User Manual for the Corporate Vulnerability Utility

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A. Introduction

The Corporate Vulnerability Utility (CVU) provides indicators for surveillance of the corporate sector in 53 countries. These indicators are based on underlying data from the annual reports of publicly traded companies and capture four types of risk:

- **balance sheet risk:** indicators that capture risk associated with excessive leverage, poor liquidity, low profitability, and high valuation;

- **international business cycle risk:** indicators that measure the exposure of the corporate sector to shocks from abroad though foreign sales, assets, and income;

- **external financing risk:** indicators that measure the sensitivity of investment to tighter financing conditions during a credit crunch or stock market crash;

- **default risk:** indicators that summarize many dimensions of risk into a single statistic, a forward-looking probability of default.

The CVU provides easy access to these indicators via an interactive window in Excel. This window allows users to download annual indicators from 1990 at the country, region and industry levels. The CVU generates these indicators in the following steps:

1. **Identifying indicators:** the CVU synthesizes information from inside and outside the Fund to identify the appropriate set of vulnerability indicators.

2. **Downloading data:** the CVU downloads required balance sheet, cash flow and income statement items from Worldscope. Separately, it also downloads stock price and market capitalization data from Datastream.

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3. **Cleaning data:** the CVU ensures that every firm is represented in the data only once, in the country of its primary listing. It checks that firms that cease operations exit the data, and drops outliers.
4. **Assessing coverage:** the CVU constructs indicators on whether the data provide good coverage of publicly traded firms in each country. It also constructs an indicator to pick up how important publicly traded firms are relative to the overall economy.

5. **Calculating indicators:** the CVU calculates firm-level vulnerability indicators, ranging from standard accounting ratios to option pricing-based default probabilities.
6. **Aggregating indicators:** the CVU provides simple and market capitalization-weighted averages of firm-level indicators for countries, regions and industries. It also displays the representative observation at the bottom quartile, at the median, and at the top quartile.

7. **Updating data:** the CVU updates the set of vulnerability indicators every quarter, so that they can be used for ongoing surveillance.

The CVU aims to make ongoing surveillance of the corporate sector easier. It does this in a number of ways:

- **The CVU frees users from the time-consuming task of constructing vulnerability indicators**. By providing ready-made indicators, the CVU allows users to focus on surveillance.

- **The CVU is easy to use.** Its Excel-based interactive window allows users to quickly access vulnerability indicators, and this user manual reviews these indicators and their strengths and weaknesses.

- **The CVU provides a common platform for corporate surveillance across countries.** It centralizes the downloading, cleaning and aggregating of firm-level data, providing a consistent framework for corporate surveillance across departments.

- **The CVU automatically updates indicators every quarter.** This feature is critical for ongoing surveillance. Many economists currently download Worldscope data on a *one-off* basis, which means that corporate surveillance lacks continuity.

- **The CVU systematically assesses the quality of coverage for each country.** It does this by comparing coverage of firms for each country to that in the S&P Global Stock Markets Factbook, a widely-used alternate data source.

- **The CVU constructs indicators in a transparent way.** The CVU spells out exactly how indicators are constructed and allows users to modify them. For example, some indicators are weighted averages of underlying accounting ratios. The CVU allows users to change the weights, which are often based on estimates for US data and may not carry over to other countries, especially emerging markets.

- **The CVU provides an improved measure of systemic risk to the corporate sector as a whole.** The *pooled* Black-Scholes-Merton default probability nets out idiosyncratic risk among companies, isolating systemic risk to the overall corporate sector.

The underlying data have several limitations. The CVU addresses these in several ways:

- **Worldscope covers only publicly traded firms.** The CVU systematically documents the quality of coverage, by comparing coverage to the S&P Global Stock Markets Factbook, both in terms of number of companies in each country and in terms of market cap. It also compares the capitalization of the stock market to GDP, to assess whether many firms are unlisted, in which case the stock market is a poor measure of the full corporate sector.

- **Worldscope does not break out the currency composition of debt.** The CVU includes option pricing-based default probabilities, which should incorporate all publicly available information through stock prices and their volatility. Hence, these default probabilities should capture risks from foreign currency debt exposure, and possible natural hedging through foreign sales. These indicators are also forward-looking, while balance sheet data on currency composition are not.

- **There is a lag in the updating of Worldscope data,** due to the fact that reporting dates for individual companies are distributed throughout the year. This means that the CVU is ill-suited for high frequency corporate surveillance and is better suited for monitoring broad trends in corporate balance sheets.

We suggest using the CVU in the following steps. Before looking at the vulnerability indicators themselves, it is critical to get a sense of the quality of the underlying data. This means studying the importance of the stock market in relation to the overall economy, and getting a feel for how coverage changes over time. Next, we suggest getting a sense for the overall trends in corporate vulnerability, using the default risk indicators. These indicators have two advantages. First, they bundle various dimensions of risk into one statistic, allowing a rise in leverage to be offset by a rise in liquidity, for example. Second, they are forward-looking. Finally, we suggest taking a disaggregated look at corporate vulnerability, using accounting ratios, to get a sense of what factors are driving changes in overall corporate vulnerability.

For cross-country comparisons, we suggest using market capitalization-weighted averages. These weighted averages have two advantages. First, they collapse the data toward the largest, economically most important firms, thereby focusing on systemic corporate risk. Second, they control for differences across countries in depth of coverage. For example, the CVU has data on 7,587 firms in the US in 2003. In contrast, Chile has 168 firms. Comparing the medians of both countries would be misleading, because the representative firm in the US is small, while it is relatively larger for Chile. The medians and upper and lower quartiles are more useful for looking at time-series within countries, or for comparisons across markets with similar coverage.

The remainder of this paper is structured as follows. Section B provides a summary of country, region and industry coverage. Section C lists the indicators, places them in the context of the recent literature, and explains their strengths and weaknesses. Section D reviews how the CVU cleans and aggregates firm-level data. Section E looks at how good data coverage is for individual countries. Section F gives a case study for using the CVU. Appendix I provides data codes for all Worldscope and Datastream items and provides tables on cut-offs for outliers and the number of firms in Datastream indices. Appendix II provides summary tables for all indicators, by country and year, in addition to the number of firms underlying each indicator, again by country and year. Because of its length, Appendix II is not included in this document, but can be downloaded separately from the "Data Summary" link on the CVU website.

B. Coverage

This section gives an overview of country, region and industry coverage. The CVU covers 53 countries. Following the Morgan Stanley Capital International (MSCI) indices, these countries are divided into 7 regions: Developed Americas (DAM), Emerging Americas (EAM), Developed Asia (DAS), Emerging Asia (EAS), Developed Europe (DEU), Emerging Europe (EEU), and the Middle-East and Africa (MEA). The CVU also provides indicators for the Euro Zone, which is included as a separate entry in the Developed Europe region. At the regional level, including the Euro Zone, indicators are calculated by pooling firm-level data for all countries in a given region. For more information on the MSCI classification, see http://www.msci.com/equity/coverage_matrix.pdf. Table 1 lists the countries and gives their region affiliations.

Each company is assigned to one of 10 FTSE industry groups: Resources, Basic Industries, General Industrials, Cyclical Consumer Goods, Non-Cyclical Consumer Goods, Cyclical Services, Non-Cyclical Services, Utilities, Financials, Information Technology. In addition, the CVU provides indicators for the non-financial corporate sector, which aggregates data for firms in all industries except the financial sector. For more information on these groups, see http://www.datastream.com/product/investor/index.htm.

Table 1. Country and Region Coverage

Developed Americas (DAM)	Developed Asia (DAS)	Developed Europe (DEU)	Middle-East and Africa (MEA)
CANADA	AUSTRALIA	AUSTRIA	EGYPT
USA	HONG KONG	BELGIUM	ISRAEL
	JAPAN	DENMARK	MOROCCO
	NEW ZEALAND	FINLAND	PAKISTAN
	SINGAPORE	FRANCE	SOUTH AFRICA
		GERMANY	ZIMBABWE
		GREECE	
		IRELAND	
		ITALY	
		LUXEMBOURG	
		NETHERLANDS	
		NORWAY	
		PORTUGAL	
		SPAIN	
		SWEDEN	
		SWITZERLAND	
		UNITED KINGDOM	
		EURO ZONE	
Emerging Americas (EAM)	**Emerging Asia (EAS)**	**Emerging Europe (EEU)**	
ARGENTINA	CHINA	CZECH REPUBLIC	
BRAZIL	INDIA	HUNGARY	
CHILE	INDONESIA	POLAND	
COLOMBIA	KOREA (SOUTH)	RUSSIAN FEDERATION	
MEXICO	MALAYSIA	SLOVAK REPUBLIC	
PERU	PHILIPPINES	SLOVENIA	
VENEZUELA	SRI LANKA	TURKEY	
	TAIWAN		
	THAILAND		

C. Indicators

This section lists the indicators provided by the CVU, defines their construction and explains their intuition. The indicators fall into five broad groups: (i) measures of data coverage; (ii) accounting ratios; (iii) measures of international exposure; (iv) measures of dependence on external financing; and (v) measures of default risk. Table 2 gives an overview of the various indicators in each category.

Table 2. Panel A. Accounting Ratios

Leverage	Liquidity	Profitability	Valuation
Debt-to-Equity (in %)	Quick Ratio	Return on Assets (in %)	Price-to-Earnings Ratio
Debt-to-Assets (in %)	Current Ratio	Return on Equity (in %)	Market-to-Book Ratio
Debt-to-Sales (in %)	Cashflow to Sales in %		Tobin's Q
Debt-to-Cashflow (in %)	Interest Coverage Ratio		
Short-Term Debt in % Total Debt	Estimated Avg. Interest Rate in %		
Total Liabilities in % Total Assets			
Current Liabilities in % Total Liabilities			
Current Assets in % Total Assets			

Table 2. Panel B. Other Indicators

Data Description	External Dependence	External Financing	Default Risk
Number of Firms Market Cap in Millions of USD Number of Firms in % of S&P Benchmark Market Cap in % of S&P Benchmark Market Cap in % of GDP	Foreign Sales in % Total Sales Foreign Assets in % Total Assets Foreign Income in % Total Income	Kaplan & Zingales (1997) Index Rajan & Zingales (1998) Index	Z-Score and Z-Probability O-Score and O-Probability Black-Scholes-Merton Default Probability

Future versions of the CVU aim to incorporate additional indicators. In particular, recent academic work has found measures of corporate governance and ownership structure to be important determinants of performance. Mitton (2002) finds that firm-level differences in variables related to corporate governance have a strong impact on firm performance during the East Asian financial crisis in 1997 – 1998. Joh (2003) finds that ownership structure and conflicts of interest among shareholders under a poor corporate governance system affected firm performance in Korea in the years before the East Asian financial crisis.[2]

More generally, the CVU aims to continually expand the measures of risk. Additional indicators could measure currency composition of corporate debt, economic activity, etc.

C.1 Measures of Data Coverage

The CVU provides statistics by country and region that describe data coverage. These statistics address two main concerns: (i) coverage of listed firms may vary across countries and over time; and (ii) the listed universe of firms may not provide a good representation of the corporate sector, if a significant number of corporations are unlisted. To address the first concern, the CVU compares data coverage in terms of number of firms and market caps to the S&P Global Stock Markets Factbook. To address the second, the CVU provides the ratio of total market capitalization to GDP. The full set of data coverage indicators is:

- number of firms
- market capitalization in millions of USD
- number of firms in percent of S&P Global Stock Markets Factbook
- market capitalization in percent of S&P Global Stock Markets Factbook
- market capitalization in percent of GDP

C.2 Accounting Ratios

Analysis of the corporate sector should cover: (i) leverage; (ii) liquidity; (iii) profitability; and (iv) valuation. This section discusses each of these areas in turn.

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[2] Todd Mitton. 2002. "A Cross-Firm Analysis of the Impact of Corporate Governance on the East Asian Financial Crisis." *Journal of Financial Economics* 64: 215 – 241. Sung Wook Joh. 2003. "Corporate Governance and Firm Profitability: Evidence from Korea before the Economic Crisis." *Journal of Financial Economics* 68: 287 – 322.

C.2.1 Leverage

Leverage is a key measure of corporate sector vulnerability. Highly leveraged corporate sectors have little equity relative to assets, so they are at higher risk of insolvency in response to shocks that reduce the value of assets and hence equity. Actual or threatened insolvency will lead to reduced access to finance and/or bankruptcy. The CVU reports all measures of leverage in percent. The leverage indicators are as follows:

- debt-to-equity
- debt-to-assets
- debt-to-sales
- debt-to-cashflow
- short-term to total debt
- total liabilities to total assets
- current liabilities to total liabilities
- current assets to total assets

Leverage indicators are subject to distortions and must be used carefully. There is often a discrepancy between book and market value of debt, because accounting measures of debt do not adjust for interest rate risk. In addition, debt-to-equity and debt-to-assets are subject to potential measurement error in the book value of equity or assets. Underlying weakness may be masked during a stock market or real estate bubble, for example, when assets (and hence equity) may be overvalued. As a result, debt-to-sales or debt-to-cashflow may be better indicators. The ratio of short-term to total debt examines the maturity structure of debt. The numerator of this indicator captures debt payable within one year including the current portion of long-term debt. When companies become financially distressed, this ratio tends to rise as lenders prefer shorter-term exposures. Total liabilities is the most comprehensive measure of firms' obligations. This measure includes current liabilities, long-term debt, pension benefits, and unrealized losses on marketable securities. The ratio of total liabilities to total assets is thus the most comprehensive measure of leverage.

C.2.2 Liquidity

Liquidity is a buffer against shocks to financing and cashflow, and declining liquidity ratios may be an indication of financial difficulties. Firms typically first respond to shocks by drawing down their liquid assets and allowing accounts payable to rise, so falling liquidity ratios can be a signal of financial distress. A less liquid company is more likely to become delinquent on loans if cashflow turns negative or new financing is limited. The CVU reports five liquidity indicators:

- current ratio
- quick ratio
- cashflow to sales
- interest coverage ratio

- estimated average interest rate

The current ratio is the ratio of current assets to current liabilities. It measures the ability of a firm to pay its short-term obligations with assets that can easily and quickly be converted into cash. Current assets refer to cash and other assets that can be liquidated and converted to cash within one year, e.g. cash, marketable securities, accounts receivable, and inventory. Current liabilities are obligations that require cash payment within one year (e.g. short-term debt, accounts payable, wages, taxes, etc).

The quick ratio is a stricter measure of liquidity than the current ratio, because it nets out inventories from current assets. This is because inventories are considered the least liquid of current assets. The quick ratio therefore compares cash, cash equivalents and net receivables to current liabilities.

