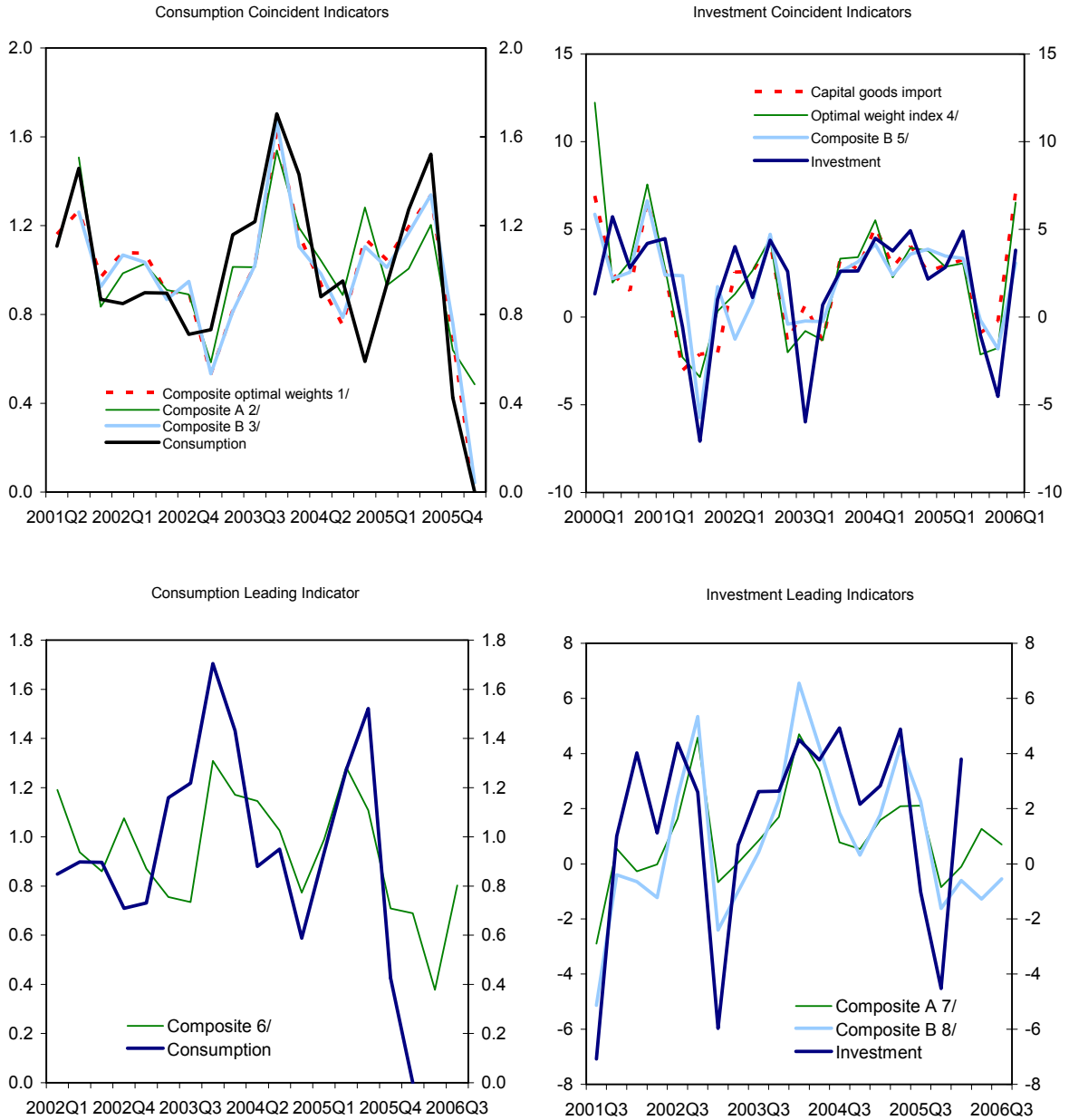
¹² It may appear implausible for motor vehicle sales to be a leading indicator for investment when it is not strongly related to private consumption. However, a large portion of local motor vehicle sales are of commercial, not passenger, vehicles. This means that car sales may reflect business demand more than private consumption.

¹³ Comparators include South Korea, Malaysia, the Philippines, and Thailand. The numbers are based on 2000–2005 average.

31. **Overall, consumption indicators (both coincident and leading) seem to be somewhat weaker than investment indicators in predicting the respective aggregates.** This may reflect the limited number of time series, the short time horizon over which they are available, and weaker coverage of consumption data.

32. **The compilation of additional data that better reflect trends in the economy is also needed to improve the forecasting ability of the model.** Some research projects in this direction are already underway in Indonesia. For example, BI has adopted the OECD package and continues to search for composite indicators by expanding the set of candidate indicators, including internally accumulated data. The Ministry of Finance has also just started to compile detailed VAT revenue data, which seems to have produced promising results in explaining consumption.

Figure 2. Performance of Indicators
(In percent, q/q seasonally-adjusted growth rate)



Sources: CEIC database and Fund staff calculations.

1/ Including consumer credit, currency in circulation, and the consumer confidence index with estimated optimal weights.

2/ Including consumer credit, currency in circulation, and the consumer confidence index with equal weights.

3/ Including consumer credit and currency in circulation with equal weights.

4/ Including capital good imports and cement consumption with estimated optimal weights.

5/ Including capital goods import, cement consumption, and bank credit with equal weights.

6/ Including the retail sales index, the consumer confidence present condition index, and real 1-month SBI rate.

7/ Including composite leading indicators for Japan and the US, IP, the retail sales index.

8/ Including composite leading indicators for Japan and the US, IP, the retail sales index, motor vehicle sales and JCI index.

