

# CORPORATE FINANCIAL STRUCTURE AND FINANCIAL STABILITY

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**Abstract:** Drawing on a unique dataset of flow-of funds and balance sheet data, this paper analyzes the impact of financial crises on aggregate corporate financing and expenditure in a range of countries. Investment and inventory contractions are the main contributors to lower GDP growth after crises, with a much greater effect in emerging market countries. The debt-equity ratio is correlated with investment and inventory declines following crises. Econometric analysis suggests that financial crises have a greater impact on expenditure and the financing of corporate sectors in emerging markets than in industrial countries. Industrial countries appear to benefit from a pick-up in bond issuance in the wake of banking crises. Although companies in emerging market countries hold more precautionary liquidity, this is evidently not sufficient to prevent greater amplitude of response of expenditure to shocks.

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## INTRODUCTION

This paper examines how corporate financial structure shapes the impact of a financial crisis on the real sector via its effects on flows of funds and on corporate real expenditures. It is one of the first papers to utilize extensive cross-country flow and balance sheet data and also to examine subcomponents of GDP in the wake of banking and currency crises rather than purely focusing on aggregate GDP.

The analysis of this paper compares and contrasts corporate financing and expenditure patterns during periods of financial crisis in OECD and emerging market (EME) countries. The implications of corporate financial structure for financial fragility are measured here empirically by examining shifts in the size and composition of financial flows and expenditures by the corporate sector during a crisis, controlling for normal shifts in financing or expenditures that take place over the cycle.

The analysis suggests that investment and inventory contractions are the main contributors to lower GDP growth after crises and the effect is much greater in emerging market countries. There is a marked correlation of the debt-equity ratio to investment and inventory declines following crises. Financial crises have a greater and more consistently negative impact on corporate sectors in emerging markets than in industrial countries, although even in the latter the impact is not negligible. Industrial countries benefit from the existence of multiple channels of intermediation in that bond issuance is shown to pick up in the wake of banking crises.

The paper is structured as follows: Section 1 comprises a review of the relevant theoretical and empirical literature and suggests some testable hypotheses drawn from that literature; Section 2 outlines the data, and illustrates broad corporate financing patterns; Sections 3 and 4 provide empirical analysis of corporate expenditures and financial flows during financial turbulence; and Section 5 concludes. Inter alia it is suggested that the implications of financial structure for the impact of a crisis on the corporate sector, and thereby real output, strengthen the case for financial sector reforms and surveillance of the financial sector by governments and international financial institutions.

### 1 LITERATURE REVIEW

This paper draws from several disparate financial and economic literatures, beginning with the *general determinants of corporate financial structure*. The first modern theory of the general determinants of corporate financial structure was the proof by Modigliani and Miller (1958) that under simplifying assumptions the balance sheet structure of a firm is irrelevant to the cost of capital. However, introducing differential microeconomic costs of bankruptcy between equity holders and debt holders stimulates firms to issue only equity. Conversely, the tax deductibility of interest payments encourages debt finance, with firms consequently absorbing “unnecessary” levels of business cycle risk and raising the risk of default (Gertler and Hubbard 1989).

The understanding of corporate balance sheet structure was further refined by the introduction of asymmetric information and consequent adverse selection and moral hazard in the context of incomplete contracts. The availability of internal financing may thus impact on real decisions (Fazzari, Hubbard, and Petersen 1988) as firms prefer to—or are constrained to—finance themselves by internal rather than external funds. Internal funds are more plentiful for

large and established firms than in small and new firms, where the latter may be more typical of emerging market countries. A corollary is that financial systems that cope better with agency costs will supply more external financing, *ceteris paribus*.

The *literature on economic and financial development* provided insights into the different corporate financial structures of industrial and emerging market countries. King and Levine (1993) found that financial variables have a strong relation to capital accumulation, economic growth and productivity growth. Levine and Zervos (1998) concluded that stock market liquidity (but not size, international integration or volatility) as well as banking development was related to growth. An implication of this and related papers is that the overall development of financial services is important to growth and not its bias to bank or market financing.

Financial systems seem to go through *stages of development* in which corporate sources of financing are mainly: (i) internal, (ii) banks due to information collection efficiencies, (iii) equity issuance for more diversity, and (iv) bonds when information collection costs become sufficiently low. Demirguc-Kunt and Levine (2000) showed that banks, nonbanks and stock markets are larger, more active and more efficient in richer countries, although Rajan and Zingales (2000) show financial development has not been monotonic over a long time horizon. Furthermore, in OECD countries, stock markets become more active and efficient relative to banks, and there is some tendency for financial systems to become more market oriented as they become richer. The legal system also helps shape the weight of bank versus nonbank financing. Rajan and Zingales (1998) found a link from financial development to growth via dependence of industries most dependent in external finance. Levine (2000) found little evidence that a bank-based system is “better” for overall economic performance.

The “financial accelerator” and “credit channel” approaches to business cycles help set the stage for recent theories for the role of the corporate sector in financial crises. The financial accelerator is the procyclicality of borrower net worth due to adverse selection and information asymmetries which amplifies the impact on the economy of changes in the stance of monetary policy by increasing risk premia (Bernanke and Gertler 1995). An indicator of this “financial accelerator” which applies to debt in general is the debt-equity ratio. Other work on the related “credit channel” has focused on bank credit *per se*, implying a relevance for the bank loan/debt ratio (Gertler and Gilchrist 1994, 1992).