High levels of leverage may be more sustainable if profits are high relative to interest payments, as measured by the interest coverage ratio (ICR). This ratio compares earnings before interest and taxes (EBIT) to interest payments falling due. When this ratio is less than one, it can mean that a firm is in arrears on its interest payments. However, other indicators of liquidity are needed to get a more complete picture of financial distress, because ICRs do not account for all resources that a company has available to meet its debt service payments. During a recession or period of restructuring, companies may show a sharp decline in ICRs, but liquid assets may allow them to remain current on their payments. This ratio can also be constructed using EBITDA, which may be a better measure of cashflow available for interest obligations, since depreciation is a non-cash expense. Finally, because profitability is a key input for the ICR, the CVU also provides an alternate measure of liquidity relative to sales: cashflow to sales.

The estimated average interest rate is calculated by dividing interest expense on debt by total debt. This interest rate will be higher for firms that are more financially distressed.

C.2.3 Profitability

Profits are a sign of financial strength that can shape the response of creditors to shocks. Large one-time losses are manageable if firms generate sufficient profits. Creditors are less likely to withdraw credit for more profitable firms. The CVU provides two measures of profitability, both of which are reported in percent:

- return on assets
- return on equity

The return on assets (RA) is the ratio of net income to total assets and measures the efficiency with which a company uses its assets. Net income is the bottom line measure of total earnings after adjustments for operating costs, depreciation, interest, taxes, and other expenses. RA can be expressed as the product of profit margin (net income divided by

operating revenue) and asset turnover (operating revenue over total assets). Separating these components of RA may shed light on whether firms are raising RA via higher profit margins or greater turnover of their assets. For example, service companies like luxury goods stores typically have high margins but low turnover, while retail firms such as discount warehouse have low margins but high turnover. Persistently low or declining RA at the sectoral level could be an indication of excess capacity (reduced margins) or low productivity.

The return on equity (RE) is the ratio of net income to shareholders' equity and measures the return to shareholders on their investment. It may be useful to break down RE into the return on assets (net income/total assets) and the equity multiplier (total assets/equity). Firms may boost their RE by raising their return on assets or by taking on more leverage.

C.2.4 Valuation

These indicators combine accounting and stock market data to provide a measure of the stock market valuation of a company relative to its earnings and growth potential. Standard finance textbooks, such as Corporate Finance by Ross and others (2002), provide detailed descriptions of these measures.[3] The CVU has three valuation measures:

- price-to-earnings ratio
- market-to-book ratio
- Tobin's Q

The P/E ratio is a common measure of the esteem in which a firm is held by investors. This ratio divides the stock price of a company by its earnings per share. If the dividends of a company are expected to grow at a steady rate, the current stock price can be written as $P = Div/(r - g)$ where Div measures expected dividends next year, r is the return that investors require from similar investments next year, and g is the expected rate of dividend growth. The P/E ratio can thus be written as:

$$\frac{P}{E} = \frac{Div}{E} \times \frac{1}{r - g}$$

A high P/E ratio may mean (i) investors expect high dividend growth (g); (ii) the stock has low risk and investors are content with a low prospective return (r); or (iii) a company is expected to achieve average growth while paying out a high proportion of earnings.

The market-to-book ratio is the ratio of stock price to book value per share. Book value per share is stockholders' book equity (net worth) divided by number of shares outstanding.

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[3]Stephen A. Ross, Randolph W. Westerfield, Jeffrey Jaffe. 2002. "Corporate Finance."

Book equity equals common stock plus retained earnings—the net amount a firm received from stockholders or reinvested on their behalf. A ratio of 1.25, for example, means that a firm is worth 25 percent more than past and present shareholders have put into the company. Investment managers classify firms with high book-to-market ratios as *value stocks*, which are seen as having higher risk of financial distress than growth stocks (low book-to-market ratios). Consistent with this notion, Fama and French (1998) find that *value* stocks tend to have higher returns than *growth stocks* in equity markets around the world.[4]

Tobin's Q is defined as the ratio of the market value of a company's debt and equity to the current replacement cost of assets. However, because the market value of debt and replacement cost of asset are hard to measure, the CVU approximates Q as market value of equity plus book value of debt, divided by book value of assets. James Tobin argued that firms have an incentive to invest when Q is greater than one (i.e. when capital equipment is worth more than it costs to replace), and that they will stop investing only when Q is equal to one (i.e. when the value of equipment falls to replacement cost). From an M&A perspective, if the market value of a company is smaller than its replacement cost of asset, an investor can profit from purchasing the company. Hence, in either case, Tobin's Q should be one in equilibrium. In practice, however, this is not often the case, reflecting both imperfect markets and measurement error.[5] If a firm faces financial constraints, Q can become higher than one. An example is a start-up company: while investors recognize growth potential and price the stock accordingly, the company cannot borrow sufficiently and operates with low total assets. Shrinking industries are an illustration of the opposite. Measurement error is associated with valuation of intangible assets. When intangible assets are not well recorded, Q can become higher than one, as is often the case with companies with strong brand images or patent protection.

C.3 Measures of External Dependence

This section presents three indicators that measure the exposure of the corporate sector to foreign shocks. These indicators are based on firm-level data on the importance of foreign operations for firms' sales, assets and profitability. At the country level, these measures give an indication of the sensitivity of the corporate sector to shocks from abroad. At the industry level, they help distinguish between industries that are more versus less global and therefore provide information on how industrial structure affects the sensitivity of countries to foreign shocks. The three indicators, which are measured in percent, are:

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[4] Eugene F. Fama and Kenneth R. French. December 1998. "Value versus Growth: The International Experience." *Journal of Finance* 53: 1975 - 1999.

[5] For example, see discussions in Abdul Abiad, Nienke Oomes, and Kenichi Ueda, 2004, "The Quality Effect: Does Financial Liberalization Improve the Allocation of Capital?" IMF Working Paper WP/04/112.

- foreign sales to total sales
- foreign assets to total assets
- foreign income to total income

A limitation of the foreign sales and income data is that they reflect only sales and income generated by operations abroad (i.e., through foreign subsidiaries), and therefore omit sales and income associated with exports. These variables are therefore a lower bound on the international exposure of the corporate sector. Furthermore, unlike the accounting ratios above, foreign sales, assets and income are not standard reporting items in firms' annual reports, which means that they may be subject to selection bias. For example, companies may report data only in favorable years. More generally, the quality of these variables is less good than for other Worldscope data. However, Brooks and Del Negro (2003) find that firms with a high foreign component to sales, assets or income also tend to have stock returns that comove more with global shocks. This is evidence that the indicators correctly identify firms with more international operations.[6]

Regional aggregates are calculated by pooling firm-level data within a given region, including for the Euro Zone. Because this does not net out international sales within a region, the regional international sales ratios are overstated. The same goes for the regional international asset and international income ratios.

C.4 Measures of Dependence on External Financing

This section presents two measures that quantify the extent to which companies depend on external sources of funds to finance investment. In the medium-term, the importance of external financing is related to financial depth and structure of a country.[7] In the short-term, a rise in dependence on external financing may be a leading indicator for higher growth, if higher capacity utilization rates are spurring companies to invest more. At the same time, however, it can also be a risk factor, as it raises the sensitivity of a country to an unexpected "credit crunch." A collapse in business investment in the event of a credit crunch can have larger adverse effects on economic activity. The CVU features two measures of dependence on external financing: (i) the Rajan and Zingales (1998) index of dependence on external financing; and (ii) the Kaplan and Zingales (1997) index of financial constraints.

I**n perfect capital markets a firm's investment decisions are independent of its financial condition.** But if internal and external capital are not perfect substitutes—issuing debt and equity is costly because of transaction costs and asymmetric information. Fazzari, Hubbard

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[6] Robin Brooks and Marco Del Negro, forthcoming in 2005, "Firm-Level Evidence on International Stock Market Comovement," *Review of Finance*.

[7] Raghuram Rajan and Luigi Zingales. 1998. "Financial Dependence and Growth." *American Economic Review* 88(3): 559 – 586.

and Petersen (1988) argue that firms' internal cash flow may affect investment spending because of a "financing hierarchy," whereby internal funds have a cost advantage over new debt or equity. Under these conditions, measures of dependence on external financing can be related to investment behavior and thus economic activity.[8]

C.4.1 The Rajan and Zingales (1998) Index

This index measures dependence on external finance as a firm's capital expenditures minus cash flow from operations divided by capital expenditures. The CVU presents this variable in percent—meaning it shows the percentage of total capital expenditures that are externally financed.[9] Cashflow from operations is the sum of cashflow from operations, plus decreases in inventories, decreases in receivables, and increases in payables. This definition includes changes in the non-financial components of net working capital as part of funds from operations. In certain businesses these represent major sources (or uses) of funds that help a firm avoid (or force it to tap) external sources of funds.

$$RZ = \frac{CE - (CF + DF + DR + IP)}{CE}$$

Capital expenditures (CE) refer to funds used to acquire fixed assets other than those associated with acquisitions. Cashflow consists of two components: (i) income before extraordinary items and preferred and common dividends, but after taking into account the operating and non-operating income and expense, reserves, income taxes, minority interest and equity in earnings; and (ii) depreciation, depletion and amortization. Decrease in inventory (DF) is generated by taking the difference between last period's total inventories with those from the current period. Decrease in receivables (DR) is the difference between last period's total receivables with this periods receivables. Finally, increase in payables (IP) is the difference between last period's accounts payable with those from this period. This variable tracks the increase in accounts payable.

Users can use the components of this index to construct a US Dollar measure of the financing gap. This measure is simply: $CE - (CF + DF + DR + IP)$, and is denominated in thousands of US Dollars.

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[8] Steven Fazzari, Glenn Hubbard and Bruce Petersen. 1988. "Financing Constraints and Investment." *Brookings Papers on Economic Activity* 1.

[9] To measure dependence on external financing, Rajan and Zingales (1998) use Compustat data for the 1980s. They sum each component of the RZ index over the 1980s, firm by firm, to smooth out annual fluctuations, and then construct the ratio of investment financed externally for each firm. Then they report the RZ index as the median within industries. The CVU reports an annual RZ index to capture fluctuation between investment and cashflow.

C.4.2 The Kaplan and Zingales (1997) Index

A variety of models suggest that financial constraints are important determinants of real activity and asset prices, see Bernanke et al. (1996) for a review. According to these models, imperfect capital markets serve to magnify macroeconomic shocks. The Kaplan and Zingales (1997) index measures the degree to which firms are likely financially constrained, and is higher for firms more likely to be constrained. The CVU follows Lamont and others (2001) in constructing this index: -1.001909*[cashflow to capital] + 0.2826389*[Tobin's Q] + 3.139193*[debt to capital] - 39.3678*[dividends to capital] - 1.314759*[cash to capital]. These coefficients are based on regressions by Kaplan and Zingales (1997) using data for U.S. manufacturing firms with positive real sales growth over the period 1969 to 1984. After calculating the KZ index for every firm, Lamont et al. (2001) classify the top 33 percent of all firms ranked on the KZ index as constrained.[10]

An important caveat to the Kaplan and Zingales (1997) index is that its coefficients are based on US data. These coefficients may not carry over to other countries, where financial markets are less developed or institutions and regulatory frameworks differ. To address this, the CVU makes the input variables for the index available for download. This allows users to adapt the index by changing the coefficients on the input variables.

C.5 Default Probabilities

This section presents three indicators that measure the risk of default. Relative to simple accounting ratios, they have two main advantages: (i) they are forward-looking; and (ii) they combine various dimensions of risk into a single statistic, which gives the overall impact on vulnerability from potentially offsetting changes, such as a rise in leverage versus a rise in profitability, for example. Of course, it is still important to monitor movements in individual accounting ratios to get a sense of underlying vulnerabilities. There are two ways to calculate default probabilities: one is empirical and combines accounting ratios into a single statistic, while the other is model-based and combines accounting data with stock price information. Two widely-used models in the first category are the Altman (1968)[11] Z-Score model and the

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[10] Owen Lamont, Christopher Polk and Jesus Saa-Requejo. 2001. "Financial Constraints and Stock Returns." *The Review of Financial Studies* 14(2): 529 – 554. Steven Kaplan and Luigi Zingales. 1997. "Do Financing Constraints Explain Why Investment is Correlated with Cash Flow?" *Quarterly Journal of Economics* (112): 168 – 216. Ben Bernanke, Mark Gertler and Simon Gilchrist. 1996. "The Financial Accelerator and the Flight to Quality." *Review of Economics and Statistics* 78: 1 – 15.

[11] Edward I. Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy", *The Journal of Finance*, Vol. 23, No. 4 (Sep., 1968), 589-609.

Ohlson (1980)[12] O-Score model. Both are based on regression models to explain historical default patterns. The model-based approach uses the Black-Scholes-Merton option pricing model to derive the market's assessment of default risk. Because the Black-Scholes-Merton default probability uses stock prices and their volatility as inputs, this measure incorporates all publicly available information and is therefore more comprehensive than the empirical models.