Table A.1. List of variables

Code	Unit	Available from 1/	Frequency	Description
Production				
IP	year 2000=100	Mar-93	M	Industrial Production Index
MVP	(Units)	Jan-94	M	Motor Vehicle Production
Trade				
EX	(USD)		M	Exports: fob
EXOG	(USD)		M	Exports: fob: Oil and Gas
EXNOG	(USD)		M	Exports: fob: Non Oil and Gas
IM	(USD)		M	Imports: cif
IMOG	(USD)		M	Imports: cif: Oil and Gas
IMNOG	(USD)		M	Import: cif: Non Oil and gas
IMK	(USD)		M	Imports: Capital Goods
IMRM	(USD)		M	Imports: Raw Materials
IMCG	(USD)		M	Imports: Consumer Goods
Investment				
INVr	(Rupiah)	Jun-96	M	Investment approval, deflated with CPI
INVFr	(USD)	Jun-96	M	Foreign investment approvals, converted into Rupiah and then deflated with CPI
INVDr	(Rupiah)	Jun-96	M	Domestic investment approvals, deflated with CPI
Real sector surveys				
CCI	(Index Number)	Apr-01	M	Consumer confidence index, Bank Indonesia (BI)
CCIE	(Index Number)	Apr-01	M	Consumer confidence index, expectation, BI
CCIP	(Index Number)	Apr-01	M	Consumer confidence index, present, BI
RSS	(Index Number, real)	Nov-00	M	Retail Sales Index, BI (deflated with headline CPI by BI)
BUSS	(Index Number)	Dec-99	M	Business Sentiment Index, Danareksa
ELEC	(Thousands KWH)	Jan-95	M	Electricity Consumption
Sales				
CEMC	(Tons)	Jan-94	M	Cement consumption
CEMS	(Tons)	Jan-96	M	Commercial Cement Sales
MVS	(Units)	Jan-91	M	Motor Vehicle Sales: PT Astra: Local
MVSex	(Units)	Jan-91	M	Motor Vehicle sales export
MCS	(Units)	Jan-91	M	Motorcycle Sale: PT Astra: Local
Money, exchange rate, and financials				
CPI	year 2000=100		M	Consumer price index
FX	(Rp/USD)		M/D	Exchange rate
REER	(Index Number)		M	Real Effective Exchange Rate Using INS Trade Weights Based on CPI (2000=100)
SBI1Mr	(%)	Jul-96	M	1 month SBI rate (policy rate) - headline CPI inflation
INTD	(%)	Jul-96	M	Interest rate differential: 1 month SBI rate - US Federal Fund Rate
BC	(Rupiah)	May-91	M	Commercial banks Credits (BCr: deflated with CPI)
BCI	(Rupiah)	Apr-93	M	Commercial banks Investment Credits (BCIr: deflated with CPI)
BCC	(Rupiah)	Mar-93	M	Commercial banks: Consumption Credits (BCCr: deflated with CPI)
CIC	(Rupiah)	Oct-00	M	Currency in Circulation (CICr: deflated with CPI)
MON2	(Rupiah)		M	Broad Money (M2) (MON2r: deflated with CPI)
DEP	(Rupiah)		M	Commercial banks Deposits (DEPr: deflated with CPI)
IRESV	(USD)	Jan-95	M/D	Gross official reserves
JCI	(Index Number)		M/D	Jakarta Composite Index (JCIR: deflated with CPI)
Government				
GREV	(Rupiah)	Jan-01	M	Central Government Operation: Total Revenue
GEXP	(Rupiah)	Jan-01	M	Central Government Operation: Total Expenditures
VAT	(Rupiah)	Jan-98	M	Central Government VAT revenue (VATr: deflated with CPI)
Other				
APASS	(Person)	Nov-92	M	Aircraft passenger arrival & departure, domestic & international
CAG	(Units)	Sep-90	M	Cargo loaded, unloaded, domestic and international, 4 main ports
VISA	(Thousands)	Jan-98	M	Visitors Arrivals: Thirteen Main Gates
National accounts				
RGDP	2000price	Mar-93	Q	Real GDP
RGC	2000price	Mar-93	Q	Real Government consumption
RPC	2000price	Mar-93	Q	Real Private consumption
RINV	2000price	Mar-93	Q	Real Investment
Foreign indicators				
CLI7	(Index Number)		M	OECD Composite Leading Indicator, G7
CLIJP	(Index Number)		M	OECD Composite Leading Indicator, Japan
CLIUS	(Index Number)		M	OECD Composite Leading Indicator, US
IPUS_sa	(Index Number)		M	Seasonally-adjusted IP, US
IPJP_sa	(Index Number)		M	Seasonally-adjusted IP, Japan

1/ An empty cell indicates data start before January 1990.

Table A.2. Significance of Islamic Holiday Seasonality Effect and Results From Unit Root Tests 1/

Code	Monthly Significance of coefficient on Muslim holiday dummy	Unit root tests			
		Monthly		Quarterly	
		Augmented Dickey-Fuller	Phillips- Perron	Augmented Dickey-Fuller	Phillips- Perron
IP	**	--	--	--	--
MVP	(***) 2/	--	--	--	--
EX	--	--	--	--	--
EXOG	--	--	--	--	--
EXNOG	--	--	--	--	--
IM	--	--	--	--	--
IMOG	--	--	--	--	--
IMNOG	--	--	--	*	--
IMK	--	--	**	--	--
IMRM	--	--	--	--	--
IMCG	--	--	--	--	--
INVr	--	***	***	--	***
INVFr	--	***	***	***	***
INVDr	--	***	***	--	***
CCI	--	--	--	**	--
CCIE	--	*	*	--	--
CCIP	--	--	--	--	--
RSS	--	--	--	--	--
BUSS	--	*	--	--	--
ELEC	--	--	--	--	--
CEMC	***	***	--	--	--
CEMS	***	--	--	--	--
MVS	(**) 2/	--	--	*	--
MVSex	--	--	--	--	--
MCS	--	--	--	--	--
CPI	--	--	--	--	--
FX	--	--	--	--	--
REER	--	--	--	--	--
SBI1Mr	...	**	*	**	**
INTD	...	**	*	--	*
BC	--	--	--	--	--
BCr	--	**	--	--	--
BCI	--	--	--	*	--
BCIr	--	--	--	--	--
BCC	--	--	--	--	--
BCCr	--	--	--	--	--
CIC	--	--	--	--	--
CICr	--	--	--	--	--
MON2	--	--	--	--	--
MON2r	--	--	--	--	--
DEP	--	--	--	--	--
DEPr	--	--	--	--	--
IRESV	--	--	--	--	--
JCI	--	--	--	--	--
JCIr	--	--	--	***	--
GREV	--	--	***	--	--
GEXP	--	--	***	--	--
VAT	--	--	--	--	--
VATr	--	--	--	--	--
APASS	--	--	--	--	--
CAG	--	--	**	--	--
VISA	--	***	***	*	*
RGDP	...	...	...	--	--
RGC	...	...	...	--	--
RPC	...	...	...	--	--
RINV	...	...	...	--	--
CLI7	...	--	--	--	--
CLIJP	...	--	--	**	--
CLIUS	...	--	--	--	--
IPUS_sa	...	--	--	--	--
IPJP_sa	...	--	--	--	--