This paper also draws from the theories of financial crisis and their application to corporate financial structure. Corporate financial structure had little or no role in the early theoretical crisis literature which began with “first generation” currency crisis models stressing government debt (Krugman, 1979), and “second generation” models (Obstfeld 1994), which took into account a broader government’s objective function. The introduction of banks into more recent models allowed them to cover patterns of liquidity and foreign currency denominated debt (Velasco, 1987; Mishkin, 1997; and Goldfajn and Valdes, 1995). The relatively recent foreign exchange liquidity approach explicitly addresses joint currency and bank crisis dynamics arising from a shortfall of foreign exchange liquidity, including to the corporate sector (Chang and Velasco, 1999).

Many of the more recent theoretical models of crises are rooted in problems associated with the collateral that backs up corporate borrowing. Gertler, Gilchrist and Natalucci (2000), show that *microeconomic rigidities* can amplify corporate balance sheet channels in an open economy framework. The collateral approach has been extended based on more recent

theoretical models that stress *macroeconomic rigidities* in the form of underdeveloped domestic financial sectors and fragile corporate and financial sector balance sheets. Kiyotaki and Moore, (1997). The dynamic interaction between credit limits and asset prices is a powerful transmission mechanism by which the effects of shocks persist, amplify, and spill over to other sectors. Caballero and Krishnamurthy (1999 and 2000) extend the Kiyotaki/Moore model to use shortfalls of the collateral that is necessary to get domestic and international financing to explain crisis vulnerability. These shortfalls are rooted in weak governance and legal systems. Kim and Stone (1999) model a similar emphasis on wasteful capital sales owing to a drop in collateral value.

The role of *financial breadth*, or the availability of a broad range of financing alternatives to the corporate sector, is generally recognized as helping limit the impact of a crisis on the real sector, but is only beginning to attract theoretical and empirical analysis. The large output contraction caused by the recent Asian crisis has been attributed in part to the lack of nonbank financing alternatives (Chatu Mongol 2000), whereas nonbank financing helped limit the impact of the slowdown of American bank lending in 1990 that resulted from a collapse in the value of real estate collateral (Greenspan, 1999). Using data from the US, UK, Japan and Canada, Davis (2001) concluded that the existence of active securities markets alongside banks (“multiple avenues of intermediation”) is beneficial to the stability of corporate financing, both during cyclical downturns and during banking and securities market crises. These benefits increase in the similarity of the size of securities market and intermediated financing, and in the proportion of companies with access to both loan and securities markets.

This paper is an extension of the small literature on corporate financial structure and *post-crisis output contractions* which we extend to cover disaggregated output and financial flow and balance sheet variables. Bordo et al. (2000) examined output contractions over the past 120 years and concluded that the probability of crisis has increased but intensity has not. They attribute the increased probability to capital mobility and financial safety nets. Hoggarth and Sapporta (2001) explore a variety of measures of output losses, including measures based on benchmarks of pre-crisis trend growth, a forecast based on the absence of a crisis, and comparison with similar countries that did not experience a crisis. Stone (2000) looked at the impact of financial crises on output via the corporate sector and concluded that crisis-induced output contractions are associated with high levels of corporate debt, openness, and exchange rate over-appreciation. Stone and Weeks (2001) found that output contractions are driven by the degree of cut-off of private capital inflows, corporate balance sheet indicators, and to a lesser extent imports to GDP and financial breadth.

Reflecting such conclusions, the role of private sector balance sheet indicators has been stressed more recently in analysis of crisis prevention. In their estimate of a monthly “early warning system” Mulder et al. (2001) found that the corporate indicators of leveraged financing, short-term debt to working capital and shareholders rights help predict crises. Davis (1995) used flow of funds data to look at pre and post-crisis changes in corporate balance sheets for industrial countries.

## 2 DATA

This paper utilises a new cross-country data set of aggregate corporate sector financial data, details of which are available from the authors on request. Flow of funds, corporate asset and liability stock data are available for all the G-7 countries and ten small industrial countries. Flow of funds data are available for five emerging market countries (Czech Republic, India,

Korea, South Africa, and Thailand) and balance sheets for four (Croatia, Czech Republic, Israel and Korea). There are hence no Latin American countries in the sample. The time intervals for the data vary considerably, with data available for most G-7 and emerging market countries since the 1970s, but only in the 1990s for most of the smaller industrial economies. The sectoral concept is the non financial corporate sector. Total corporate liabilities for both stocks and flows were organized into: (i) loans, (ii) bonds, (iii) equities, (iv) trade credit, and (v) a residual “other” category for some countries. In addition, liquid assets are reported. The aggregate flow data are likely to be more directly comparable than stock data, where there remains a risk that valuation conventions may differ.

The literature suggests a few priors for cross-country patterns in corporate financial structure data. The size of corporate sector balance sheets can be expected to be greater for industrial countries owing to their larger and more developed financial sectors. The corporate sectors of emerging market countries are expected to borrow more, especially from banks, since firms are on average at an earlier stage of development with less internal cash generation relative to investment needs, while securities markets are less developed. In addition, emerging market corporate sectors are expected to maintain higher levels of liquidity to offset their greater vulnerability to shocks.

## 2.1 Stock data<sup>2</sup>

The size of the corporate sector balance sheet tends to be highest for G-7 countries and lowest for emerging market countries, although there is a fairly wide range across countries (Table 1). The country groups that are larger and more developed have bigger financial sectors and thus larger corporate sector balance sheets. This pattern holds notwithstanding the combination of bank- and market-related financial systems included in each sub-group. In other words, the size of corporate balance sheets appears to be determined more by level of development than by whether a country has a bank-based or market-based financial system.