C.5.1 The Altman (1968) Z-Score

Altman (1968) develops a measure of distress that combines five accounting ratios. Letting D_i denote a binary variable (1 for default and 0 otherwise), the Altman (1968) model is similar to a logit regression where $x_{1i},\cdots,x_{ni}$ are the accounting ratios:

$$D_i = \frac{\exp(y_i)}{1+\exp(y_i)}, \text{ with } y_i = \alpha_0 + \alpha_1 x_{1i} +,\cdots,+\alpha_n x_{ni}.$$

Altman (1968) calls $-y_i$ the Z-Score (higher *Z* means lower *y* and lower default probability). The Z-Score therefore captures the probability of survival (one year ahead) and is defined as follows:

$$Z\text{-Score} = 1.2\frac{\text{Working Capital}}{\text{Total Asset}} + 1.4\frac{\text{Retained Earnings}}{\text{Total Asset}} + 3.3\frac{\text{EBIT}}{\text{Total Asset}} + 0.6\frac{\text{Market Value of Equity}}{\text{Total Liabilities}} + 0.999\frac{\text{Sales}}{\text{Total Asset}},$$

where EBIT stands for earning before interest and taxes. The Z-Probability is calculated using the cumulative density function for the logistic distribution:

$$Z\text{-Prob}_i = \frac{\exp(-Z\text{-Score}_i)}{1+\exp(-Z\text{-Score}_i)}.$$

One caveat to Altman's (1968) Z-Score is that the coefficients were estimated a long time ago based on a relatively narrow sample of US data. How applicable are these coefficients for the US today, and how well do they carry over to other countries, where attitudes towards default and the legal environment are different? Because of these questions, the CVU reports

[12] James A. Ohlson, "Financial Ratios and the Probabilistic Prediction of Bankruptcy", *Journal of Accounting Research*, Vol. 18, No.1 (Spring, 1980), 109-131.

makes all input variables available for download to users, so that they can change the coefficients. Updated coefficients for the US are available in Hillegeist and others (2004).[13]

C.5.2 The Ohlson (1980) O-Score

The Ohlson (1980) O-Score measures the one-year-ahead probability of default (higher O means higher *y* and therefore a higher default probability). The O-Score combines nine accounting ratios into a single statistic:

$$\begin{aligned} O\text{-Score} = & -1.32 - 0.41\text{Size} + 6.03\frac{\text{Total Liability}}{\text{Total Asset}} - 1.43\frac{\text{Working Capital}}{\text{Total Asset}} \\ & + 0.08\frac{\text{Current Liabilities}}{\text{Current Asset}} - 2.37\frac{\text{Net Income}}{\text{Total Asset}} - 1.83\frac{\text{FFO}}{\text{Total Liabilities}} \\ & + 0.285F - 1.72G - 0.52H, \end{aligned}$$

where Size is the natural log of total asset divided by the GDP deflator;[14] FFO means pre-tax income plus depreciation and amortization; *F* is an indicator variable equal to one if cumulative net income over the previous tow years is negative, and zero otherwise; *G* is an indicator variable equal to one if owners' equity is negative and zero otherwise; and *H* is the scaled change in net income (*NI*): $(NI_t - NI_{t-1})/(|NI_t| + |NI_{t-1}|)$. The O-Probability is defined as:

$$O\text{-Prob}_i = \frac{\exp(O\text{-Score}_i)}{1 + \exp(O\text{-Score}_i)}.$$

The caveat for Altman's (1968) Z-Score carries over to Ohlson's (1980) O-Score, which is estimated for US data. The CVU reports all input variables separately, allowing users to change the coefficients. Updated coefficients are available in Hillegeist and others (2004).

C.4.3 The Black-Scholes-Merton (BSM) Default Probability

The BSM default probability is calculated based on a widely-used theoretical asset pricing model. The BSM model in the CVU follows Hillegeist and others (2004) and Vassalou and Xing (2004)[15] who apply the BSM formula[16] to assess the probability of

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[13] Stephen A. Hillegeist, Elizabeth K. Keating, Donald P. Cram, and Kyle G. Lundstedt, "Assessing the Probability of Bankruptcy," *Review of Accounting Studies*, 9, 5-34, 2004.

[14] The CVU uses 2000 as the base year of the GDP deflator for all the countries.

[15] Maria Vassalou and Yuhang Xing, "Default Risk in Equity Returns," *The Journal of Finance*, Vol. LIX, No. 2, April 2004.

default. BSM derive the market's assessment of default risk for a company from its equity price, assuming that the market price reflects investors' correct calculation of default risk.[17]

- **The BSM default probabilities show the theoretical probability of default one-year-ahead.** See the formulas and computational notes below for further details.

- **Distance-to-default, an input into the default probability, shows how much the asset value needs to fall one-year-ahead for a firm to default given its current balance sheet position.** It is reported in terms of the number of standard deviations of asset returns. The higher this number, the lower the BSM probability of default.

The model may generate default probabilities that are biased, if markets are not arbitrage free—possible in emerging markets with thin trading—or if the distribution of asset returns is not approximately normal. However, Hillegeist and others (2004) show that the BSM model predicts defaults for US data much better than the Z- or O-Score models.

Because the BSM probability is a non-linear measure, creating default probabilities at the country, region or industry levels is more complicated that for other measures. The CVU does two things. As for other indicators, it calculates country, region or industry averages based on firm-level BSM probabilities. However, these measures do not provide a good indication of systemic risk, because they do not net out firm-specific risk. For this reason, the CVU reports *pooled* BSM probabilities, which treat the corporate sector in a country, region or industry as a portfolio. Inputs such as stock prices and balance sheet items are added up across companies to create a synthetic company at the country, region, and industry levels. The BSM probability is then calculated for this synthetic company, which corresponds to a portfolio of stocks. De Nicolo (2004) shows that these *pooled* BSM probabilities incorporate imperfect correlation of firm-level default risk and allow for time-variation in this correlation. The *pooled* BSM is thus the most appropriate measure of systemic risk to the corporate sector.[18]

The pooled BSM probability differs from the market cap-weighted average of firm-level BSM probabilities. If firm-specific shocks predominate, and the industrial structure of

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[16] Fischer Black and Myron Scholes, "The Pricing of Options and Corporate Liabilities," *Journal of Political Economy*, 7, 637-654, 1973; Robert Merton, "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates," *Journal of Finance*, 29, 449-470, 1974.

[17] Commercially available Moody's KMV model works essentially in the same way, though the exact formula behind Moodys KMV is proprietary and not disclosed fully.

[18] Gianni De Nicolo, "US Large Complex Banking Groups: Business Strategies, Risks, and Surveillance Issues," IMF Country Report 04/228.

a country is well diversified, then the pooled BSM probability will typically be lower than the market cap-weighted average. If, however, firm-specific shocks are drowned out by a large common shock, the BSM probability may exceed the market cap-weighted average, especially if the corporate sector is dominated by a few disproportionately large firms.

Formulas and Computational Notes

Instantaneous distance-to-default: For a firm to survive, its assets must exceed its debt. Hence, log(Asset) - log(Debt) is a natural measure for distance to default. For practical reasons, short-term debt plus half of long term debt plus interest payments (defined as *B*) is typically used as the default barrier. If the value of assets falls below this level, a firm is assumed to declare default. To make the distance to default comparable across individual firms, it is normalized by the standard deviation of the asset return (σ_A). Letting *A* stand for assets,

$$\text{Instantaneous distance-to-default} = \frac{\log(A) - \log(B)}{\sigma_A}.$$

Distance-to-default within one year: as in Black and Scholes (1973) and Merton (1974), the logarithm of a firm's assets is assumed to follow the standard Brownian motion, and thus

$$\text{Distance-to-default within one year} = DtD = \frac{\log(A) - \log(B) + \left(\mu - \frac{\sigma_A^2}{2}\right)}{\sigma_A},$$

where μ is the expected return.[19] Because *DtD* is normally distributed with mean zero, we add 3 to the calculated *DtD* measure so that the reported *DtD* is always positive.[20]

$$\text{Reported distance-to-default within one year} = DtD + 3.$$

For example, if the reported distance-to-default is 3, a firm has enough assets not to default as long as the asset return does not drop 3 standard deviation from its current level within one year.

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[19] Following Vassalou and Xing (2004) and Hillegeist and others (2004), we use last year's annual capital gain of assets as the expected return. While the latter use ex dividend returns with 200 percent as the upper bound and the risk free rate as the lower bound, we use cum dividend returns without bounds as in Vassalou and Xing. A priori bounds may be reasonable for US data, but they do not seem appropriate for volatile emerging market economies. We find little difference between the two ways of defining the formula.

[20] In normal distributions, 3 standard deviation left from the mean has cumulative density of 1 percent.

BSM default probability within one year: By construction, *DtD* follows a standard normal distribution. Hence, letting Φ denote the standard cumulative normal distribution, the probability of default is calculated as follows:

$$\text{BSM default probability within one year} = Def.Prob. = \Phi(-DtD).$$

For example, in case the reported distance to default is 3 as in previous example, it is 0 in unadjusted terms, and the default probability is $\Phi(0) = 0.5,$ or 50 percent.

Data on the value of assets and on the standard deviation of asset returns are not observed and thus need to be estimated using the Black-Scholes-Merton formula. Specifically, given the observed price of equity and the observed standard deviation of equity returns, the value of assets and the volatility of asset returns can be solved for, as there are two unknowns in two equations.[21] The first is the Black-Scholes-Merton pricing formula:

$$E = A\Phi(DtD + \sigma_A) - Be^{-r},$$

where *E* is price of equity and *r* is the risk free rate. The second is the optimal hedge equation:

$$\sigma_E E = \sigma_A A\Phi(DtD + \sigma_A),$$

where σ_E is the standard deviation of equity prices. The annualized weekly equity return is used to calculate σ_E for each firm in each year.[22]

D. Data Cleaning and Aggregation

This section discusses the process of data cleaning and aggregation. It provides detailed explanations for how outliers are dropped from the underlying data, and reviews how the

[21] These equations are highly non-linear and are solved iteratively by first the fixing standard deviation of asset returns to search over the asset value, and then fixing the asset value to search over standard deviation, until the squared error of approximation falls within 0.001 for each firm in each year. Hillegeist and others (2004) simultaneously solve two equations. This method sometimes fails to deliver the solution for our dataset. Vassalou and Xing (2004) calculate asset values (the first equation) daily and obtain the sample variance of assets without using the second equation. Although it may be a superior method, this computation requires much more computational time and memory than our approach.

[22] The return is based on a weekly price index and all (typically 52 weeks) observations are used to calculate the standard deviation of equity returns.

CVU aggregates firm-level data up to country, region and industry levels. Most important, it explains how various aggregations differ in interpretation.

D.1 Outliers

The CVU eliminates two kinds of outliers. First, observations are dropped on an *economic* basis when values are incompatible with the economic content of the data. An example is a negative value for the market capitalization of a company, which is bounded from below by zero. Table 1 in Appendix I lists such bounds for all underlying data. Observations outside these bounds are dropped. Second, data are dropped on a *statistical* basis, by eliminating observations in excess of two standard deviations from the mean for that variable.

The CVU automatically drops all *economic* outliers from the firm-level data, so that simple averages, market cap-weighted averages, and quartiles for all indicators are based on cleaned data. The CVU only drops *statistical* outliers for calculating simple averages and market cap-weighted averages of indicators. It does not eliminate *statistical* outliers for quartiles, since these are not sensitive to the inclusion of such outliers in the data.

D.2 Aggregation

For every indicator, the CVU aggregates firm-level data up to country, region and industry levels using simple averages, market cap-weighted averages, and quartiles. This section shows how to interpret these measures.

- **The CVU provides simple averages and market cap-weighted averages for each indicator.** As the size distribution is typically skewed towards smaller firms, the simple average contains more information on smaller companies than the market cap-weighted average.

- **The market cap-weighted average is the best measure for cross-country studies.** This is because it compresses data for each country towards the economically most important companies, which focuses on systemic risk and mitigates differences across countries in coverage. Market caps are lagged by one year for this method of aggregation.

- **The CVU also provides data on the representative firm at the 25^{th} percentile, the median, and 75^{th} percentile.** The wider the range between the 25^{th} and 75^{th} percentiles, the more heterogeneous the corporate sector in terms of risk exposure. The difference between the median and simple average is a measure of the skewness of the distribution.

The CVU provides an additional way to control for differences across countries in coverage. It gives users the option to download indicators based on underlying data only for firms in the Datastream Global Equity Indices. These indices cover 49 countries and for each market contain a representative sample of stocks covering between 75 – 80 percent of total market capitalization. They provide an alternative perspective on the most important firms in

terms of overall corporate vulnerability. Table 2 in Appendix I lists the countries for which Datastream indices are available and provides the number of companies in each case.

E. Data Coverage

This section reports on the representativeness of data in the CVU. It consists of four tables. Table 1 shows the number of all companies (financial and non-financial) for each country, region and globally from 1990 to 2003.