1/ The significance tests represent the statistical significance at 10 percent (*), 5 percent (**), and 1 percent(***). The results for Muslim holiday seasonality are shown only for monthly data, as none of the quarterly series show significant Muslim holiday effects.

2/ Significance with dummy variables for the Asian crisis period.

REFERENCES

- Burns, A. and W. Mitchell, 1946, "Measuring Business Cycles," NBER Working Paper No.2.
- Hamilton, J., 1989, "A New Approach to the Economic Analysis of Nonstationary Time Series and the Business Cycle," *Econometrica* 57.
- Leigh, D. and M. Rossi, 2002, "Leading Indicators of Growth and Inflation in Turkey," IMF Working Paper WP/02/231.
- Marcellino, M., 2005, "Leading Indicators" manuscript, Bocconi University.
- Mongardini, J. and T. Saadi-Sedik, 2003, "Estimating Indexes of Coincident and Leading Indicators: An Application to Jordan," IMF Working Paper WP/03/170.
- Moore, G. and J. Shiskin, 1967, "Indicators of Business Expectations and Contractions," NBER Occasional Paper No.103.
- Simone, A., 2001, "In Search of Coincident and Leading Indicators of Economic Activity in Argentina," IMF Working Paper WP/01/30.
- Stock, J. and M. Watson, 1989, "New Indexes of Coincident and Leading Economic Indicators," NBER Macroeconomic Annual Report, pp. 351-394.
- , 1991, "A Probability Model of the Coincident Economic Indicators," *Leading economic indicators: new approaches and forecasting records*, edited by K. Lahiri and G. Moore, Cambridge University Press.
- , 2002, "Forecasting Using Principal Components from a Large Number of Predictors," *Journal of the American Statistical Association*, December 2002, Vol. 97, No.460.
- , 2004, "An Empirical Comparison of Methods for Forecasting Using Many Predictors," manuscript.

VI. EXPLAINING HIGHER INFLATION IN INDONESIA—A REGIONAL COMPARISON¹

A. Introduction

1. **Over the past 15 years inflation in Indonesia has been consistently higher than elsewhere in the region.**² Indeed, inflation has often exceeded the 7–11 percent threshold above which it is estimated to adversely affect growth (Khan and Senhadji, 2000). At these rates, inflation may also make the poor significantly worse off by reducing real minimum wages and the income share of the lowest quintile (Easterly and Fischer, 2001). The higher inflation rate and its potential adverse effects raise the question: what is driving the Indonesian inflation differential vis-à-vis its neighbors?

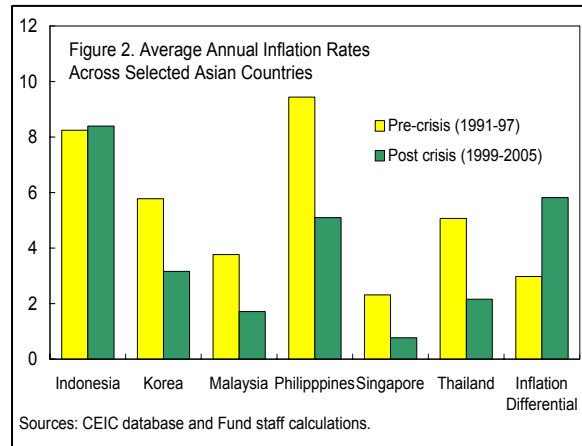
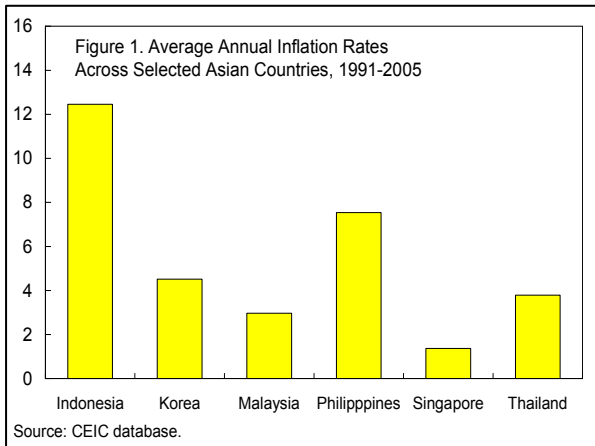
2. **This chapter reviews a number of stylized facts comparing inflation in Indonesia with other Asian countries.** It uses econometric techniques to assess various hypotheses to explain the Indonesian inflation differential vis-à-vis neighboring countries. Finally, it discusses the policy implications for reducing inflation in Indonesia towards rates prevailing in the region.