The share of corporate liabilities accounted for by loans is decreasing in the level of economic development, also as expected. G-7 countries have about 20 percent of liabilities as bank loans, versus around 30 percent for the small industrial and emerging market countries. As countries develop they move away from bank financing and toward securities (and internal financing which boosts equity values), again despite the mix of bank and market-based financial systems.

The share of trade credit is also decreasing in the level of economic development. Trade credit accounts for 6 and 8 percent of G-7 and small and medium industrial country corporate liabilities and about 20 percent of liabilities for the three emerging market countries with available data. This pattern may reflect the importance of supplier credits for countries with less sophisticated financial markets. In emerging market countries suppliers may have more scope to reduce asymmetric information and exert corporate control more readily than banks.

G-7 country balance sheets are dominated by securities (bonds and equities) relative to small industrial countries and emerging market countries. Besides financial development per se, this seems to reflect the development of nonbank financial markets in larger countries which enjoy

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<sup>2</sup> In Davis and Stone (2004) we show extensive individual country data on a time-series as well as a cross-sectional basis.

economies of scale. The surprisingly high share of bond financing for emerging market countries is due to the large share of financing in Korea, which dominates the small sample.

Perhaps surprisingly, emerging market countries are not markedly more highly leveraged than other countries. The debt-equity ratio (at market value) is the most common indicator of corporate leverage. The debt-equity is marginally higher for the smaller industrial countries vis-à-vis the G-7, and somewhat higher for the emerging market countries, although this is largely due to Korea.

Total corporate debt to GDP is highest for small industrial countries. The relatively high level of loans incurred by small industrial country corporate sectors outweighs their relatively low level of outstanding bonds. The debt to GDP of the three emerging market countries covers a wide range.

Emerging market corporate sectors are the most liquid while G-7 country corporate sectors are the least liquid. The lower level of liquidity for the G-7 would appear to reflect their access to external financing in the event of a shock, which allows them to maintain lower levels of precautionary liquidity.

## **2.2 Flow data**

The flow data capture the sources of financing for corporate sectors across the country groups and in many cases over an extended time period. The net financing/GDP ratio gauges the change in the net financial position of the aggregate corporate sector, which is equivalent to its net cash flow. Typically, corporations are net borrowers because of large investment needs relative to revenue, so that they operate with negative net financing. Gross financing/GDP measures the overall access of the corporate sector to outside financing, which may be broken down into components of bank lending, equity financing, bond financing and trade credit. Liquidity accumulation is simply the change in the liquid asset position of the corporate sector. Period averages are used owing to the volatility of flows for individual years. Cross-section data for in most cases 1995–99 indicate how corporate financing patterns differ across countries. Of course, the data will also reflect country specific shocks.

As expected, almost all sectors operate with a negative net financing/GDP flow, especially in the emerging market countries (Table 2). Gross financing flows vary considerably; again, the emerging market countries seem to have the highest levels of gross financing, as expected.

Bonds and equities account for most G-7 corporate financing, reflecting their more sophisticated financial systems. The surprisingly large share of bond financing for the emerging market countries can be attributed to the sharp growth in the bond markets of Korea and Thailand after the 1997–98 crisis.

Liquidity accumulation is lowest for the G-7 countries and highest for the emerging market countries, presumably owing to the relatively higher vulnerability of the latter to financial shocks, especially during the late 1990s.

## **2.3 Financial crises**

The financial crises in this paper encompass bank and currency crises. The source is Eichengreen and Bordo (2002), who define financial crises for a large group of industrial and

emerging market countries. In their work, currency crises entail a forced change in parity, abandonment of a pegged exchange rate, or an international rescue. Banking crises involve bank runs, widespread bank failures and the suspension of convertibility of deposits into currency, or significant banking sector problems that result in the erosion of most or all of banking system collateral. For the 29 countries in this study, 59 crisis episodes occurred during 1977–99 (Table 3), including 18 banking crises and four twin bank-currency crises. Emerging market countries accounted for 17 of the crises, and 23 of the crises occurred during the 1990s. Corporate balance sheet data are available for 41 of the 59 episodes. For currency crises, cross-checks on the Bordo/Eichengreen list were made with Aziz et al. (2000), and for banking crises with Caprio and Klingebiel (1996), extended in each case by Stone and Weeks (2001). The resulting lists of crises were virtually identical.

### **3 CORPORATE FINANCIAL STRUCTURE AND FINANCIAL STABILITY—DESCRIPTIVE ANALYSIS**

This section describes the impact of a crisis on the level and composition of GDP and the relationship between this impact and corporate financial structure. The analysis is based on 59 banking crisis and currency crisis although the number of crises used in the succeeding econometric analysis is often smaller due to data availability.

#### **3.1 Crises and the level and composition of GDP**

We first analyse the impact of crises on the level and composition of GDP, to shed light on how corporate financial structure shapes the level and composition of changes in GDP triggered by a systemic financial crisis. As noted in Section 1 above, most of the post-crisis output contraction literature focuses on the response of the aggregate level of GDP. The data for real GDP and its components are expressed in terms of contributions to deviations of growth from trend, rather than as growth per se. The use of growth for cross-country comparisons of crisis severity would be distorted by different levels of country trend growth. (Hoggarth and Sapporta 2001). Deviation of growth from trend was calculated as follows:

- (i) Data for real GDP and its components was retrieved from the IMF’s World Economic Outlook database and in some cases adjusted to ensure that the components added up to the total;
- (ii) The data was transformed into the contribution to growth of each component;
- (iii) The deviation of the contribution to growth of each component was calculated as the difference between the contribution to growth of each component for each year less the average contribution of the five preceding years, the year of the crisis and the five following years, and
- (iv) The effect of the crisis on GDP was calculated as the sum of the deviation of the contribution to growth for crisis year  $t$  and year  $t+1$ .