Table 1. Number of Firms

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
DEVELOPED ASIA	**1616**	**1962**	**2063**	**2097**	**2296**	**2561**	**2806**	**2930**	**3767**	**4023**	**4689**	**5766**	**6104**	**6376**
AUSTRALIA	94	100	104	108	121	158	191	207	260	352	592	1178	1232	1276
HONG KONG	78	100	121	121	147	245	341	371	394	418	580	779	860	906
JAPAN	1392	1686	1742	1773	1905	1982	2066	2135	2870	2985	3113	3282	3451	3592
NEW ZEALAND	9	11	13	14	22	27	34	36	47	53	65	106	110	110
SINGAPORE	43	65	83	81	101	149	174	181	196	215	339	421	451	492
EMERGING ASIA	**162**	**328**	**548**	**734**	**965**	**1361**	**1552**	**1656**	**1837**	**2349**	**3033**	**3360**	**4540**	**4744**
CHINA	.	1	6	12	18	52	57	67	68	164	194	208	1186	1252
INDIA	3	15	56	101	115	185	209	222	236	253	277	317	324	329
INDONESIA	3	47	65	64	85	118	138	147	155	182	272	302	316	316
KOREA (SOUTH)	59	68	93	131	181	206	242	266	360	594	694	738	775	790
MALAYSIA	83	132	203	211	223	310	376	411	437	447	630	735	796	851
PHILIPPINES	4	15	25	33	50	85	94	95	100	107	188	189	193	199
SRI LANKA	.	.	.	.	14	18	16	18	18	20	24	21	14	19
TAIWAN	3	10	23	40	97	185	202	208	219	342	423	512	568	590
THAILAND	7	40	77	142	182	202	218	222	244	240	331	338	368	398
DEVELOPED EUROPE	**1817**	**1956**	**2099**	**2243**	**2402**	**2533**	**3132**	**3538**	**3999**	**4509**	**5344**	**5727**	**5632**	**5823**
AUSTRIA	28	32	34	39	44	50	62	66	69	77	91	97	91	89
BELGIUM	56	59	58	62	66	67	72	87	105	129	136	135	126	134
DENMARK	80	96	101	103	108	110	139	146	162	166	178	181	179	170
FINLAND	24	24	27	29	51	53	69	80	93	114	128	132	134	133
FRANCE	220	247	276	287	301	313	401	474	573	663	766	800	785	811
GERMANY	240	260	283	321	339	359	449	481	556	679	818	813	766	825
GREECE	28	32	54	72	93	104	150	154	164	211	280	297	160	299
IRELAND	32	33	32	34	34	36	38	40	45	50	59	51	59	57
ITALY	91	95	97	97	101	111	122	138	157	181	233	249	258	259
LUXEMBOURG	.	1	5	6	6	7	9	11	19	20	27	25	28	27
NETHERLANDS	83	96	100	106	112	117	127	138	158	174	207	207	201	195
NORWAY	33	34	43	49	53	57	73	100	125	129	151	164	161	154
PORTUGAL	22	25	28	30	35	41	65	64	61	68	71	70	60	67
SPAIN	61	69	76	84	86	86	96	106	114	125	132	141	144	139
SWEDEN	36	45	61	70	78	83	106	147	179	225	288	313	314	306
SWITZERLAND	106	108	112	117	125	132	161	179	198	213	252	262	268	262
UNITED KINGDOM	677	700	712	737	770	807	993	1127	1221	1285	1527	1790	1898	1896
EURO ZONE	885	973	1070	1167	1268	1344	1660	1839	2114	2491	2948	3017	2812	3035
DEVELOPED AMERICAS	**1761**	**1999**	**2153**	**2412**	**3318**	**3820**	**4376**	**4885**	**6647**	**7915**	**8434**	**8573**	**8543**	**8675**
CANADA	179	188	189	205	213	255	286	321	517	738	900	1006	1089	1088
UNITED STATES	1582	1811	1964	2207	3105	3565	4090	4564	6130	7177	7534	7567	7454	7587
EMERGING AMERICAS	**55**	**82**	**130**	**167**	**221**	**246**	**294**	**321**	**438**	**633**	**699**	**712**	**705**	**705**
ARGENTINA	2	5	9	13	20	25	31	37	49	59	68	68	63	67
BRAZIL	24	34	44	49	65	79	89	92	135	238	264	270	266	264
CHILE	19	27	40	45	55	63	72	79	109	159	161	167	170	168
COLOMBIA	.	.	8	13	17	17	19	20	23	23	23	25	30	31
MEXICO	10	14	20	30	40	41	49	57	78	93	100	98	96	95
PERU	.	.	6	11	17	13	24	26	33	45	55	58	57	59
VENEZUELA	.	2	3	6	7	8	10	10	11	16	28	26	23	21
EMERGING EUROPE	**10**	**14**	**27**	**51**	**53**	**77**	**142**	**186**	**232**	**279**	**321**	**356**	**387**	**393**
CZECH REPUBLIC	.	.	.	.	.	4	26	30	32	33	34	34	32	31
HUNGARY	.	.	.	6	5	8	17	21	26	33	34	34	34	35
POLAND	.	.	.	4	7	20	28	35	52	63	75	87	87	86
RUSSIAN FEDERATION	.	.	.	.	.	1	11	19	16	19	24	29	27	32
SLOVENIA	.	.	.	.	.	.	.	.	.	.	1	1	7	7
SLOVAKIA	.	.	.	.	.	.	.	1	2	2	3	3	3	3
TURKEY	10	14	27	41	41	44	60	80	104	129	150	168	197	199
MIDDLE EAST AND AFRICA	**50**	**55**	**77**	**106**	**127**	**140**	**162**	**222**	**416**	**509**	**578**	**608**	**610**	**612**
EGYPT	.	.	.	.	.	.	.	3	14	12	18	14	12	16
ISRAEL	.	.	.	3	7	18	25	36	51	62	86	111	119	124
MOROCCO	.	.	.	.	.	.	.	8	8	11	15	15	15	17
PAKISTAN	.	1	17	31	39	40	44	63	67	67	75	79	78	79
SOUTH AFRICA	50	54	60	72	77	78	87	105	266	346	371	374	371	361
ZIMBABWE	.	.	.	.	4	4	6	7	10	11	13	15	15	15
GLOBAL	**5471**	**6396**	**7097**	**7810**	**9382**	**10738**	**12464**	**13738**	**17336**	**20217**	**23098**	**25102**	**26521**	**27328**

Coverage expands dramatically over time, from 5,471 firms in 1990 to 27,328 firms in 2003. Table 1 also shows that coverage in emerging markets is lower than advanced countries. But

how representative is this coverage, relative to the known universe of listed companies and relative to economic activity?

Table 2 shows the ratio of the number of companies in the CVU by country, region and globally, compared to the number of companies listed in the S&P Global Stock Markets Factbook.

Table 2. Number of Firms in Percent of the Number of Firms in the S&P Global Stock Markets Factbook

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
DEVELOPED ASIA	**42.9**	**53.0**	**54.0**	**52.6**	**53.0**	**59.0**	**62.8**	**62.2**	**79.8**	**82.4**	**89.6**	**111.0**	**102.7**	**103.1**
AUSTRALIA	8.6	10.4	10.1	10.1	10.2	13.4	16.1	17.0	22.4	28.9	44.5	88.3	92.3	90.8
HONG KONG	27.5	30.0	31.3	26.9	27.8	47.3	60.8	55.3	56.9	58.3	74.5	90.9	88.8	88.0
JAPAN	67.2	80.0	82.2	82.3	86.4	87.6	88.5	89.4	118.8	120.9	121.6	132.8	112.9	115.3
NEW ZEALAND	5.3	7.9	10.6	10.3	12.7	16.0	21.5	27.3	35.9	42.7	45.1	73.1	73.8	70.1
SINGAPORE	28.7	39.2	50.9	45.5	42.1	70.3	78.0	59.7	61.1	60.6	81.1	109.1	103.9	103.6
EMERGING ASIA	**4.0**	**7.5**	**11.5**	**13.3**	**13.4**	**16.2**	**16.4**	**16.5**	**18.1**	**22.7**	**28.1**	**30.8**	**40.9**	**42.0**
CHINA	.	.	11.5	6.6	6.2	16.1	10.6	8.8	8.0	17.3	17.9	17.9	96.0	96.6
INDIA	0.1	0.6	2.0	3.1	2.6	3.4	3.5	3.8	4.0	4.3	4.7	5.5	5.7	5.8
INDONESIA	2.4	33.3	41.9	36.8	39.4	49.6	54.5	52.1	53.8	65.7	93.8	95.6	95.5	94.9
KOREA (SOUTH)	8.8	9.9	13.5	18.9	25.9	28.6	31.8	23.4	33.4	50.4	53.1	52.3	50.8	50.5
MALAYSIA	29.4	41.1	55.0	51.5	46.7	58.6	60.5	58.1	59.4	59.0	79.2	90.9	92.0	94.9
PHILIPPINES	2.6	9.3	14.7	18.3	26.5	41.5	43.5	43.0	45.2	47.6	82.1	81.8	82.5	85.0
SRI LANKA	.	.	.	.	6.5	8.0	6.8	7.5	7.7	8.4	10.0	8.8	5.9	7.8
TAIWAN	1.5	4.5	9.0	14.0	31.0	53.3	52.9	51.5	50.1	74.0	79.7	87.7	89.0	88.2
THAILAND	3.3	14.5	25.2	40.9	46.8	48.6	48.0	51.5	58.4	61.2	86.9	88.5	94.1	98.3
DEVELOPED EUROPE	**35.1**	**38.7**	**36.8**	**45.1**	**42.9**	**44.4**	**52.0**	**57.6**	**63.2**	**64.9**	**73.9**	**75.9**	**66.6**	**63.7**
AUSTRIA	28.9	30.5	30.4	35.1	39.6	45.9	58.5	65.3	71.9	79.4	93.8	85.1	100.0	103.5
BELGIUM	30.8	32.2	33.9	37.6	42.6	46.9	51.8	61.7	62.1	75.0	78.2	86.5	80.8	82.2
DENMARK	31.0	36.8	39.3	40.1	42.9	51.6	58.6	61.6	66.9	71.2	79.1	87.0	89.1	90.9
FINLAND	32.9	38.1	44.3	50.9	78.5	72.6	97.2	64.5	72.1	77.6	83.1	86.8	91.2	93.7
FRANCE	38.1	44.8	35.1	60.8	65.6	69.6	58.5	69.4	80.6	68.5	94.8	101.1	101.7	112.2
GERMANY	58.1	60.7	42.6	75.4	81.3	52.9	65.9	68.7	75.0	72.8	80.0	82.3	107.1	120.6
GREECE	19.3	25.4	41.9	50.3	43.1	49.1	67.0	67.0	67.2	75.1	85.1	87.9	46.9	88.2
IRELAND	.	.	.	.	42.5	45.0	50.0	48.2	56.3	59.5	77.6	75.0	95.2	103.6
ITALY	41.4	42.4	42.5	46.2	45.3	44.4	50.0	57.7	64.6	67.0	80.1	86.5	87.5	95.6
LUXEMBOURG	.	1.4	8.5	9.7	10.0	11.5	16.7	19.6	35.8	39.2	50.0	48.1	80.0	81.8
NETHERLANDS	31.9	47.1	53.5	43.3	35.3	53.9	58.5	68.7	74.5	82.1	88.5	115.0	111.7	106.6
NORWAY	29.5	30.4	37.4	40.8	40.2	37.7	46.2	51.0	58.7	66.2	79.1	88.2	89.9	98.7
PORTUGAL	12.2	13.9	14.7	16.4	17.9	24.3	41.1	43.2	45.2	54.4	65.1	72.2	95.2	113.6
SPAIN	14.3	15.9	19.0	22.3	22.7	23.8	26.9	27.6	23.6	17.4	13.0	9.7	4.8	4.4
SWEDEN	14.0	19.6	29.8	34.1	34.2	37.2	46.3	60.0	69.4	81.2	98.6	109.8	112.9	115.9
SWITZERLAND	58.2	59.3	62.2	54.4	52.7	56.7	75.6	82.9	85.3	89.1	100.0	99.6	103.9	90.7
UNITED KINGDOM	39.8	43.1	38.0	44.8	37.2	38.8	45.7	52.2	58.5	66.1	80.2	93.1	111.6	82.0
EURO ZONE	33.1	36.6	34.7	46.2	47.4	47.9	55.1	59.5	64.1	61.4	67.5	64.4	48.1	51.2
DEVELOPED AMERICAS	**22.7**	**25.5**	**27.5**	**28.8**	**37.4**	**43.1**	**44.9**	**47.8**	**67.6**	**86.9**	**94.3**	**112.0**	**90.5**	**97.8**
CANADA	15.6	17.3	16.9	18.2	18.0	21.3	22.6	23.6	37.4	50.7	63.5	77.4	29.0	30.4
UNITED STATES	24.0	26.9	29.3	30.5	40.4	46.5	48.2	51.6	72.5	93.8	100.1	119.1	131.1	143.3
EMERGING AMERICAS	**4.7**	**6.5**	**8.1**	**10.5**	**13.8**	**14.6**	**17.5**	**19.0**	**26.5**	**40.7**	**47.7**	**52.8**	**55.2**	**56.9**
ARGENTINA	1.1	2.9	5.1	7.2	12.8	16.8	21.1	27.2	37.7	45.7	53.5	61.3	75.9	62.6
BRAZIL	4.1	6.0	7.8	8.9	11.9	14.5	16.2	17.2	25.6	49.8	57.5	63.1	66.7	71.9
CHILE	8.8	12.2	16.3	17.1	19.7	22.2	25.4	26.8	38.0	55.8	62.4	67.1	66.9	70.0
COLOMBIA	.	.	10.0	14.6	15.0	8.9	10.1	10.6	14.1	15.9	18.3	20.3	26.3	27.2
MEXICO	5.0	6.7	10.3	15.8	19.4	22.2	25.4	28.8	40.2	49.5	55.9	58.3	57.8	59.7
PERU	.	.	2.4	4.7	7.8	5.3	10.4	10.5	12.8	18.6	23.9	28.0	28.2	29.9
VENEZUELA	.	2.3	3.3	6.5	7.8	8.9	11.5	11.0	11.7	18.4	32.9	41.3	39.0	38.9
EMERGING EUROPE	**9.1**	**10.4**	**18.6**	**25.2**	**20.4**	**3.9**	**7.0**	**10.3**	**12.4**	**19.8**	**21.2**	**24.1**	**31.9**	**31.4**
CZECH REPUBLIC	.	.	.	.	.	0.2	1.6	10.9	12.3	20.1	26.0	36.2	41.0	49.2
HUNGARY	.	.	.	21.4	12.5	19.0	37.8	42.9	47.3	50.0	56.7	59.6	70.8	71.4
POLAND	.	.	.	18.2	15.9	30.8	33.7	24.5	26.3	28.5	33.3	37.8	40.3	42.4
RUSSIAN FEDERATION	.	.	.	.	.	.	15.1	9.1	6.8	9.2	9.6	12.3	13.8	15.0
SLOVENIA	.	.	.	.	.	.	.	.	.	.	2.6	2.6	20.0	5.2
SLOVAKIA	.	.	.	.	.	.	.	0.1	0.2	0.4	0.6	0.6	0.8	1.0
TURKEY	9.1	10.4	18.6	27.0	23.3	21.5	26.2	31.1	37.5	45.3	47.6	54.2	68.4	70.1
MIDDLE EAST AND AFRICA	**.**	**0.2**	**5.9**	**7.9**	**8.4**	**8.3**	**9.3**	**7.9**	**13.5**	**15.7**	**17.9**	**19.2**	**20.0**	**21.8**
EGYPT	.	.	.	.	.	.	.	0.5	1.6	1.2	1.7	1.3	1.0	1.7
ISRAEL	.	.	.	.	.	.	.	5.6	7.8	9.6	13.1	17.5	19.3	21.5
MOROCCO	.	.	.	.	.	.	.	16.3	15.1	20.0	28.3	27.3	27.3	32.1
PAKISTAN	.	0.2	2.7	4.7	5.4	5.2	5.6	8.1	8.7	8.8	9.8	10.6	11.0	11.3
SOUTH AFRICA	.	.	8.8	11.1	12.0	12.2	13.9	16.4	39.8	51.8	60.2	69.0	82.4	84.7
ZIMBABWE	.	.	.	.	6.3	6.3	9.4	10.9	14.9	15.7	18.8	20.8	19.7	18.5
GLOBAL	**24.5**	**27.7**	**28.2**	**30.0**	**32.0**	**33.1**	**35.7**	**36.7**	**46.1**	**53.9**	**60.1**	**67.3**	**65.5**	**67.0**

Table 2 shows that coverage in terms of the numbers of firms comes close to 70 percent of listed companies in the Factbook. This proportion has improved over time, increasing from 25 percent in 1990. This ratio is much lower in emerging markets than for mature countries.

Table 3 shows that coverage is more exhaustive in market capitalization terms. While the CVU covers only about 70 percent of the Factbook in terms of the number of companies, it covers over 90 percent of companies in market capitalization terms. This means that, though coverage is not exhaustive in terms of numbers, the CVU does cover the most significant listed firms in terms of size.