B. Indonesian Inflation in the Asian Context

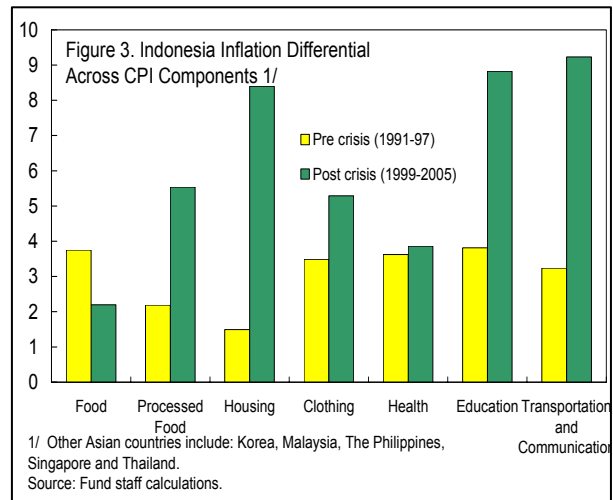
3. **Inflation in Indonesia has been substantially higher than in the other countries of the region, both before and after the crisis.** Over the past one and a half decades, the annual inflation rate in Indonesia has averaged about 12.5 percent, or 9 percentage points higher than in neighboring countries, and has shown significantly higher variance (Figure 1 and Table 1). While the magnitude of the inflation differential reflects in part the high inflation rates registered in Indonesia during the Asian financial crisis, the differential widened in the period after the crisis as inflation in neighboring countries declined, while remaining broadly unchanged in Indonesia (Figure 2).

¹ Prepared by Geremia Palomba (APD).

² The analysis is based on a panel of quarterly data covering the period 1990Q4–2005Q4, and including, in addition to Indonesia, five neighboring countries: Korea, Malaysia, Philippines, Singapore, and Thailand.



4. **Inflation in Indonesia has been higher across a wide range of products.** Indonesia has registered a positive inflation differential vis-à-vis the other countries in the sample across all the main components of the CPI. After the crisis, the differential widened for most of the CPI components, with the exception of food items. Indeed, contrary to the commonly held belief in Indonesia that high inflation is the result of distortions in the agricultural sector and weak rural infrastructure, the inflation differential for food items has decreased after the crisis, while widening for all the other categories in the CPI, particularly housing, education, and transportation and communications (Figure 3). In sum, no single CPI component can alone explain the Indonesian inflation differential with respect to other Asian countries; therefore, other factors need to be explored.



C. What Can explain Inflation in Indonesia and in Neighboring Countries?

Theories explaining inflation across countries

5. **Different factors have been analyzed in the literature to explain the sources of inflation and inflation differentials across countries.** It is generally accepted that inflation is:

- *A phenomenon with some degree of inertia due, for example, to the way expectations are formed.* Inflation expectations are in part adaptive or backward looking, particularly in countries that, like Indonesia, have experienced long periods of high inflation (Mankiw and others, 2003).
- *Closely related to country-specific shocks.* These include demand and supply shocks associated, for example, with the pace of economic activity (Coe and McDermott, 1997), the

stance of monetary policy, and exchange rate fluctuations (Siregar, 2002). High demand pressures, expansionary monetary policy (e.g., rapid growth in monetary aggregates) and significant currency depreciations have been found to be positively correlated to inflation across countries (Anglingkusumo, 2005; Campillo and Miron, 1996).

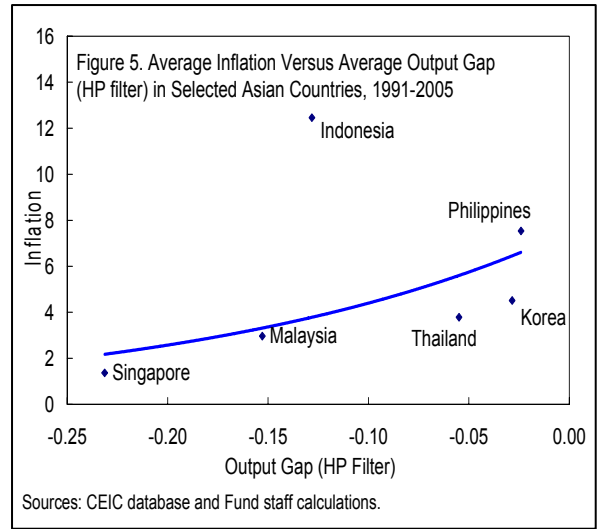
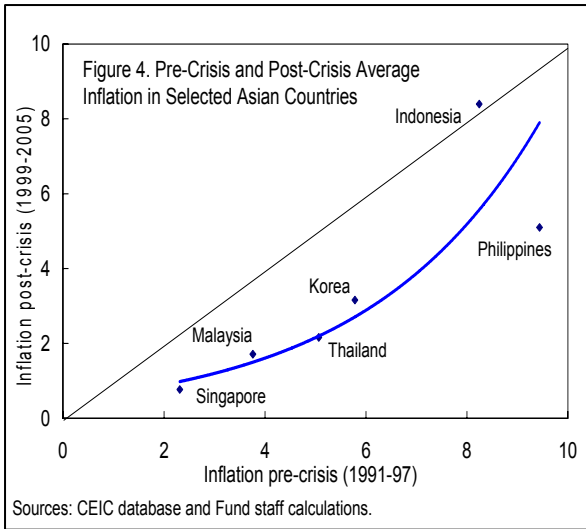
- *Dependent on the structural features of the economy.* For example, the degree of central bank independence (Berger and others, 2001), economic openness (Romer, 1993), the public debt burden (Campillo and Miron, 1996), and the type of exchange rate regime (Loungani and Swagel, 2001) are found to have an impact on the rate of inflation across countries. Central bank independence is generally found to reduce inflation, especially in less developed countries, as it helps to insulate monetary policy from political influences. Inflation is often found to be negatively associated with economic openness, as this increases the costs of unanticipated monetary expansion and allows for additional productivity gains and price competition (IMF, 2006). Fiscal imbalances may also lead to higher inflation either by triggering higher money growth or forcing currency depreciation.
- *Related to the degree of political stability and institutional development.* For example, frequent cabinet changes and weak institutions shorten the time horizon of governments and make difficult the pursuit of consistent and sound policies to maintain low inflation. A number of political and institutional variables have been found to affect inflation, particularly in developing countries (Aisen and Veiga, 2005; Cukierman, Edwards and Tabellini, 1991).