Note that step (iii) corrects for growth in excess of trend in the years preceding the crisis, at a cost of including the crisis itself in the calculation of trend growth. Data for real GDP and its components are available for 14 emerging market countries and 24 industrial countries, with 37 currency crises and 18 banking crises, with 3 of these being twin crises.

The response to crises of both kinds is a decline in GDP. The unweighted average is a 1.5 percent fall in GDP, and the median is one percent, suggesting a degree of skewness with a few very serious crises and a number of mild ones. Financial crises have a bigger impact on the real sector of emerging market countries compared to industrial countries (Table 4). The average (median) negative deviation of real GDP growth from trend is 3.2 (3.3) percent for emerging market compared to just 0.9 (0.2) percent for industrial countries.

The range of post-crisis output responses is quite wide. As shown in Davis and Stone (2004) Appendix 1, emerging market country crisis GDP output changes range from -13 percent (Korean and Thailand in the late 1990s) to 4 percent (South Africa in 1995). Interestingly, the range for industrial countries is even wider largely due to an outlier for Japan in 1979. Domestic demand bears the brunt in these crisis-induced recessions for both groups of countries. Indeed, on average foreign demand (exports less imports) positively contributes to growth, probably because the trade balance must shift in a positive direction to offset the sudden cessation of capital inflows that often triggers the crisis.

The contribution to GDP of the change in public sector demand following the crises (the sum of public sector consumption and investment) is broadly neutral for both groups of countries. The signs of the average and median contribution to growth of the public sector are negative for the emerging market countries—perhaps owing to a larger decline in revenues from the impact on growth and lesser ability to expand borrowing given lower creditworthiness of the government.

The post-crisis change in real GDP is dominated by the contribution of private domestic demand. The contraction in private demand for the emerging market countries is some 5.6 percent of GDP compared to 2 percent for industrial countries. Private investment explains the bulk of the contraction for the limited number of observations available for the emerging market countries as well as for the industrial countries.<sup>3</sup> The range of the contribution of investment to growth after a crisis is a wide 10 percent for both groups of countries.

Inventory decumulation is also an important drag on economic activity in the wake of a financial crisis for the emerging market countries. The change in inventory contributes negatively to growth for 11 of the 14 emerging country crisis episodes for an average (median) of -1.1 percent (-0.1 percent) of GDP. Inventory changes are on average negative for the industrial countries, but the average is rather small and the median is zero. Meanwhile, consumption is surprisingly robust in the wake of the crises. For emerging market countries the decline is equivalent to 1.3 percent of GDP on average, while in OECD countries it is 0.5 percent. Consumers may seek to draw on saving to sustain consumption and labor income is typically more stable than profits.

Banking crises have a more severe impact on GDP than currency crises. The average fall in GDP for both OECD and EME countries is 3.1 percent for banking crises<sup>4</sup> compared with 1.1 percent for currency crises. The relative magnitude of the contributions is similar to those discussed above, with a particularly important negative effect from domestic demand, and

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<sup>3</sup> Private investment data that is comparable across countries are not available for several of the emerging market countries prior to the 1990s.

<sup>4</sup> We note that this figure for output losses is lower than those typically found by Hoggarth and Sapporta (2001). Reasons could include that we are only looking at the first 2 years, when crises may last 4 years or more; we have a different sample excluding Latin America, and our method of detrending which includes both the pre crisis boom and the post crisis slump in our estimate of trend growth reduces the estimated impact.

therein private investment and inventories. Public demand rises in the wake of banking crises while it contracts slightly after currency crises. The net foreign balance rises much more strongly after banking crises, giving a partial offset to the contraction generated by private domestic demand. The impact of banking crises on GDP seem to be more homogenous and normally distributed than that of currency crises.

### 3.2 Crises and corporate financial structure

The change in the composition of GDP growth induced by a financial crisis raises several important questions regarding corporate financial structure. Post-crisis contractions in GDP are dominated by a downward shift in private domestic demand, which in turn is explained mostly by declines in investment and inventory decumulation. Given that most private investment is financed by corporate liabilities, an important question is whether there are cross-country differences in corporate financial structure shown in Section 2 that could help explain the wide range in the severity of crisis-induced recessions.

We calculated correlations between key balance sheet measures of the corporate financial structure and GDP contractions and its key components. Large corporate liabilities do not in and of themselves induce large crisis-induced declines in output. Regressions of the corporate liabilities to GDP ratio on overall contraction in GDP growth, contributions of private fixed investment, or of inventory investment do not suggest a strong negative relationship. This result may not be surprising since the size of balance sheets is largest in the most stable economies of the G-7.

In contrast, corporate leverage does correspond to larger GDP declines. The simple correlation coefficient between the GDP contraction itself and the aggregate debt-equity ratio is a weak -0.22. However, the correlation between debt-equity ratio and the deviation from the trend contribution to GDP of private fixed investment across the crises is -0.47, and the correlation between inventory accumulation and the debt-equity ratio is -0.42. On the other hand, GDP declines do not exhibit strong correlations with corporate liquidity or the loan to liability ratio.