Table 3. Year-End Market Capitalization in Percent of Year-End Market Capitalization in the S&P Global Stock Markets Factbook

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
DEVELOPED ASIA	**71.1**	**73.1**	**74.0**	**72.9**	**75.8**	**78.0**	**80.7**	**84.2**	**87.1**	**94.7**	**91.3**	**95.0**	**95.3**	**95.9**
AUSTRALIA	58.5	60.7	55.6	59.0	60.0	64.4	66.2	67.2	84.6	80.3	84.6	88.2	89.0	91.7
HONG KONG	59.7	61.8	60.9	62.7	62.0	72.7	77.0	70.3	69.5	72.7	75.8	77.2	72.4	67.0
JAPAN	72.2	74.4	76.3	76.5	78.7	79.4	82.9	89.3	90.1	99.5	95.0	99.5	100.9	102.8
NEW ZEALAND	18.4	39.9	40.5	43.4	50.6	55.2	57.0	59.9	64.8	69.9	71.7	94.7	97.6	97.1
SINGAPORE	65.9	68.6	72.3	47.9	55.1	82.4	83.9	84.6	87.3	88.4	97.8	108.1	105.0	109.7
EMERGING ASIA	**26.3**	**33.3**	**43.3**	**53.9**	**56.4**	**67.4**	**67.3**	**56.3**	**60.4**	**67.2**	**56.8**	**64.6**	**88.8**	**84.3**
CHINA	.	.	8.7	6.2	6.8	9.8	6.6	6.2	4.3	18.3	20.2	21.1	81.3	61.8
INDIA	4.2	9.1	22.6	40.1	41.8	47.4	62.0	69.2	72.7	80.4	76.1	83.3	87.6	88.2
INDONESIA	4.6	102.3	83.9	74.6	60.4	90.4	89.3	87.3	87.1	91.2	99.3	94.5	98.3	97.8
KOREA (SOUTH)	34.6	37.9	42.8	52.4	59.2	63.4	63.1	61.5	654.1	69.1	79.3	88.4	90.3	92.7
MALAYSIA	72.6	76.0	80.4	80.0	74.9	79.3	83.5	87.0	61.6	85.0	91.1	94.8	97.3	93.6
PHILIPPINES	10.6	54.9	69.1	57.6	52.3	73.7	75.7	78.6	78.4	70.6	44.0	44.6	41.1	90.5
SRI LANKA	.	.	.	.	46.8	51.1	38.8	43.6	41.3	45.5	46.5	47.5	34.9	48.1
TAIWAN	9.9	14.0	19.5	32.7	47.4	66.8	65.3	68.1	66.9	87.0	92.8	101.6	103.0	103.9
THAILAND	10.1	30.9	44.9	62.1	71.9	76.8	77.9	82.9	102.6	88.1	93.1	91.5	92.1	98.0
DEVELOPED EUROPE	**56.0**	**56.4**	**58.7**	**62.2**	**60.0**	**61.3**	**68.5**	**71.6**	**76.0**	**79.9**	**89.3**	**91.7**	**92.6**	**93.8**
AUSTRIA	90.0	135.5	41.0	45.7	53.1	58.3	65.3	70.6	73.5	75.0	80.8	93.4	97.3	95.0
BELGIUM	42.5	48.4	49.1	46.9	45.5	46.4	53.9	60.1	67.3	72.8	73.0	77.3	85.6	83.2
DENMARK	42.8	44.5	45.8	46.1	45.6	53.6	54.2	49.9	59.6	57.7	76.8	71.9	84.0	78.2
FINLAND	24.8	26.9	29.4	41.8	51.4	47.2	59.5	60.9	65.4	79.0	90.0	90.4	91.8	92.7
FRANCE	53.0	60.4	60.8	63.1	65.2	64.1	71.0	79.0	80.9	84.5	91.7	92.9	94.3	92.5
GERMANY	68.4	63.9	68.2	68.9	72.1	68.4	77.6	75.1	85.3	78.2	85.1	83.7	93.6	93.2
GREECE	40.4	48.6	58.0	63.2	61.0	65.3	80.8	83.6	75.2	80.6	89.3	93.8	89.2	95.4
IRELAND	.	.	.	.	.	69.3	68.3	71.7	85.0	72.0	79.9	85.1	90.4	93.6
ITALY	49.6	47.8	48.7	54.6	47.5	61.1	58.8	62.3	68.5	70.7	76.5	80.9	85.0	95.8
LUXEMBOURG	.	0.1	9.5	13.0	14.3	11.8	17.3	17.9	23.2	31.0	65.4	38.1	80.9	104.2
NETHERLANDS	93.5	97.2	96.0	97.3	76.9	79.0	99.0	98.7	102.2	99.2	106.1	116.6	105.0	112.4
NORWAY	45.6	41.3	47.2	56.2	57.9	57.1	61.1	62.4	63.5	71.8	88.3	95.9	98.4	102.1
PORTUGAL	35.8	41.6	56.8	57.9	62.4	79.1	87.0	114.2	92.2	85.0	97.5	106.4	106.8	105.8
SPAIN	59.4	56.1	70.1	73.2	58.0	58.1	64.0	65.8	69.6	80.8	73.9	71.4	68.0	66.7
SWEDEN	22.1	21.9	26.1	37.9	39.7	41.1	45.3	52.6	60.0	77.8	82.1	85.4	91.5	88.5
SWITZERLAND	30.3	31.1	33.9	41.4	44.3	44.1	66.0	69.3	86.1	89.8	95.6	113.1	94.4	96.8
UNITED KINGDOM	58.9	58.4	60.3	64.2	60.6	64.1	66.5	69.7	68.2	76.4	93.9	95.1	96.9	99.1
EURO ZONE	61.0	61.5	64.3	66.6	64.1	64.9	73.3	75.9	80.3	81.2	86.9	88.1	90.2	91.3
DEVELOPED AMERICAS	**60.0**	**62.3**	**63.2**	**61.8**	**64.5**	**66.7**	**67.6**	**69.6**	**77.2**	**85.2**	**88.9**	**89.7**	**90.0**	**92.3**
CANADA	52.3	51.2	51.1	50.9	51.5	55.2	55.5	59.6	63.8	74.0	68.6	73.0	85.9	88.6
UNITED STATES	60.5	63.0	63.9	62.5	65.3	67.3	68.2	70.1	77.8	85.7	90.0	90.6	90.2	92.5
EMERGING AMERICAS	**20.8**	**30.5**	**34.7**	**39.7**	**38.3**	**42.4**	**43.1**	**46.5**	**51.9**	**56.8**	**47.9**	**44.8**	**51.1**	**73.3**
ARGENTINA	3.5	25.3	56.2	68.6	67.0	80.8	82.7	87.0	89.8	61.2	26.3	16.9	14.5	87.0
BRAZIL	9.5	19.4	18.2	21.2	20.1	21.7	22.8	24.2	32.8	43.4	45.8	45.9	49.0	54.0
CHILE	44.3	53.6	72.6	69.3	68.3	62.9	67.2	72.1	74.3	82.9	83.1	86.6	89.4	96.3
COLOMBIA	.	.	46.4	56.1	53.5	49.7	57.4	67.3	46.9	44.0	35.7	34.4	64.6	61.3
MEXICO	18.4	31.0	29.5	35.7	38.5	41.9	47.1	53.6	57.2	65.9	64.7	68.9	74.1	82.7
PERU	.	.	38.2	37.7	40.9	42.1	63.7	44.9	36.5	37.2	34.9	28.6	27.4	139.1
VENEZUELA	.	20.0	18.2	28.6	59.5	46.6	54.1	45.6	44.0	46.3	58.7	58.4	58.4	69.4
EMERGING EUROPE	**29.4**	**35.5**	**46.6**	**55.3**	**54.6**	**37.6**	**84.0**	**70.9**	**72.3**	**76.2**	**86.8**	**88.5**	**80.4**	**77.0**
CZECH REPUBLIC	.	.	.	.	.	13.5	52.8	67.2	79.8	90.0	88.3	85.0	64.2	93.0
HUNGARY	.	.	.	48.3	24.3	22.6	77.2	87.8	89.8	94.7	96.7	97.5	99.0	98.9
POLAND	.	.	.	20.1	35.1	40.4	59.0	52.7	79.7	87.9	87.7	93.3	93.8	95.1
RUSSIAN FEDERATION	.	.	.	.	.	.	121.0	66.2	38.2	48.7	85.6	88.4	75.7	67.5
SLOVENIA	.	.	.	.	.	.	.	.	.	.	16.7	14.5	49.0	46.2
SLOVAKIA	.	.	.	.	.	.	.	12.1	12.5	3.1	6.7	5.7	5.5	7.0
TURKEY	29.4	35.5	46.6	58.0	59.6	56.8	65.0	83.0	80.5	87.3	89.1	92.0	94.8	95.7
MIDDLE EAST AND AFRICA	**.**	**0.2**	**51.1**	**40.6**	**38.7**	**31.8**	**31.8**	**38.6**	**49.5**	**53.8**	**63.6**	**58.5**	**61.1**	**65.7**
EGYPT	.	.	.	.	.	.	.	8.1	26.3	13.1	27.2	13.5	12.2	23.0
ISRAEL	.	.	.	.	.	.	.	51.7	62.1	88.2	113.9	78.8	85.2	87.0
MOROCCO	.	.	.	.	.	.	.	48.8	50.3	55.5	75.7	74.0	69.8	77.9
PAKISTAN	.	0.2	20.7	40.1	39.1	29.1	24.1	78.2	71.4	78.4	76.8	72.4	82.5	80.1
SOUTH AFRICA	.	.	53.5	40.7	38.9	32.0	32.2	35.7	49.2	49.8	52.2	56.1	62.1	63.2
ZIMBABWE	.	.	.	.	13.9	13.8	33.4	119.2	34.0	46.4	38.1	32.3	43.1	31.7
GLOBAL	**61.2**	**62.6**	**63.3**	**63.4**	**65.0**	**67.1**	**69.5**	**70.5**	**76.9**	**83.6**	**86.9**	**88.4**	**90.2**	**91.8**

Finally, Table 4 compares coverage in terms of economic activity. It shows the ratio of market capitalization to GDP in percent for each country and region in the sample, in addition to the sample total across all countries. This ratio is highest for small economies like

the Netherlands and lowest for some emerging markets with a large proportion of state owned companies (Brazil). This table suggests that caution should be used in emerging markets especially when drawing inferences regarding overall economic activity.

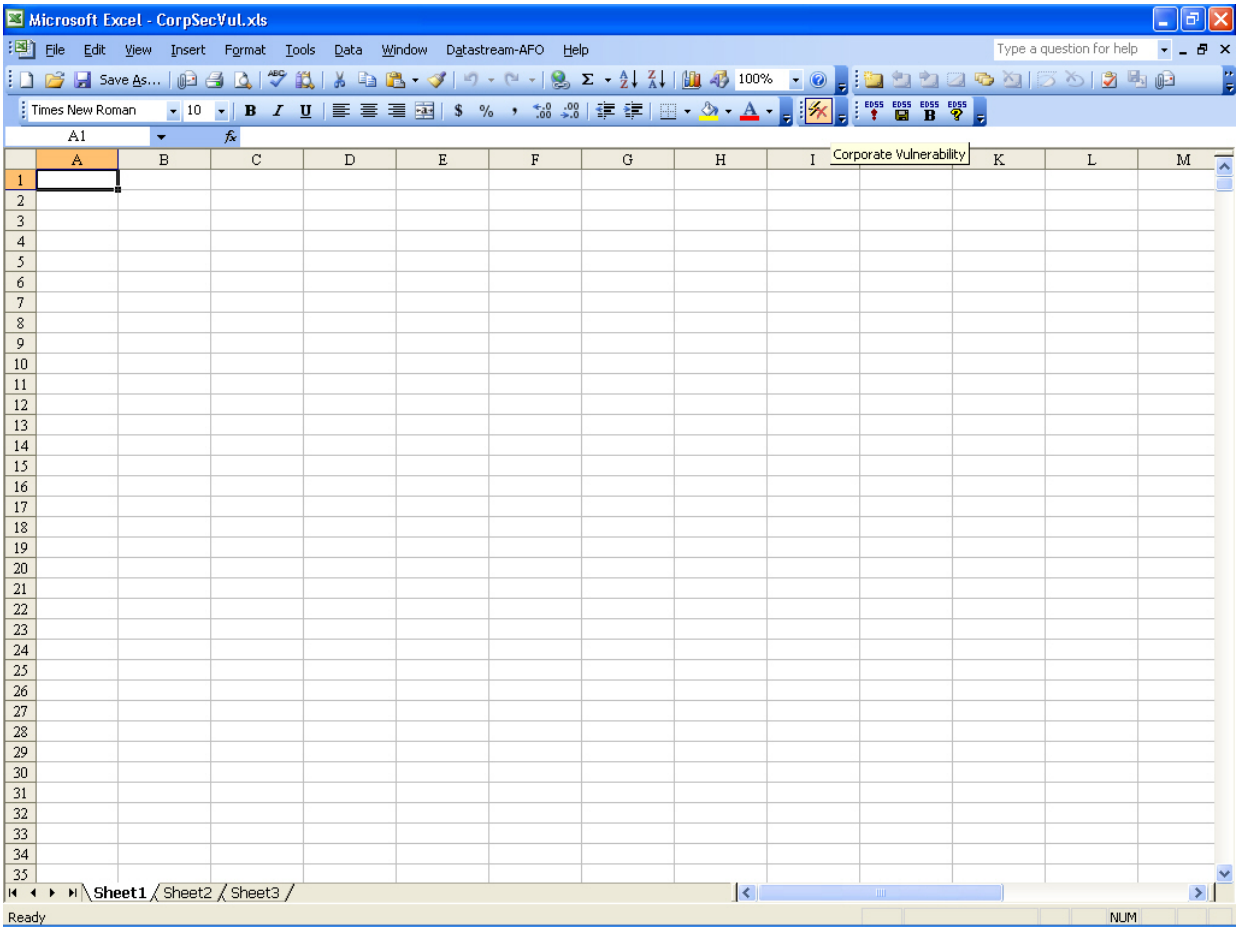
Table 4. Year-End Market Capitalization to GDP in Percent