Some simple facts to explain inflation in Indonesia and neighboring countries

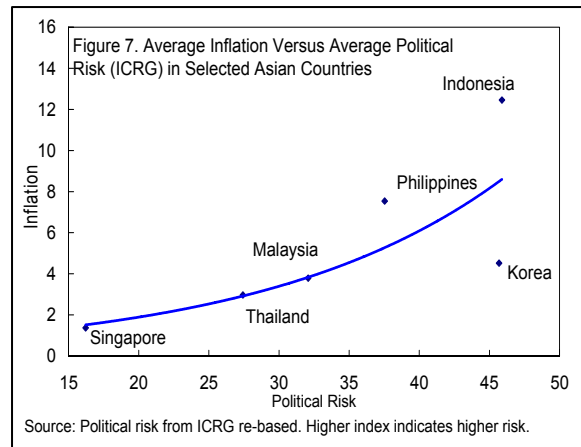
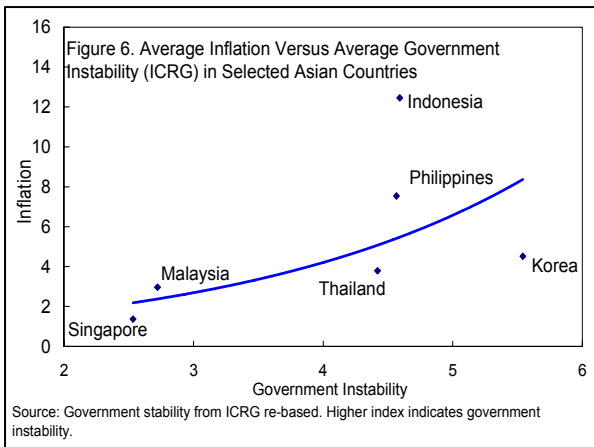
Some factors explaining inflation seem to play a more important role in Indonesia than in neighboring countries.

- **Inflation inertia appears to be stronger in Indonesia than in the other countries of the sample.** Countries that have had relatively high inflation rates in the past (e.g., in the pre-crisis period) have registered higher inflation rates in more recent years. In this respect, Indonesia seems to face stronger inflation inertia than the other countries as inflation has been higher after the crisis than before the crisis (Figure 4).
- **The positive relationship between inflation and the output gap is stronger in Indonesia.** As expected, smaller output gaps are associated with higher inflation rates across all the countries of the sample (Figure 5). Once again, Indonesia appears to be an outlier with much higher inflation for a given output gap (Table 2).³

³ Results remain broadly unchanged if the average inflation rate excludes the crisis period.



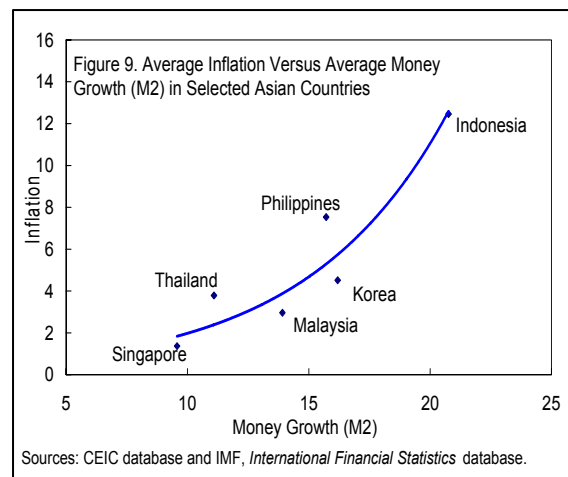
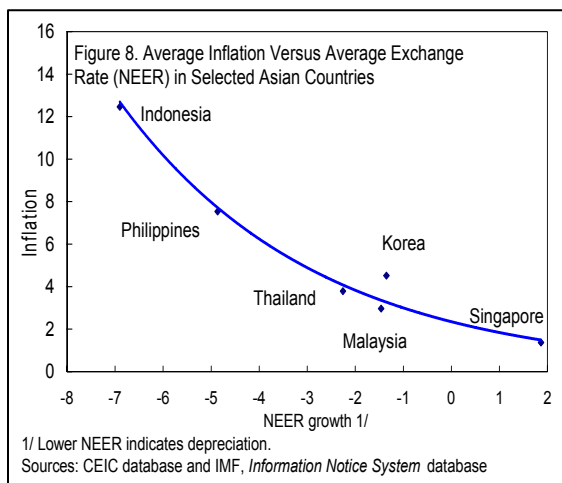
- Political and institutional factors affect inflation differently across countries.** Political risks and government instability (measured by the International Country Risk Guide (ICRG)’s indices) are positively correlated with inflation across selected Asian countries. However, Indonesia is once again an outlier in the region with high political risks associated with relatively higher inflation (Figures 6–7).⁴



⁴ Indonesia would be less of an outlier if the average annual inflation rate excluded the crisis period. It is worth noting that despite the similarity in the average level of political risk between Indonesia and Korea (and the lower average government instability in Indonesia), Indonesia has recently been falling behind Korea on both accounts. However, before the crisis Indonesia had lower political risk and instability, thus showing a better average rating than Korea for the period as a whole.

In other respects, Indonesia is similar to other Asian countries...

- **The influence of changes in monetary aggregates and exchange rates on inflation in Indonesia is broadly similar to that in neighboring countries** (Figures 8–9). In Indonesia, monetary growth and currency depreciation (NEER) are on average higher, but the degree of correlation with inflation appears to be similar to that in other countries (Table 2). Importantly, the more expansionary monetary policy and the higher average inflation rate in Indonesia suggest that the country's inflation differential may in part be a monetary phenomenon.