We next examined the average change in financial flows as a proportion of GDP during the year of the crisis, to give an idea of the financing changes which underlie the expenditure shifts by the corporate sector. Note that since flow/GDP data are not likely to be trended, they do not require to be measured relative to trend as is the case for GDP components—but bear in mind that there could be adjustment for “normal” cyclical changes that might have occurred (we address this issue in the econometric results in Section 4).

Post-crisis changes in financial flows are bigger for emerging market countries and for bank crises (Table 5). For the 27 crises for which the flow data are available, the average fall in external finance was equivalent to -0.6 percent of GDP, with the bulk being from bank loans (-0.5 percent). Liquidity also fell markedly, by -0.7 percent of GDP on average. There are slight declines in equity issues and trade credit while bond issues rise.

There are interesting contrasts between the OECD and emerging market economies. The fall in external finance is much greater for the latter, at -1.4 percent of GDP, which is wholly accounted for by bank lending. There is also a very sharp fall in liquidity of -1.6 percent of GDP for emerging market countries and a -1 percent of GDP fall in trade credit. In contrast, OECD countries have on average only slight falls in external finance, largely due to equity

issues, and a sharp rise of 0.5 percent of GDP in trade credit. These results suggest that the much greater vulnerability of emerging market countries to financial instability. OECD countries' corporate sectors on average are not required to draw heavily on liquidity while trade credit performs an interesting stabilizing function.

For banking crises, results are similar in sign for OECD countries and emerging market countries, but different in magnitude. In each case there is a fall in total external financing; the fall is on average -2 percent of GDP, but with only -0.5 percent for the OECD and no less than -3.4 percent for emerging market countries. The fall is more than accounted for by the decline in bank lending which is -2.2 percent on average, -0.6 percent in the OECD and -4.3 percent in emerging market countries. On the other hand, there is everywhere a rise in bond issuance of 0.3 percent of GDP, showing the benefits of "multiple avenues of intermediation." Liquidity shrinks in each case. There are some contrasts for equity issues, which fall in OECD countries but rise in emerging market countries, while trade credit rises in the OECD and falls for emerging market countries. Again, trade credit is stabilizing in the OECD, substituting to some extent for bank credit.

Looking finally at currency crises, these are clearly far more serious in terms of financing for emerging market countries—in OECD countries, total external financing rose in the year of crisis. In emerging market countries, external financing falls -1.8 percent of GDP in the crisis year, corresponding to declines in all subcomponents—bank lending, bond issuance and equity issuance—as well as trade credit and liquidity. This pattern may reflect inter alia the common withdrawal of foreign bank finance in the wake of EME currency crises.

Direct comparison of these data with the expenditure components in Table 4 is not possible, since the expenditures are defined relative to trend GDP growth. However, given that for both OECD countries and emerging market countries, trend growth is positive, it can be suggested that the falls in external finance as well as trade credit and liquidity may account for a substantial part of the fall in corporate expenditures. This is notably the case for the emerging market countries, where falls in investment of over 4 percent relative to trend could be accounted for largely by a 1.4 percent fall in external finance/GDP.

#### **4 CORPORATE FINANCIAL STRUCTURE AND FINANCIAL STABILITY—ECONOMETRIC ANALYSIS**

The econometric work is in two main parts. First, we estimate equations for fixed investment and inventory accumulation, the key corporate-expenditure components of GDP. In each case, we tested for the significance of dummies for currency and banking crises as shown in Table 3. Second, we test for effects of crises on corporate sector flow of funds variables. We made estimates for the full sample of countries and data for which information was available, before focusing more closely on emerging market economies and OECD countries, respectively.

Normal cyclical relationships in the variables of interest are estimated before testing whether crises had additional effects. This approach distinguishes crisis effects from cyclical or policy-induced changes that would occur in the absence of the crisis. The estimates were made using a cross-section weighted generalized least squares (GLS) unbalanced panel, with fixed effects for each country and cross section weights. The fixed effects should deal with the inevitable heterogeneity between countries in the panel, in terms of levels of the variables concerned. The standard errors are White heteroskedasticity-consistent.

## 4.1 Corporate expenditure

### 4.1.1 Private fixed investment

Private fixed investment is a broader concept than business investment, as it includes also residential investment. However, since the latter is typically undertaken largely by construction companies, and its variability is considered to be an important effect of financial crises, we considered this aggregation an appropriate one. Note that only this breakdown is available for several emerging market economies.

Our preferred specification is one with the valuation ratio as a key independent variable. As discussed in Ashworth and Davis (2001), Tobin (1969) and Brainard and Tobin (1968) maintain that investment should be an increasing function of the ratio of the capitalised financial value of the firm relative to the replacement (purchase) cost of the unit of capital. The key variable is *marginal q*, the ratio of the future marginal returns on investment relative to the current marginal costs of investment. *Marginal q* is unobservable; however, when the production and adjustment cost functions adhere to certain homogeneity conditions (implying inter alia that there is no market power) then marginal and *average q* are equal. Therefore, in line with other empirical researchers we have included measures of *average q* as the corporate equity stock at market value divided by the replacement cost of the capital stock (logged and lagged) in the investment equation. Other variables included are the growth in income (as an “accelerator”) and lagged growth in investment, to allow for dynamics, as well as a lagged ratio of investment to output as an error correction term.