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
DEVELOPED ASIA	**64.0**	**64.0**	**48.0**	**56.1**	**61.5**	**57.8**	**60.2**	**51.1**	**62.3**	**106.9**	**72.7**	**64.4**	**63.0**	**84.4**
AUSTRALIA	20.7	28.9	26.3	40.7	39.0	43.8	51.0	49.0	76.6	87.9	83.1	92.2	84.7	105.6
HONG KONG	66.0	86.4	102.5	204.6	125.3	155.7	221.1	167.3	144.5	275.5	285.8	240.1	209.6	305.6
JAPAN	69.3	67.0	48.3	52.7	61.0	55.1	54.5	46.0	57.2	101.5	63.2	53.8	54.0	72.7
NEW ZEALAND	3.7	13.6	15.6	25.7	27.1	29.5	33.1	27.6	29.8	34.8	26.1	32.9	35.8	41.0
SINGAPORE	61.0	75.6	71.1	109.3	105.0	145.3	136.7	94.3	100.7	212.9	161.4	147.5	121.2	174.3
EMERGING ASIA	**8.6**	**8.5**	**12.2**	**25.9**	**29.6**	**29.2**	**31.4**	**17.9**	**20.8**	**41.5**	**27.7**	**31.4**	**38.7**	**50.0**
CHINA	.	0.0	0.3	0.4	0.5	0.6	0.9	1.4	1.1	6.1	10.9	9.4	29.6	29.8
INDIA	0.5	1.6	5.3	14.4	17.2	17.1	20.4	21.9	18.7	34.0	24.5	19.4	23.1	42.4
INDONESIA	0.3	5.4	7.3	15.6	16.1	29.8	35.8	11.8	20.2	41.8	17.7	15.2	17.0	25.6
KOREA (SOUTH)	14.3	11.7	13.8	20.0	26.7	22.3	15.7	5.5	23.0	61.4	26.6	43.0	41.2	50.5
MALAYSIA	80.2	90.7	127.8	263.4	200.4	198.8	254.3	81.3	84.1	156.1	118.0	129.2	126.6	151.9
PHILIPPINES	1.4	12.4	18.0	42.7	46.4	57.5	72.4	29.4	41.6	44.5	30.3	26.4	21.2	27.3
SRI LANKA	.	.	.	.	11.5	7.8	5.2	6.1	4.5	4.6	3.0	4.0	3.5	7.2
TAIWAN	6.2	9.7	9.3	28.4	48.0	47.2	63.9	67.5	65.1	113.6	74.3	105.7	95.5	137.6
THAILAND	2.8	11.5	23.9	66.6	65.5	64.7	42.7	12.9	32.0	41.9	22.4	28.8	33.4	81.3
DEVELOPED EUROPE	**18.5**	**19.9**	**17.6**	**26.3**	**26.4**	**28.7**	**37.0**	**49.5**	**66.3**	**87.7**	**99.6**	**81.7**	**63.2**	**72.9**
AUSTRIA	6.4	6.1	4.7	7.0	8.0	8.1	9.6	12.2	11.8	11.8	12.7	12.0	14.9	20.4
BELGIUM	12.6	14.3	12.3	15.4	15.6	15.9	22.0	30.0	57.4	49.3	52.7	48.4	43.4	48.3
DENMARK	12.5	14.9	10.2	13.9	16.3	16.7	21.2	27.7	34.2	35.1	52.3	42.8	37.4	47.1
FINLAND	4.1	3.1	3.3	11.4	19.6	16.0	29.4	36.4	78.0	215.8	219.8	141.9	96.6	97.9
FRANCE	13.7	17.1	15.8	22.6	21.8	21.5	27.0	37.9	55.2	86.3	101.0	82.5	63.2	71.1
GERMANY	15.7	14.2	11.7	16.3	16.2	16.0	21.9	29.3	43.5	53.1	57.7	48.3	32.3	41.8
GREECE	7.3	7.0	5.5	8.3	9.1	9.5	15.7	23.5	49.3	130.9	86.9	69.2	45.9	59.1
IRELAND	13.2	16.4	13.4	23.3	22.9	26.9	32.4	44.2	65.0	51.9	68.7	61.9	44.8	52.3
ITALY	6.7	6.5	5.1	7.5	8.3	11.7	12.3	18.4	32.6	43.5	54.5	39.1	34.1	40.0
LUXEMBOURG	.	0.2	14.3	26.3	30.4	26.4	40.7	49.8	82.1	78.4	170.7	91.8	105.2	138.9
NETHERLANDS	37.9	43.6	38.6	54.5	62.4	67.8	91.0	122.6	156.4	172.8	182.9	138.9	100.3	106.9
NORWAY	10.3	7.7	6.6	13.1	17.0	17.2	22.0	26.4	19.9	28.9	34.4	39.0	34.7	43.8
PORTUGAL	4.6	4.9	5.3	8.3	11.2	13.5	19.1	41.8	51.6	49.0	55.5	44.9	37.7	42.0
SPAIN	12.9	15.1	11.5	17.4	17.8	19.7	25.5	34.0	47.6	57.9	66.1	57.1	47.6	57.5
SWEDEN	9.0	8.7	7.8	20.5	24.4	29.5	41.4	57.9	67.4	115.6	112.6	90.5	67.2	84.4
SWITZERLAND	20.6	22.6	26.6	46.4	46.8	60.7	87.7	152.0	220.4	235.1	307.5	235.3	190.5	219.9
UNITED KINGDOM	50.3	55.7	51.8	76.7	70.4	79.6	97.1	104.9	113.8	153.3	167.9	147.3	115.2	133.0
EURO ZONE	13.3	14.2	12.2	17.8	18.5	19.6	25.4	34.9	51.9	69.3	77.6	62.0	47.0	55.0
DEVELOPED AMERICAS	**30.7**	**41.2**	**43.2**	**46.8**	**45.5**	**60.3**	**71.9**	**92.4**	**115.4**	**149.5**	**134.4**	**120.1**	**93.2**	**117.8**
CANADA	19.3	22.8	21.4	29.5	28.7	34.2	44.0	53.1	56.2	89.7	79.7	71.5	67.0	91.0
UNITED STATES	31.9	43.0	45.2	48.2	46.8	62.4	74.1	95.4	119.6	153.8	138.5	123.5	95.0	119.9
EMERGING AMERICAS	**1.5**	**6.0**	**7.3**	**12.7**	**11.8**	**10.5**	**12.1**	**15.1**	**10.8**	**20.1**	**16.1**	**15.3**	**13.7**	**24.6**
ARGENTINA	0.1	2.5	4.6	12.8	9.6	11.8	13.6	17.6	13.6	18.1	15.4	12.1	14.8	26.6
BRAZIL	0.3	2.0	2.1	4.8	6.9	4.6	6.4	7.7	6.7	18.9	17.3	16.8	13.2	25.7
CHILE	18.0	39.2	46.5	62.9	82.8	64.4	58.5	62.8	48.5	77.6	66.7	71.3	63.2	115.2
COLOMBIA	.	.	4.6	8.0	9.2	9.6	10.1	12.3	6.4	5.9	4.0	5.4	7.8	11.3
MEXICO	2.3	9.7	11.3	17.8	11.9	13.3	15.1	20.9	12.5	21.1	13.9	13.9	11.8	16.2
PERU	.	.	2.7	5.6	7.5	9.3	14.0	13.4	7.5	9.8	7.0	5.9	6.5	36.8
VENEZUELA	.	4.2	2.3	3.8	4.2	2.2	7.7	7.5	3.5	3.3	3.9	2.9	2.5	3.1
EMERGING EUROPE	**3.7**	**3.6**	**2.8**	**6.9**	**5.1**	**5.5**	**10.0**	**18.8**	**9.5**	**27.0**	**18.7**	**19.2**	**19.7**	**26.3**
CZECH REPUBLIC	.	.	.	.	.	3.7	15.3	15.0	15.6	17.8	17.4	13.0	13.8	18.3
HUNGARY	.	.	.	1.0	0.9	1.2	8.9	28.4	26.6	32.2	25.1	19.5	20.0	20.0
POLAND	.	.	.	0.6	1.1	1.4	3.2	4.2	9.7	15.8	16.5	13.1	14.1	16.9
RUSSIAN FEDERATION	.	.	.	.	.	7.5	11.5	20.9	2.9	18.0	12.8	22.0	27.2	36.0
SLOVENIA	.	.	.	.	.	.	.	.	.	.	2.2	2.1	10.2	11.9
SLOVAKIA	.	.	.	.	.	.	.	1.0	0.5	0.2	0.4	0.4	0.4	0.6
TURKEY	3.7	3.6	2.8	10.7	9.5	6.8	11.1	26.8	13.2	49.4	30.3	28.3	17.4	27.3
MIDDLE EAST AND AFRICA	**37.7**	**32.4**	**31.4**	**30.2**	**36.2**	**34.0**	**30.3**	**28.9**	**30.5**	**48.7**	**46.1**	**35.6**	**43.1**	**56.7**
EGYPT	.	.	.	.	.	.	.	2.2	7.8	4.8	7.9	3.4	3.7	7.8
ISRAEL	.	.	.	0.9	6.2	11.9	12.4	22.7	23.8	54.3	63.6	49.2	37.3	60.5
MOROCCO	.	.	.	.	.	.	.	17.8	22.0	21.6	24.8	19.8	16.6	23.0
PAKISTAN	.	0.0	3.3	9.0	8.5	4.3	4.1	13.8	6.4	9.1	8.3	6.3	13.1	18.1
SOUTH AFRICA	37.7	45.1	42.4	53.6	64.7	59.4	54.0	55.7	62.7	99.9	83.5	68.6	107.5	105.8
ZIMBABWE	.	.	.	.	.	.	.	.	.	.	.	.	.	.
GLOBAL	**29.6**	**33.4**	**30.3**	**37.9**	**39.1**	**42.4**	**48.9**	**56.8**	**72.5**	**102.2**	**92.4**	**81.9**	**67.7**	**83.9**

F. Using the CVU

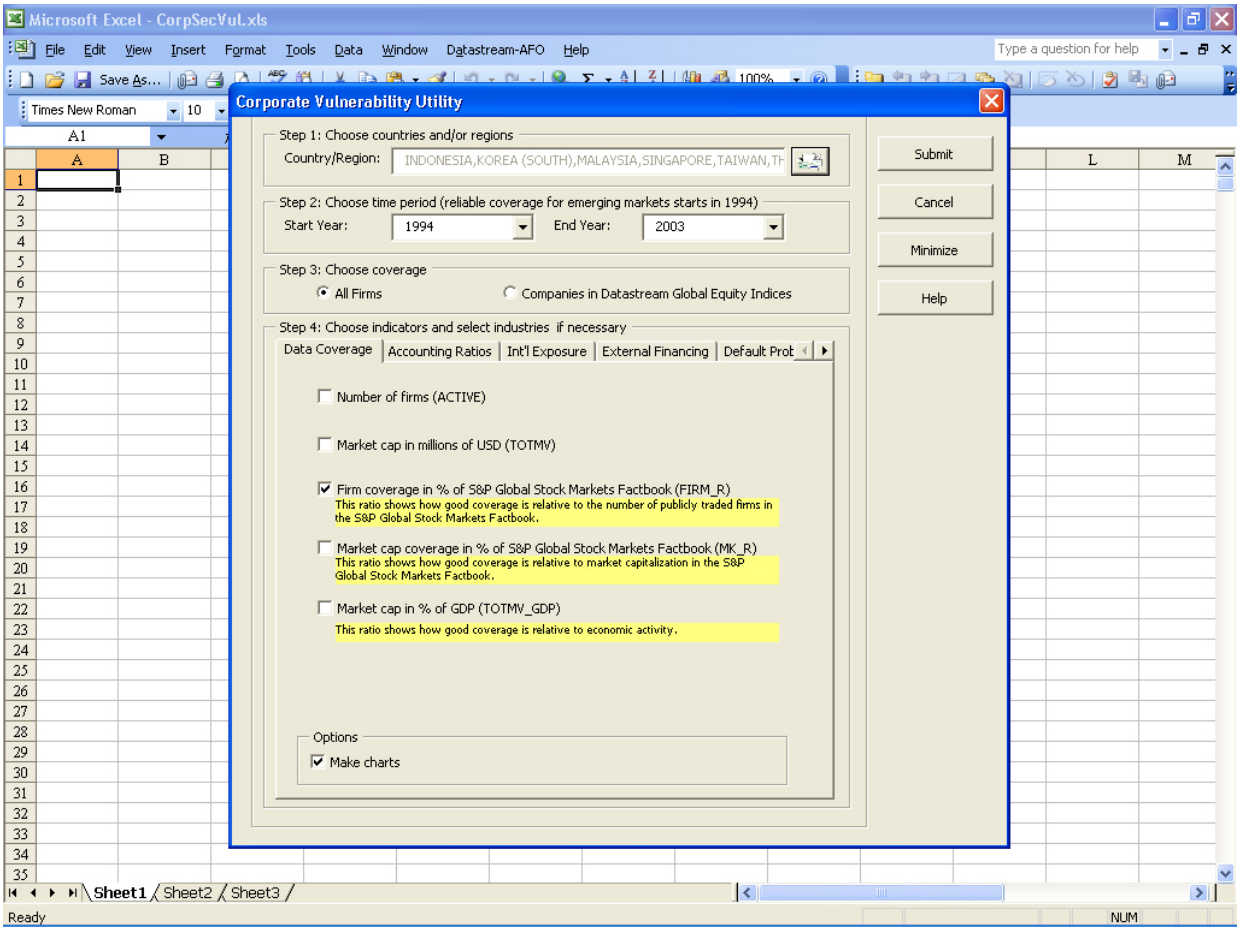
This section explains how to use the CVU. It shows an example of how to download the return on assets for the non-financial corporate sector in Indonesia, South Korea, Malaysia, Singapore, Taiwan POC and Thailand between 1994 and 2003.

1. TGS has downloaded the CVU add-in onto all Fund computers. To activate the add-in, users go to Tools menu, choose the add-ins menu, and select the CVU add-in. After the CVU add-in is activated, users will see the CVU button  on the Toolbar in Excel, which is shown in the screenshot below.



2. To open the CVU, users click the CVU button  . This opens the interactive CVU window.

3. The CVU opens to the data coverage window, the default window, which allows users to assess data coverage. We suggest users **always** assess data coverage before downloading corporate vulnerability indicators. In case of low or variable coverage, corporate health indicators should be interpreted with caution. The data coverage window is shown in the screenshot below.