6. **Overall, Indonesia appears to differ from neighboring countries in the way some structural factors relate to inflation while being similar in other respects.** An econometric analysis is therefore needed to clarify the differences and similarities and to explore the reasons underlying the Indonesia inflation differential vis-à-vis its neighboring countries.

D. An Econometric Analysis

7. **In this section, econometric analysis is used to explain why inflation in Indonesia has been higher than in the region.** The analysis is carried out in three steps. First, a cross-country empirical model identifying the main inflation determinants across our sample is estimated (Box 1).⁵ Second, a set of Indonesia-related slope dummies is employed to investigate whether the role of the inflation determinants differs in Indonesia from the

⁵ The basic model is a dynamic panel in which the explanatory variables include the lagged dependent variable. To address possible endogeneity problems, difference GMM estimators are used (Arellano and Bond, 1991).

average of the selected countries.⁶ Finally, the causes of Indonesia's higher inflation are examined by looking at the combined effect of two elements: how inflation determinants have evolved in Indonesia compared to other countries in the sample and how they have differently affected inflation in Indonesia compared with other countries (using the coefficients of the dummy variables). In this framework, the basic econometric model sets a benchmark against which to test different hypotheses about the reasons for the higher inflation in Indonesia.

Step 1—Explaining Cross-Country Inflation in Selected Asian Countries

8. **A simple model explains inflation well in the selected Asian countries.** Across the sample, the rate of inflation depends positively on past inflation, the output gap, currency depreciation, and growth in M2

(Table 3). Inflation also depends on institutional factors as measured, for example, by the ICRG's political risk index. In particular, government instability and the quality of national bureaucracies are the two institutional factors that make the strongest contribution to inflation.⁷ Structural factors such as the degree of economic openness, the public debt burden, and the level of price regulation (as measured by an index from the Heritage Foundation) play no role in shaping inflation dynamics across the selected countries (these results are not reported).

	Model (1)	Model (2)
Previous inflation	0.64***	0.6***
Output gap	0.12*	0.11**
M2 Growth	0.03***	0.03***
NEER growth 1/	-0.2**	-0.2**
Political risk (ICRG)	0.1**	...
Government instability (ICRG)		0.14***
Lack of bureaucracy quality (ICRG)		0.59*
Chi-square	0.66	0.00
Obs.	348	348

Notes: Difference GMM estimations using quarterly data 1990Q4-2005Q4.
 Independent variable: End-period inflation rate.
 Countries: Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand.
 *, **, *** denote significance at 10, 5, 1 percent, respectively.
 1/ Negative changes denote depreciation.

Step 2—What is special about inflation in Indonesia?

9. **Inflation in Indonesia is more persistent and more sensitive to country-specific shocks and political risks than in other Asian countries.** The estimates of the slope dummies suggest that inflation in Indonesia is more sensitive to past inflation, the output gap, exchange rate fluctuations and political risks than in the other countries of the sample. The estimated magnitude of these effects appears significant. For example, using a modified

⁶ The coefficients of the slope dummies measure how much the impact of a given variable on inflation is different in Indonesia compared to the sample of selected countries.

⁷ The ICRG political risk variable aggregates twelve different subcomponents, including government stability and bureaucracy quality. The indices have been re-based, so that the greater the political risks (instability, lack of quality of the bureaucracy) the higher are the indices.

version of our basic model (Table 4, model 3), an additional one percentage point in past inflation is associated with an increase in the inflation rate of about 0.65 percent in Indonesia, 0.2 percentage points higher than the sample average. This suggests that the historically high inflation rates in Indonesia have generated strong inflation inertia. At the same time, an additional one percentage point change in either the output gap or in the depreciation of the

	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
Previous inflation	0.45***	0.67***	0.60***	0.53***	0.63***
Output gap	0.13*	0.08*	0.12**	0.09**	0.12**
M2 Growth	0.03***	0.03***	0.02***	0.01***	0.03***
NEER growth 1/	-0.2***	-0.19**	-0.18**	-0.06***	-0.19**
Political risk	0.12***	0.1*	0.11***	0.9***	0.07**
Previous inflation (Ind. dummy)	0.20**				
Output gap (ldn dummy)		0.28***			
M2 Growth (ldn dummy)			0.07		
NEER growth (ldn dummy)				-0.3***	
Political risk (ldn dummy)					0.10***
Chi-square	0.00	0.00	0.00	0.00	0.00
Obs.	348	348	348	348	348

Notes: Difference GMM estimations using quarterly data 1990Q4-2005Q4.
 Independent variable: End-period inflation rate
 Country coverage: Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand.
 *, **, *** denote significance at 10, 5, 1 percent, respectively.
 1/ Negative changes denote depreciation.

currency in Indonesia is associated with an increase in the inflation rate of about 0.36 percent, 0.3 percentage points higher than in other countries (Table 2, models 4 and 6). Finally, a one percentage point increase in the overall political risk index increases inflation in Indonesia by 0.6 percentage points compared to an increase of 0.4 percentage points for the average of the sample (Table 2, model 7). The results are robust to structural changes due to the crisis as the model estimated for the whole sample is broadly similar to the model estimated for the post crisis period (Box 1).

10. Monetary policy has similar effects on inflation in Indonesia and other Asian countries. The coefficient of the Indonesia-related slope dummy for money growth is not significant (Table 4, model 5). This suggests that an additional one percentage point increase in the growth of M2 is associated with an increase in inflation of a similar magnitude as in neighboring countries.