The results suggest that financial crises have an independent and significant impact on investment (Table 6). Results were generated for OECD countries, and for OECD countries together with the only two emerging market countries for which equity and capital stocks data were available. All the variables are significant at 95 percent with the expected signs and magnitudes. Investment is highly sensitive to output, with a first period elasticity of 2.3. Fourteen percent of the disequilibrium between output and investment is removed each year. A one percent rise in *q* leads to a 1.1 percent rise in the level of investment in the long term. The banking and currency crisis dummies were entered as a lag since gestation lags in investment mean changes in plans take time to come to fruition. They both have a significant effect on investment, with an average impact of around 3 percent (for all countries) and 2 percent (for OECD countries—although in the basic equation the banking crisis dummy was not significant).

The debt-equity ratio (the balance sheet channel) and the bank loan stock/total debt ratio (the credit channel) were both tested. In practice, the latter was dominant. A rise in bank debt as a share of the total has a significant positive effect on investment, consistent with the “specialness” of bank credit. Since there are fixed effects, we are not merely capturing cross-country differences. In the presence of bank debt, the entire crisis effects are significant, and somewhat larger (3-4 percent). A final experiment with these equations was to test for additional interaction effects between the credit channel and the crises. If there is already a high proportion of bank credit in total debt, does a subsequent crisis have greater or lesser impact? There is tentative evidence that a banking crisis has a worse effect in this case, although the result only comes through for the panel including two emerging market countries.

We estimated an alternative investment specification that would enable us to use the EME countries as a separate group given the data limitations for balance sheet variables. The specification is based on the neo-classical model first proposed by Jorgensen (1963), where the simple accelerator model is augmented to include the effects of relative price variables, specifically a proxy for the user cost of capital. By assuming either that net investment is determined as a distributed lag process of changes in the desired capital stock, or that there are explicit costs of adjustment, a specification is suggested where investment depends on distributed lags of output and itself, as well as a cost of capital term. Consistent with Bean (1981), we again include one long-run term ensuring homogeneity between investment and output as implied by the CES production function.

Results are shown in Table 7. Here our full sample of 517 observations can be used rather than 258 for the Tobin specification. Note that we have used the simplest possible cost of capital variable, which is the nominal money market rate. In many of these countries, long-term bonds are not in existence. The bank and currency crisis effects are both significant and negative for the full panel and for the OECD countries, while for the emerging market countries it is the banking crisis effect that is significant. Again, the key variables are significant and correctly signed. We have both a long and a short run negative effect from the cost of capital, along with dynamic and error correction terms similar to those in the Tobin specification. The effect of a banking crisis on investment is much greater in emerging market countries, with a 7.3 percent fall instead of around 2 percent in the OECD countries (the OECD effect is itself comparable to that in the Tobin equation, despite an additional 200 observations).

In the Jorgensen framework, the results indicated an impact of a high debt-equity ratio on investment. Here, many observations are lost, with the sample comprising mainly OECD countries. The debt-equity ratio had a significant negative effect on investment over the full sample, but also interaction terms with the bank and currency crisis dummies were significant. A higher debt-equity ratio at the onset of a crisis significantly worsens the impact on investment in each case, suggesting a greater impact on constrained firms during the crisis.

We also investigated the bank lending to total debt ratio as above. It was again significant in itself but not interacting with the dummies. When we entered both together, the debt-equity ratio and its interaction terms remained significant while the bank-lending ratio became significant for banking crises only. We also attempted to estimate the equation with the flow variables total external finance to GDP and bank lending to GDP, but neither they themselves nor their interactions with the dummies were significant. Note that the consistent effect of the crises across the differing country groups as well as the differing specifications (of the investment function and the leveraged dummy variables) are an important robustness check that gives confidence in the results.

#### **4.1.2 Inventories**

Next, we estimated a simple inventory adjustment function, where the dependent variable is the change in inventories as a proportion of GDP (Table 8). The independent variables are a lagged dependent variable and terms in GDP growth, the change in the interest rate (showing monetary tightening) and the level of the interest rate. The coefficients indicate that more rapid growth increases inventory accumulation, and there is also a lagged effect (a positive or negative adjustment tends to take several years to complete). The interest rate effects are positive. While this may seem surprising, it is consistent with the results of Christiano et al.

(1996) who found that after a monetary tightening, net funds raised increase for a year or so, and attributed this to inability to cut expenditures immediately, with inventories building-up being a case in point.

As regards crisis effects, the aggregate and OECD equations suggest that there is a positive effect of a banking crisis on inventories (as shown in Table 4, the median response is zero). This may be consistent with the immediate impact of a crisis being on aggregate activity, which leads to involuntary inventory accumulation. Note however, that in emerging market countries there is an immediate negative effect, suggesting a banking crisis there leads to inventory cuts via credit rationing.

We again tried to estimate inventory functions with the bank lending/debt ratio and the debt-equity ratio and their interaction with the crisis dummies. In this case, the results (not reported in detail) were much poorer than for the investment function, suggesting balance sheets have less impact on inventory accumulation than on fixed investment. Again, this was also true for the external finance and bank lending flow/GDP ratios and their interactions with the dummies.

## 4.2 Corporate sector flow of funds

We now move to equations that aim to capture empirically, the shifts in flows that accompany the declines in investment and inventories. Note that the results do not *prove* that rationing of finance caused the fall in expenditure since there may be supply and demand side influences on a given flow. Equally, as noted, we have not found a direct link from flows per se to aggregate corporate expenditures. But the results are suggestive, as well as being of interest in themselves. The variables concerned are bank lending to companies, bond issuance, and equity issuance, and, on the asset side, the flows to liquidity. All are defined as linear variables (as they can be negative) and relative to GDP.