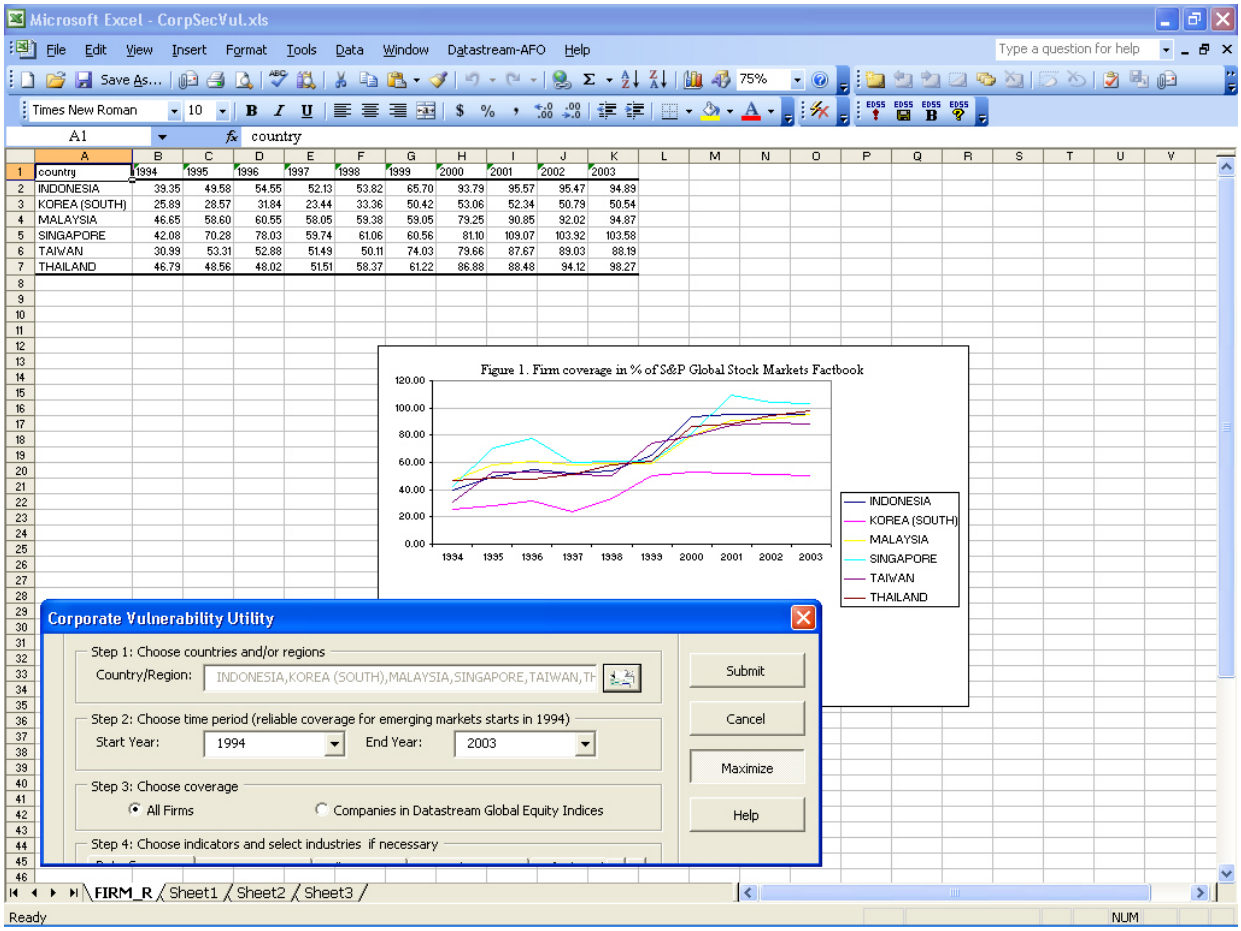


4. The data coverage window prompts users for information. **Step 1** asks them to select countries and/or regions for analysis. In this example, Indonesia, Malaysia, Singapore, South Korea, Taiwan POC and Thailand have been selected. **Step 2** asks users to specify the time period for analysis. 1994 is given as the start year and 2003 is the end year. **Step 3** asks whether users want to assess coverage for all firms in the CVU, or only for firms in the Datastream Global Equity indices, typically the largest, economically most important firms. Coverage is examined for all firms. **Step 4** asks users to choose an indicator for data coverage. Users can download multiple indicators at a time, and also have the option of graphing indicators in Excel. The number of firms in percent of the number of firms in the S&P Global Stock Markets Factbook has been selected.

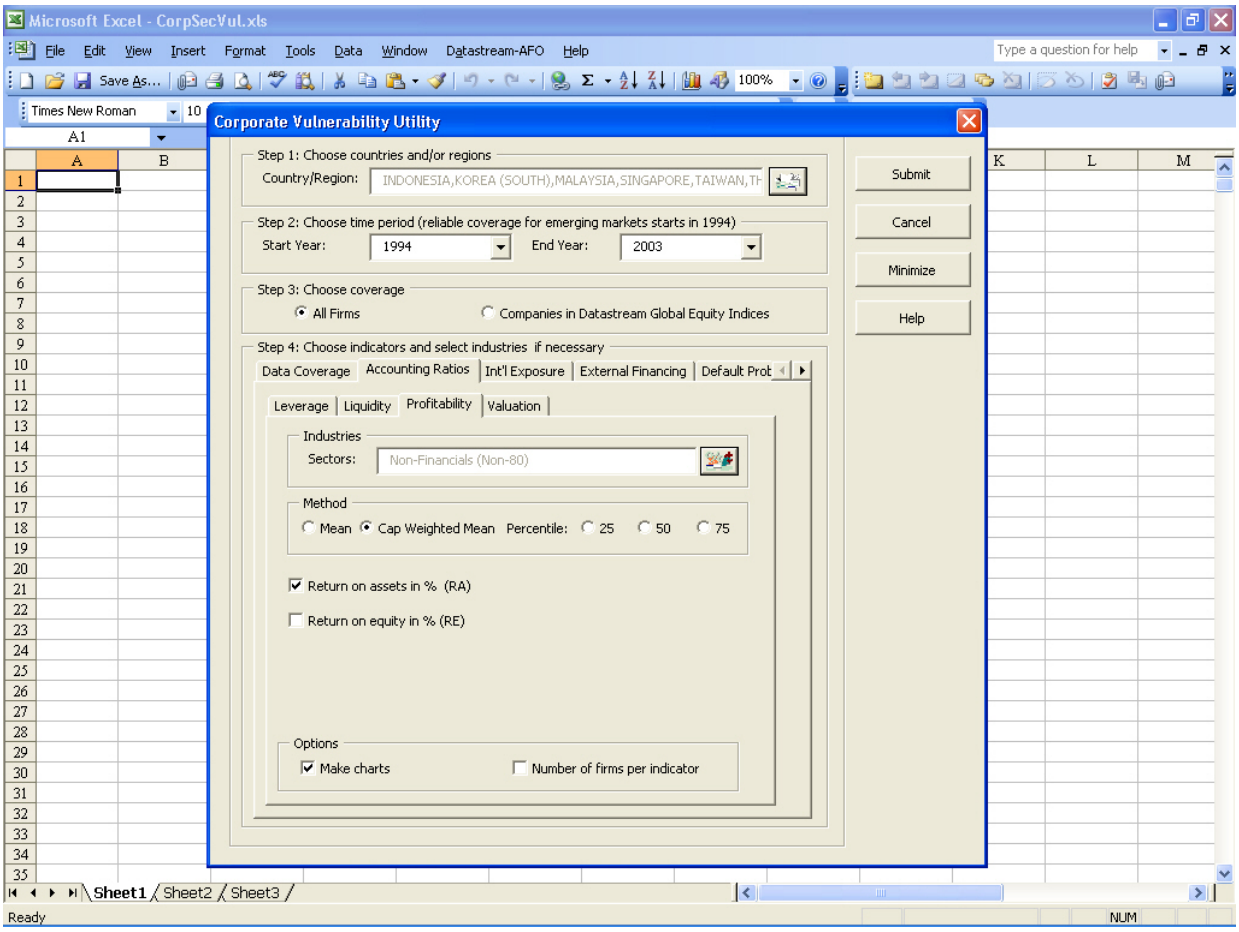
5. Users download data coverage indicators by pushing the "Submit" button. They can close the interactive window by hitting the "Cancel" button. They can access the CVU manual by pushing the "Help" button.

5. The data coverage indicator is downloaded onto an Excel sheet, as in the screenshot below. If multiple coverage indicators are selected, each indicator is downloaded onto a

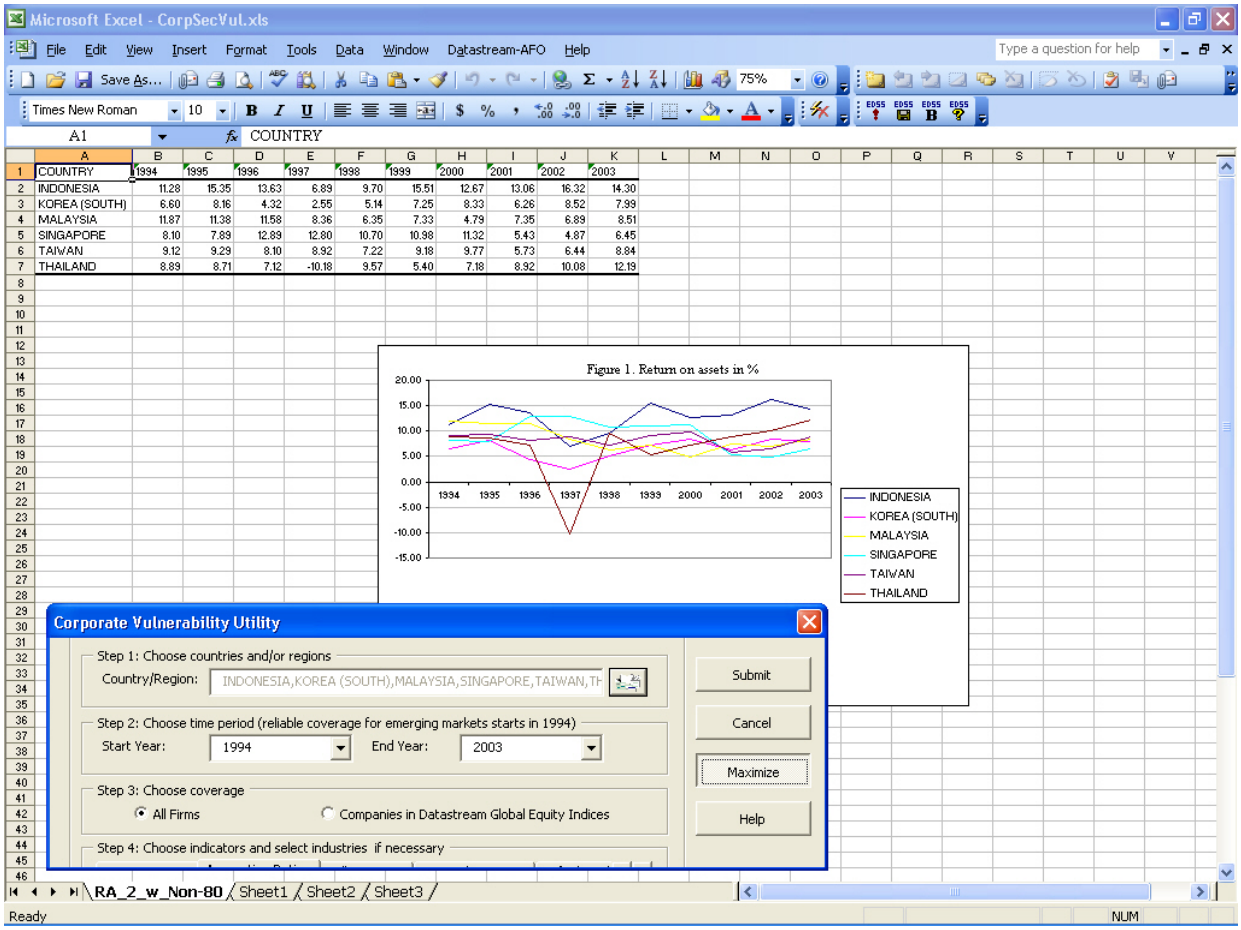
separate sheet. Users can minimize the CVU interactive window using the "Minimize" button.



6. After assessing data coverage, users return to **Step 4** to download corporate vulnerability indicators. To do this, users move from the **Data Coverage** tab to one of four corporate vulnerability indicator tabs: **Accounting Ratios**, **Int'l Exposure**, **External Financing**, and **Default Probabilities**. In this example, the user wants to study profitability trends for non-financial corporates in Indonesia, Malaysia, Singapore, South Korea, Taiwan POC and Thailand from 1994 to 2003. In the screenshot below, the user selects the **Profitability** tab from under the **Accounting Ratios** tab. She then selects the non-financial corporate sector for analysis and chooses market cap-weighted averages to aggregate the firm-level data up to the country level. Finally, she selects the return on assets in percent as the profitability measure and chooses to graph the series. She downloads the data by pushing the "Submit" button.



7. The screenshot below shows that the CVU downloads the return on assets in percent onto a separate sheet in Excel. Users can again minimize the CVU interactive window by hitting the "Minimize" button. They can download additional corporate health indicators, which will be downloaded onto separate sheets.



	A	B	C	D	E	F	G	H	I	J	K
1	COUNTRY	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
2	INDONESIA	11.28	15.35	13.63	6.89	9.70	15.51	12.67	13.06	16.32	14.30
3	KOREA (SOUTH)	6.60	8.16	4.32	2.55	5.14	7.25	8.33	6.26	8.52	7.99
4	MALAYSIA	11.87	11.38	11.58	8.36	6.35	7.33	4.79	7.35	6.89	8.51
5	SINGAPORE	8.10	7.89	12.89	12.80	10.70	10.98	11.32	5.43	4.87	6.45
6	TAIWAN	9.12	9.29	8.10	8.92	7.22	9.18	9.77	5.73	6.44	8.84
7	THAILAND	8.89	8.71	7.12	-10.18	9.57	5.40	7.18	8.92	10.08	12.19

Data Appendix

This appendix describes data sources for all indicators in the CVU. It also contains tables on the cut-offs used to eliminate outliers (Table I), on the number of firms in Datastream indices by country (Table 2), and on the sources for the riskfree rate used in the BSM calculation.

Data Coverage

- Number of firms (ACTIVE): number of firms for which fiscal-year-end market cap (WS 08001) and calendar-year-end market cap (DS Code: MV) are greater than zero.

- Market cap in millions of USD (TOTMV): total calendar-year-end market cap (DS Code: MV) for all firms in ACTIVE.

- Firm coverage in % of S&P Global Stock Markets Factbook (FIRM_R): ACTIVE in % of the number of firms in the Factbook by country.

- Market cap coverage in % of S&P Global Stock Markets Factbook (MK_R): TOTMV in % of market cap in the Factbook by country.

- Market cap in % of GDP (TOTMV_R): TOTMV in % of GDP from World Economic Outlook (Series Code: NGDP).

Accounting Ratios

Leverage

- Debt in % of equity (DE): Worldscope data item (WS 08231).

- Debt in % of assets (DA): Worldscope data item (WS 08236).

- Debt in % of sales (DS): total debt (WS 03255) divided by sales (WS 01001)×100.