Step 3—Explaining the Indonesian inflation differential

11. The Indonesian inflation differential vis-à-vis other neighboring countries is largely explained by inflation inertia and political risks, in addition to rapid monetary expansion and currency depreciation. In general terms, the inflation differential can be explained by a combination of two elements: how the different factors influencing inflation have evolved over time in each country and how differently they have affected inflation in Indonesia relative to other countries (in our model, the coefficients of the Indonesia slope dummies). Looking at the combined effects of these two elements,

	Dummies Coefficients	Mean variables			Average additional inflation effect 2/	
		Sample 1/	Indonesia	Percentage difference		
Previous inflation	0.2	5.5	12.7	132%	5.2	42.6%
Output gap	0.28	-0.2	-0.1	-19%	0.0	0%
M2 Growth 3/	0.07	12.9	20.4	58%	1.1	9.0%
NEER growth	-0.3	-2.5	-6.9	177%	2.0	16.0%
Political risk	0.10	31.8	45.8	44%	4.0	32.4%
Total					12.3	100.0%

1/ Country coverage: Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand, and Indonesia.
 2/ Effects calculated using different models and average values.
 3/ Coefficient not significant.

inflation inertia and political risks explain on average about 75 percent of the Indonesian inflation differential vis-à-vis selected Asian countries (Table 5).⁸ Monetary policy and exchange rate depreciation are also seen to contribute to the inflation differential, although to a smaller extent (about 25 percent), with the additional money-generated inflation coming from the expansionary monetary policy in Indonesia compared with other countries. In contrast, the output gap has played little role in determining the Indonesian inflation differential, as its stronger effect on inflation (significant and large slope dummy coefficient) has been largely offset by the lower average output gap in Indonesia compared with the other countries in the sample.

E. Conclusions and Policy Issues

12. **Over the past one and a half decades, Indonesia has consistently recorded higher inflation than its neighbors.** The analysis suggests that the causes of the Indonesia inflation differential vis-à-vis other countries in the region include various structural factors, such as strong inflation inertia and political instability, combined with expansionary monetary policy and currency depreciation. On the other hand, structural factors such as the degree of economic openness, the public debt burden, and the level of price regulation play no role in explaining inflation across Asian countries.

13. **In light of the strong inflation persistence, reducing inflation requires maintaining a consistent monetary framework and asserting the credibility of the policy framework.** The strong persistence of inflation in Indonesia could imply that the convergence process to lower regional inflation rates might be slow and costly in terms of economic growth. To reduce this cost and accelerate the convergence process, the central bank has an important role to play, building its credibility and thus affecting the formation of inflation expectations. In this respect, Bank Indonesia's recently adopted inflation targeting framework could play a helpful role.

⁸ These values are only indicative as they are obtained by using coefficients from different models.

**BOX 1. AN EMPIRICAL ANALYSIS OF THE INDONESIA INFLATION DIFFERENTIAL
COMPARED TO OTHER ASIAN COUNTRIES**

A cross-country econometric model of inflation determinants is estimated in order to examine various hypotheses about the sources of the Indonesia inflation differential. The basic model regresses current inflation on a set of possible inflation determinants and takes the following form:

$$\pi_{it} = \alpha_i + \beta_1 \pi_{it-1} + \beta_2 YGAP_{it-1} + \beta_3 M2g_{it-1} + \beta_4 NEERg_{it-1} + \beta_5 Polrisk_{it-1} + \varepsilon_{it-1}$$

where, i denotes the country and t time. Past inflation (π_{it-1}) captures the degree of backward looking inflation expectations (adaptive expectations or inflation inertia), the output gap ($YGAP_{it-1}$), measured using an HP filter, summarizes demand pressures, M2 and NEER growth rates ($M2g_{it-1}$, $NEERg_{it-1}$) encapsulate the role of monetary policy and exchange rate developments, and political risk ($Polrisk_{it-1}$) captures the role of institutional features. This latter variable (from ICRG) is a composite index including measures of socioeconomic conditions, government stability, internal and external conflicts, corruption, and bureaucracy quality. Difference GMM estimates are used to address possible endogeneity problems in this dynamic panel analysis.

A set of Indonesia-related slope dummies is introduced to investigate whether the role of the inflation determinants differs in Indonesia compared to the average of the selected countries. The coefficients of the slope dummies measure how much the impact of a given variable on inflation differs in Indonesia compared to the country sample.

The data consist of a quarterly panel covering the period 1990Q4-2005Q4 and including six countries: Korea, Malaysia, The Philippines, Thailand, Singapore, and Indonesia.

Results from the model are stable. The main results are presented in Section D using difference GMM estimates. They do not change substantially with alternative specifications of the model (e.g., using average inflation rates, reserve money, and price regulation indexes), and are robust to heteroskedasticity and correlated disturbances. Moreover, in-sample analysis suggests that the model is robust to structural changes due to the crisis as the model estimated for the whole sample is broadly consistent with the model estimated post crisis for inflation inertia, output gap and NEER depreciation. Finally, the model has been tested using Singapore slope dummies and results suggest that, unlike Indonesia, this country is not substantially differ from the sample average (i.e., Singapore slope dummies are not significant).

This model should not be seen as explaining inflation in any particular country, but setting a benchmark against which to examine different hypotheses about the causes of the Indonesia inflation differential. In this framework, the Indonesia inflation differential represents the difference between Indonesia and the average of the selected Asian countries.

Table 1. Comparing Headline Inflation in Selected Asian Economies (1991–2005)