Accordingly, in each equation we have as a dependent variable the change in the flow relative to GDP, while independent variables are the lagged flow/GDP ratio, economic growth terms, changes in the interest rate and the lagged interest rate. Together these seek to capture “transactions demand” for funds and “portfolio balance” effects in each case (although portfolio effects are not comprehensively captured, since we lack the necessary data for bond and equity yields, bank loan rates and costs of trade credit). We then add current and lagged crisis dummies. Note that the data for flows are more comprehensive than for stocks, and accordingly although we have fewer observations than for the Jorgensen investment function and the inventories equation, we have 100 more than for the Tobin investment function. Coverage of crises is correspondingly good. The coverage of emerging market countries by flow data is sufficient (over 100 observations covering 6 countries) to warrant separate estimation for them.

### 4.2.1 Bank lending

The first equation shown in Table 9 is for bank lending, which in most countries is the most important source of funds for corporations. All of the independent variables are significant. The bank lending/GDP ratio rises when there is economic growth and contracts in recession, consistent with a cyclical pattern of external financing. The interest rate effect is positive, consistent with the Christiano et al. (1996) result cited above, and possibly also with the

increased obligations on firms when interest rates rise and their debt is floating rate, and the lower sensitivity to credit quality of banks than other sources of funds.

The crisis dummies are consistently negative and significant, in both level and lag, for emerging market countries, and for all countries other than the level dummy for currency crises. The overall impact of a banking crisis is around 3 times greater for emerging market countries than for OECD countries, with a fall of 3 percent in lending relative to GDP, *ceteris paribus*, in the former and only 1 percent in the latter. For OECD countries, the impact of a crisis on bank lending only comes with a lag. Note that since GDP itself typically falls after a crisis, the absolute fall in bank lending is likely to be much larger. Also, since the levels of bank lending/GDP are often fairly low, the change of 3 percentage points may change from expansion to contraction.

#### **4.2.2 Bond issuance**

Bond issuance is evidently less cyclical than bank lending and seems, consistent with Table 5, to offset to some extent the crisis-induced drop in bank lending (see also Davis, 2001). A rise in interest rates tends to cut bond issuance, notably in OECD countries, consistent with a greater sensitivity to credit quality of bond markets than on the part of banks (Table 10). On the other hand, there is strong evidence for OECD countries, which carries over to the full sample that banking crises lead to increases in bond and other securities issuance. This is consistent with the idea of effective “multiple channels of intermediation” as cited in Greenspan (1999), whereby a shock to banks, which does not impact on the credit quality of firms, can be compensated by availability of securities finance. Note that this effect does not apply during a currency crisis in OECD countries or emerging market countries, effects of which on bond issuance are negative.

#### **4.2.3 Equity issuance**

The results for equity issuance are not as definitive as for the other components of financing (Table 11). There is some evidence for OECD countries that equity flows are counter cyclical, with a negative sign on GDP growth, whereas in emerging market countries the corresponding variable has a positive sign. This may be consistent with more efficient equity markets in OECD countries, where purchasers of new issues are willing to look ahead for profits growth, although it could also reflect distress-driven rights issues, which are common in recessions. There is a negative interest rate effect on equity issuance—where a fall in interest rates entails a lower discount rate on future profits. The only crisis effects to be significant are in the OECD countries, where there is a negative effect on equity issuance from both banking and currency crises. The effect is larger for banking crises (a 4 percent fall in the equity flow/GDP ratio) than for currency crises (1 percent). One explanation is the loss of beneficial information spillovers from bank lending to equity pricing (James 1987).

#### **4.2.4 Total external financing**

Estimates for total external financing flows show important differences between EME’s and OECD countries (Table 12). It can be seen that total financing is strongly cyclical, and also has a positive relation to interest rates in the short run. The effect of crises for the full sample is restricted to the lagged effect, with the effect of a banking crisis being three times larger than that of a currency crisis. There are contrasts between the subgroups, with the emerging market result showing a significant first period effect, which persists into the second period

for banking crisis episodes. In contrast, the industrial country result is in line with the full sample, with only the lag showing significant effects<sup>5</sup>.

#### 4.2.5 Liquidity accumulation

Finally, we examined the behaviour of liquidity accumulation (Table 13). When do firms build up or reduce their short-term financial assets? Cyclical effects are only significant for the emerging market countries. There is a negative effect of monetary tightening in OECD countries, suggesting that the inflexibility of expenditure requires firms to cut liquidity as well as borrowing from banks. Crisis effects arise significantly only for OECD countries in the wake of currency crises. It may be that even after a banking crisis, debt securities and trade credit are sufficient to leave firms able to maintain their precautionary liquidity.

#### 4.2.6 Summary of crisis impact

The significant dummy variables for crises are summarized in Table 14.<sup>6</sup> There is a preponderance of negative effects on expenditure and financing in the wake of crises, as would be expected, going beyond the normal behaviour of the variables in question (as captured by the rest of the equation). This is particularly the case for emerging market countries, where all the significant dummies are negative, while the coefficients for the emerging market countries are also generally larger. This illustrated the more adverse impact of crises, both from the currency or banking side, for emerging market countries compared to OECD countries. That said, the effects in OECD countries are not negligible. Investment, bank lending and equity issuance are consistently reduced by banking and currency crises. On the other hand, the positive sign for bond issuance in the wake of banking crises shows the helpful effect of “multiple avenues of intermediation,” absent for emerging market countries.