- Debt in % of cashflow (TDCF): total debt (WS 03255) divided by cashflow (WS 04201) × 100.

- Short-term debt in % of total debt (STR): short-term debt and current portion of long-term debt (WS 03051) divided by total debt (WS 03255) × 100.

- Total liabilities in % of assets (TLTA): total liabilities (WS 03351) divided by total assets (WS 02999) × 100.

- Current liabilities in % of total liabilities (CLTL): current liabilities (WS 03101) divided by total liabilities (WS 03351) × 100.

- Current assets in % of total assets (CATA): current assets (WS 02201) divided by total assets (WS 02999) × 100.

Liquidity

- Current Ratio (CR): WorldScope data item (WS 08106).
- Quick Ratio (QR): WorldScope data item (WS 08101).
- Cashflow in % of sales (CM): cashflow (WS 04201) divided by sales (WS 01001) × 100.
- Interest coverage ratio (EE): Worldscope data item (WS 08291).
- Estimated average interest rate in % (AR): Worldscope data item (WS 08356).

Profitability

- Return on assets in % (RA): WorldScope data item (WS 08326).
- Return on equity in % (RE): WorldScope data item (WS 08371).

Valuation

- Price to earnings ratio (PC): Worldscope data item (WS 09104).
- Market to book ratio (BR): Worldscope data item (WS 09704).
- Tobin's Q (TQA): [fiscal-year-end market cap (WS 08001) + book value of total debt (WS 03255)] divided by total assets (WS 02999).

International Exposure

- Foreign sales in % of total sales (FS): Worldscope data item (WS 08731).
- Foreign assets in % of total assets (FA): WorldScope data item (WS 08736).
- Foreign income in % of total income (FI): WorldScope data item (WS 08741).

External Financing Indicators

The Rajan and Zingales (1998) Index

- The RZ index (RZ) is made up of five accounting variables: [CE – (CF + DF + DR + PI)] divided by CE × 100:

- Capital expenditures (CE): Worldscope data item (WS 04601), which represents funds used to acquire fixed assets other than those associated with acquisitions.

- Cashflow (CF): Worldscope data item (WS 04201).

- Decrease in inventories (DF): -1 × change in inventories (WS 02101).

- Decrease in receivables (DR): -1 × change in receivables (WS 02051).

- Increase in payables (IP): change in accounts payable (WS 03040).

The Kaplan and Zingales (1997) Index

- The KZ Index (KZ) is a weighted average of five accounting ratios: -1.002*CC + 0.283*TQA + 3.319*DP -39.368*DI -1.315*CP.

- Cashflow / Fixed Assets (CC): cashflow (WS 04201) divided by lagged net property, plant and equipment (WS 02501).

- Tobin's Q (TQA): [fiscal-year-end market cap (WS 08001) + book value of total debt (WS 03255)] divided by total assets (WS 02999).

- Debt / Total Capital (DP): total debt (WS 03255) divided by [total debt (WS 03255) + total common equity (WS 03501) + preferred stock (WS 03451)].

- Dividends / Fixed Assets (DI): [preferred dividends (WS 05401) + common dividends (WS 05376)] divided by lagged net property, plant and equipment (WS 02501).

- Cash / Fixed Assets (CP): cash and short-term investments (WS 02001) divided by lagged net property, plant and equipment (WS 02501).

Default Probabilities

The Altman (1968) Z-Score

- The Z-Score is a weighted average of five accounting ratios: 1.2 × Z1 + 1.4 × Z2 + 3.3 × Z3 + 0.6 × Z4 + 0.999 × Z5.

- Working Capital / Total Assets (Z1): working capital (WS 03151) divided by total assets (WS 02999). (WS 03151) is the difference between current assets and current liabilities.

- Retained earnings / Total Assets (Z2): retained earnings (WS 03495) divided by total assets (WS 02999). (WS 03495) is accumulated after tax earnings which have not been distributed as dividends to shareholders or allocated to a reserve account.

- EBIT/Total Assets (Z3): EBIT (WS 18191) divided by total assets (WS 02999). (WS 18191) is earnings before interest expense and income taxes by taking the pretax income and adding back interest expense on debt and subtracting interest capitalized.

- Market Value of Equity / Book Value of Total Liabilities (Z4): fiscal-year-end market cap (WS 08001) divided by total liabilities (WS 03351).

- Sales / Total Assets (Z5): sales (WS 01001) divided by total assets (WS 02999).

The Ohlson (1980) O-Score

- The O-Score is a weighted average of nine accounting variables: - 1.32 - 0.407 × O1 + 6.03 × O2 - 1.43 × O3 + 0.076 × O4 - 1.72 × O5 - 2.37 × O6 - 1.83 × O7 + 0.285 × O8 - 0.521 × O9.

- *log*(Total Assets / GDP deflator) (O1): *log*[total assets (WS 02999) divided by GDP deflator index (2000 = 100) obtained from World Economic Outlook (Series Code NGDP_D)].

- Total Liabilities / Total Assets (O2): total liabilities (WS 03351) divided by total assets (WS 02999).

- Working Capital / Total Assets (O3): working capital (WS 03151) divided by total assets (WS 02999).

- Current Liabilities / Current Assets (O4): current liabilities (WS 03101) divided by current assets (WS 02201).

- Dummy Variable (O5): one if total liabilities (WS 03351) > total assets (WS 02999), zero otherwise.

- Net Income / Total Assets (O6): net income (WS 01751) divided by total assets (WS 02999).

- Funds from Operations / Total Liabilities (O7): [pre-tax income (WS 01401) + depreciation and amortization expenses (WS 01151)] divided by total liabilities (WS 03351).

- Dummy Variable (O8): one when there have been two successive years when net income (WS 01751) < 0, zero otherwise.

- Net Income Growth (O9): [net income (WS 01751) – lagged net income (WS 01751)] / [net income (WS 01751) + lagged net income (WS 01751)].

The Black-Scholes-Merton (BSM) Default Probability

The BSM probability is calculated in Matlab using the Black-Scholes-Merton option pricing formulas. It uses as inputs the following WorldScope and Datastream variables:

- SD: short-term debt and current portion of long-term debt (WS 03051).

- LD: total debt (WS 03255) - short-term debt and current portion of long-term debt (WS 03051).

- IN: standard deviation of return on weekly price index (DS Code: PI) from Datastream, which is annualized by multiplying by sqrt(52).

- MK: fiscal-year-end market cap (WS 08001)

- CD: common dividends (WS 05376).

- ID: interest expense on debt (WS 01251).

- IR: riskfree rate, which is the interest rate on a financial instrument as similar as possible to the US three month Treasury Bill (see Table 3 in this appendix).

Table 1. Cut-Off Conditions for Outliers

Variable	Lower cut-off condition	Upper cut-off condition	Variable	Lower cut-off condition	Upper cut-off condition
AP	AP<0	.	O2	O2<0	.
AR	AR<0	AR>500	O3	.	.
BP	.	.	O4	O4<0	.
BP_US	.	.	O5	.	.
BR	BR<0	.	O6	.	.
BSM	BSM<0	BSM>100	O7	.	.
CA	CA<0	.	O8	.	.
CATA	CATA<0	CATA>100	O9	.	.
CC	.	.	OD	OD<0	OD>100
CD	CD<0	.	OS	.	.
CE	CE<0	.	PC	PC<-500	PC>500
CF	CF<0	.	PD	PD<0	.
CI	CI<0	.	PI	.	.
CL	CL<0	.	PM	PM<-5000	PM>5000
CLTL	CLTL<0	CLTL>100	PS	PS<0	.
CM	.	.	PT	.	.
CP	CP<0	.	QR	QR<0	QR>500
CR	CR<0	CR>500	RA	RA<-1000	RA>1000
D2	D2<0	.	RC	.	.
DA	DA<0	.	RE	RE<-1000	RE>1000
DC	DC<0	.	RZ	RZ<-5000	RZ>5000
DE	DE<0	.	SA	SA<0	.
DEN	.	.	SD	SD<0	.
DF	.	.	SS	SS<0	.
DI	DI<0	.	STR	STR<0	STR>100
DP	DP<0	.	TA	TA<0	.
DR	.	.	TD	TD<0	.
DS	DS<0	.	TDCF	TDCF<0	TDCF>10000
DTD	.	.	TE	TE<0	.
EA	EA<0	.	TI	TI<0	.
EE	EE<-5000	EE>5000	TL	TL<0	.
EQ	EQ<0	.	TLTA	TLTA<0	TLTA>1000
ET	.	.	TQA	TQA<0	TQA>100
FA	FA<0	FA>100	TR	TR<0	.
FD	.	.	VOL	.	.
FI	FI<0	FI>100	WC	.	.
FS	FS<0	FS>100	XP	XP<0	.
ID	ID<0	.	Z1	.	.
IN	IN<0	.	Z2	Z2<0	.
KZ	KZ<-1000	KZ>1000	Z3	.	.
LD	.	.	Z4	Z4<0	.
MK	MK<=0	.	Z5	Z5<0	.
MV	MV<=0	.	ZD	ZD<0	ZD>100
NI	.	.	ZS	.	.
O1	.	.			

Table 2. Number of Stocks for Datastream Global Equity Indices

Country	Approximate No. of Stocks	Base date
Argentina	50	Jan 1988
Australia	160	Jan 1973
Austria	50	Jan 1973
Belgium	90	Jan 1973
Brazil	100	July 1994
Canada	250	Jan 1973
Chile	50	Jul 1989
China	100	Sept 1991
Colombia	50	Jan 1992
Czech Republic	50	Nov 1993
Denmark	50	Jan 1973
Finland	50	Mar 1988
France	250	Jan 1973
Germany	250	Jan 1973
Greece	50	Jan 1988
Hungary	50	June 1991
Hong Kong	130	Jan 1973
India	100	Jan 1990
Indonesia	50	Apr 1990
Ireland	50	Jan 1973
Israel	50	Jan 1992
Italy	160	Jan 1973
Japan	1000	Jan 1973
Korea	100	Jan 1987
Luxembourg	35	Feb 1992
Malaysia	90	Jan 1986
Mexico	90	Jan 1988
Netherlands	130	Jan 1973
New Zealand	50	Jan 1988
Norway	50	Jan 1980
Pakistan	50	Dec 1996
Philippines	50	Sep 1987
Peru	50	Jan 1994
Poland	50	Mar 1994
Portugal	50	Jan 1990
Romania	50	Dec 1996
Russia	50	June 1994
Singapore	100	Jan 1973
South Africa	70	Jan 1973
Spain	120	Jan 1986
Sri Lanka	50	June 1987
Sweden	70	Jan 1982
Switzerland	150	Jan 1973
Taiwan	70	Sep 1987
Thailand	50	Jan 1987
Turkey	50	Jan 1988
UK	550	Jan 1965
US	1000	Jan 1973
Venezuela	20	Jan 1990

Table 3. Sources for Riskfree Rate

Country	Main Source	Alternative Source
ARGENTINA	DX: WALR PC 30 DAY MINIMUM	
AUSTRALIA	For 1990-1992: EDSS: 19361TB.ZB...	For 1993-2004: EDSS: 19361.A..XI...
AUSTRIA	DS: ASVIB3M	
BELGIUM	EDSS: 12460C..ZF...	
BRAZIL	For 1990-1994: DS: BROVERN	For 1995-2004: EDSS: 22360C..ZF...
CANADA	DS: CDN3MTB	
CHILE*	Before July 1997: DX: 90 DAY PRBC	For July 1997 and thereafter: DX: 90 DAY PDBC
CHINA	DS: CHDIS3M	
COLOMBIA	DS: CBFTDEP	
CZECH REPUBLIC	EDSS: 93560C..ZF...	
DENMARK	DS: DNREPOR	
EGYPT	EDSS: 46960C..ZF...	
FINLAND	DS: FNIBC3M	
FRANCE	For 1990-2000: EDSS: 13260C..ZF...	For 2000-2004: DS: BBFRF3M
GERMANY	EDSS: 13460C..ZF...	
GHANA	EDSS: 65260C..ZF...	
GREECE	EDSS: 17460C..ZF...	
HONG KONG	EDSS: 53260C..ZF...	
HUNGARY	EDSS: 94460C..ZF...	
INDIA	For 1990-1992: EDSS: 53460B..ZI...	For 1993-2004: DS: INTB91D
INDONESIA	DS: IDSB90	
IRELAND	DS: EIRED3M	
ISRAEL	EDSS: 43660C..ZF...	
ITALY	EDSS: 13660C..ZF...	
JAPAN	DS: JPGBD3M	
KOREA (SOUTH)	DS: KOCD91D	
LUXEMBOURG	EDSS: 12460C..ZF...	
MALAYSIA	DS: MYIBK3M	
MEXICO	EDSS: 27360C..ZF...	
MOROCCO	DS: MDDEP3M	
NETHERLANDS	DS: HOLIB3M	
NEW ZEALAND	DS: NZTBL3M	
NORWAY	DS: NWIBK3M	
PAKISTAN	EDSS: 56460B..ZI...	
PERU	For 1990-2000: EDSS: 29360L..ZB...	For 2000-2004: DS: PSDP180
PHILIPPINES	EDSS: 56660..ZF...	
POLAND	For 1990-2000: EDSS: 96460C..ZF...	For 2000-2004: DS: POIBK6M
PORTUGAL	For 1990-1993: EDSS: 18260C..ZF...	For 1994-2004: DS: BPPTE3M
RUSSIAN FEDERATION	DS: RSIBK90	
SINGAPORE	DS: SNGTB3M	
SLOVAKIA	DS: SXIBK3M	
SLOVENIA	EDSS: 96160C..ZF...	
SOUTH AFRICA	EDSS: 19960C..ZF...	
SPAIN	EDSS: 18460C..ZF...	
SRI LANKA	DS: SRTBL3M	
SWEDEN	Except 2001: EDSS: 14460C..ZI...	For 2001 only: EDSS: 14460CBAZB...
SWITZERLAND	EDSS: 14660C..ZF...	
TAIWAN	DS: TAMM90D	
THAILAND	For 1990-1993: EDSS: 57860L..ZI...	For 1994-2004: DS: THBTRP3
TURKEY	EDSS: 18660LC.ZB...	
UNITED KINGDOM	EDSS: 11260C..ZI...	
UNITED STATES	DS: USTBL3M	
VENEZUELA	DS: VEN30DP	
ZIMBABWE	EDSS: 69860C..ZF..	

*Chile's yearly numbers are the simple means of its monthly figures.
**EDSS refers to IMF's Economic Data Sharing System, DS stands for Datastream from Datastream International Limited, and DX is a time series system from EconData Pty Ltd.