	Indonesia	Korea	Malaysia	Philippines	Singapore	Thailand	Differential
	Annual average						
1991–2005	12.5	4.5	3.0	7.5	1.4	3.8	9.0
Precrisis 1/	8.2	5.8	3.8	9.4	2.3	5.1	3.5
Post crisis 1/	8.4	3.2	1.7	5.1	0.8	2.2	6.2
1991	9.4	9.3	4.3	18.7	3.4	5.7	2.5
1992	7.5	6.2	4.8	8.9	2.3	4.2	2.7
1993	9.7	4.8	3.6	7.6	2.3	3.3	5.7
1994	8.5	6.3	4.1	9.1	3.1	5.1	3.4
1995	9.4	4.5	3.5	6.9	1.7	5.8	5.4
1996	7.0	4.9	3.5	9.0	1.4	5.9	2.8
1997	6.2	4.4	2.6	5.9	2.0	5.6	2.4
1998	58.0	7.5	5.1	9.7	-0.3	8.1	...
1999	20.7	0.8	2.8	6.7	0.0	0.3	20.1
2000	3.8	2.3	1.6	4.3	1.3	1.6	1.8
2001	11.5	4.1	1.4	6.1	1.0	1.7	9.2
2002	11.8	2.8	1.8	3.0	-0.4	0.6	...
2003	6.8	3.5	1.1	3.5	0.5	1.8	5.1
2004	6.1	3.6	1.4	6.0	1.7	2.8	3.4
2005	10.5	2.8	3.0	7.6	0.5	4.5	7.8
	End-Period, 12-month percent change						
1991–2005	13.3	4.2	2.9	7.1	1.3	3.7	9.9
Crisis, 1998	77.5	4.0	5.2	10.3	-1.4	4.3	72.0
Precrisis 1/	8.4	5.9	3.7	8.5	2.1	5.3	3.8
Post crisis 1/	8.9	2.5	1.9	5.2	0.8	2.1	6.8
1991	9.9	9.3	4.3	13.1	2.9	4.6	4.1
1992	5.0	4.5	4.8	8.2	1.8	3.1	1.1
1993	10.2	5.8	3.4	8.4	2.6	4.4	5.7
1994	9.6	5.6	4.0	7.2	2.9	4.8	5.0
1995	9.0	4.8	3.1	8.6	0.8	7.4	5.2
1996	5.1	4.9	3.4	7.1	2.0	4.8	1.0
1997	10.3	6.6	2.7	7.3	2.0	7.6	5.7
1998	77.5	4.0	5.2	10.3	-1.4	4.3	...
1999	2.0	1.4	2.5	4.3	0.7	0.7	0.5
2000	9.3	0.0	1.3	6.7	2.1	1.4	...
2001	12.5	3.2	1.2	4.1	-0.6	0.8	...
2002	9.9	3.7	1.7	2.5	0.4	1.6	8.3
2003	5.2	3.4	1.2	3.9	0.7	1.8	3.3
2004	6.4	3.0	2.1	8.6	1.3	2.9	3.5
2005	17.1	2.6	3.2	6.6	1.3	5.8	13.8
	Annual standard deviation						
1991–2005	4.7	0.6	0.4	1.2	0.5	0.9	4.0
Crisis, 1998–99	23.8	0.9	0.9	1.8	0.8	1.9	22.5
Precrisis 1/	1.2	0.6	0.4	1.3	0.4	0.9	0.6
Post crisis 1/	2.3	0.5	0.3	0.9	0.5	0.7	1.7
1991	0.5	0.5	0.6	2.2	0.6	0.6	-0.2
1992	2.1	1.1	0.4	0.7	0.3	0.8	1.6
1993	0.7	0.5	0.6	0.6	0.2	0.6	0.3
1994	0.9	0.5	0.4	1.1	0.4	0.4	0.4
1995	0.7	0.6	0.3	1.3	0.6	0.9	0.0
1996	1.7	0.3	0.2	2.0	0.3	1.2	1.2
1997	1.9	0.8	0.5	0.9	0.3	1.5	1.2
1998	23.3	1.4	0.8	1.3	1.1	2.2	22.0
1999	24.2	0.4	1.0	2.3	0.5	1.6	23.3
2000	3.9	0.7	0.2	1.2	0.5	0.5	3.4
2001	1.6	0.8	0.2	1.0	0.9	0.6	1.0
2002	1.9	0.5	0.4	0.5	0.5	0.5	1.5
2003	1.0	0.4	0.3	0.4	0.4	0.3	0.6
2004	0.8	0.5	0.5	1.7	0.5	0.7	0.1
2005	4.5	0.4	0.4	0.7	0.5	1.4	3.9

Source: IMF, *International Financial Statistics* database.

1/ Precrisis includes 1991–97. Post crisis include 2000–05, except for end-year inflation that also includes 1999.

Table 2. Inflation Correlations in Selected Asian Countries and Indonesia 1/

	Asian Countries	Indonesia
Output gap	-0.16	-0.47
Political risks	0.43	0.39
M2 growth	0.62	0.79
NEER perc. change	-0.58	-0.69

Source: Fund staff calculations.

1/ Asian countries include: Korea, Malaysia, Philippines, Singapore, Thailand, and Indonesia

REFERENCES

- Aisen A., and F.J. Veiga (2005), "Does Political Instability Lead to Higher Inflation? A Panel Data Analysis," IMF Working Paper 05/49.
- Anglingkusumo R. (2005), "Money inflation Nexus in Indonesia: Evidence from a P-Start Analysis," Tinbergen Institute Discussion Paper 54/4.
- Arellano M. and Bond S. (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, 58.
- Campillo M. and Miron J.A. (1996), "Why Does Inflation Differ Across Countries?" NBER Working Paper 5540.
- Coe D.T. and McDermott J.C. (1997), "Does the Gap Model Work in Asia?" *IMF Staff Papers*, 44, 1.
- Cukierman A., Edwards S., and Tabellini G. (1991), "Explaining Fiscal Policy and Inflation in Developing Countries," *Journal of International Money and Finance*, 10.
- Easterly W. and Fischer S. (2001), "Inflation and the Poor," *Journal of Money, Credit and Banking*, 33, 22.
- International Monetary Fund (2006), "Globalization and Inflation," *World Economic Outlook*, April.
- Khan M.S. and Senhadji A.S. (2000), "Threshold Effects in the Relationship Between Inflation and Growth," IMF Working Paper 00/110.
- Loungani P. and Swagel P. (2001), "Sources of Inflation in developing Countries," IMF Working Paper 01/198.
- Mankiw N.G., Reis R., and Wolfers J. (2003), "Disagreement about Inflation Expectations," NBER Working Paper 9796.
- Rajaguru G. and Siregar R. (2002), "Sources of Variations between the Inflation Rates of Korea, Thailand and Indonesia during the Post-1996 Crisis," CIES Discussion Paper 299.
- Romer D. (1993), "Openness and Inflation: Theory and Evidence," *Quarterly Journal of Economics*, CVII (4).