## 5 CONCLUSION

This paper has provided evidence on the impact of financial crises on corporate financing and expenditure in a range of countries, both advanced and emerging markets. We find that the average level of corporate financing differs markedly between country groups, with emerging market corporate sectors being more dependent on external finance, and also more dependent on banks. Further, the corporate sectors in emerging markets have higher debt-equity ratios but also smaller corporate liabilities (including equity) than in industrial countries, as well as higher liquidity ratios.

Investment and inventory contractions are the main contributors to post-crisis GDP contractions and these contractions are correlated with corporate financial structure. There is a marked correlation of the debt-equity ratio to investment and inventory declines following crises. Changes in corporate financial flows after crises are dominated by bank lending. Post-crisis changes in corporate financial flows are more severe for banking crises compared to

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<sup>5</sup> We also undertook estimation of equations for trade credit, but the results were poorly-determined, which may not be surprising given that this is one of the more difficult variables for statisticians to identify. They are hence not reported in detail. Crisis effects only became significant for the full sample, when there is lower trade credit one period after a crisis. Since this result does not carry over to either of the subsamples, it should be viewed with caution.

<sup>6</sup> Note that for calibration purposes, the expenditure equations are in logs, so the dummy indicates the proportionate change. Hence, a coefficient of -0.07 indicates a fall of 7%. The finance equations are in terms of flows divided by GDP so the dummies indicate the change in the ratio of the flow to GDP. Hence, -0.02 indicated a fall in net financing equivalent to 2% of GDP.

currency crises. Econometric analysis suggests that financial crises have a greater and more consistently negative impact on corporate sectors in emerging markets than in industrial countries, although even in the latter the impact is not negligible. Industrial countries benefit from the existence of multiple channels of intermediation, in that bond issuance is shown to pick up in the wake of banking crises.

We believe these results strengthen the case for more intense surveillance of the corporate sector by national governments and international financial institutions. A closer focus on the corporate sector's performance could enhance the assessment of overall economic vulnerability to crisis. Specifically, financial stability indicators should include corporate sector balance sheet and flow indicators as a priority. In order for this to be operational there is a need to encourage countries to gather and report flow of funds and sectoral balance sheet data. In addition, further analysis of the components of expenditure in the wake of crises would help improve understanding of the crisis channels between the corporate sector and the rest of the economy. Further research could seek inter alia to probe the separate role of foreign currency borrowing. It will also be useful to undertake complementary research with micro corporate data and data for the household sector.

Finally, governments should think seriously about reshaping corporate incentives to enhance financial stability (Stone 2001). The links between corporate financial structure and post-crisis contractions in GDP raise an important externality that only now is receiving much attention. The externality is the absence of market punishment of corporate managers who make financing decisions that help propagate systemic financial crises. The social costs of crises could be internalized for corporate managers through policies that improve corporate governance and establish proper legal, regulatory and judicial arrangements. Hopefully, these policy responses will reduce the economic and social costs of modern financial crises.

#### REFERENCES

- Ashworth, Paul, and E Philip Davis, 2001, "Some Evidence On Financial Factors in the Determination of Aggregate Business Investment for the G-7 Countries," Discussion Paper, National Institute of Economic and Social Research, London.
- Aziz, Jahangir, Francesco Caramazza, and Ranil Salgado, 2000, "Currency Crises—In Search of Common Elements," IMF Working Paper No. 00/67, March.
- Bean, Charles, 1981, "An econometric model of manufacturing investment in the UK," *Economic Journal*, Vol. 91, pp. 106-121.
- Bernanke, Ben S., and Mark Gertler, 1995, "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *The Journal of Economic Perspectives*, Vol. 9, No. 4. (Autumn, 1995), pp. 27-48.
- Bordo, Michael D., and Lars Jonung, 1987, *The Long-run Behavior of the Velocity of Money: the International Evidence* (London: Cambridge University Press).
- Bordo, Michael, Barry Eichengreen, Daniela Klingebiel and Maria Soledad Martinez-Peria, 2001, "Is the Crisis Problem Growing More Severe?" *Economic Policy*, April.
- Brainard, William C., and James. Tobin, 1968, "Pitfalls in financial model building," *American Economic Review*, Vol. 58, pp. 99-122.
- Caballero, Ricardo, and Arvind Krishnamurthy, 1999, "Emerging Markets Crisis—An Asset Markets Perspective," IMF Working Paper 99/129, (Washington: International Monetary Fund).
- Caprio, Gerald, and Daniela Klingebiel, 1996, "Bank Insolvencies: Cross-Country Experience," World Bank Working Paper No.1620, July.

- Chang, Roberto, and Andres Velasco, 1999, "Liquidity Crises in Emerging Markets: Theory and Policy," NBER Working Paper No. 7272, July.
- Chatu Mongol, M.R., 2000, "Keynote Address on the Occasion of the ADB Conference on Government Bond Market and Financial Sector Development in Developing Asian Economies," Bangkok, March.
- Christiano, Lawrence J., Martin Eichenbaum, and Charles Evans, 1996, "The effects of monetary policy shocks; some evidence from the flow of funds," *Review of Economics and Statistics*, 78, 16-34
- Davis E Philip, 1995, "Debt, financial fragility and systemic risk, revised and expanded version," Oxford University Press.
- \_\_\_\_\_, 2001, "Multiple channels of intermediation, corporate finance and financial stability," IMF Working Paper No. 01/115
- \_\_\_\_\_ and Mark Stone, 2004, "Corporate financial structure and financial stability" IMF Working Paper
- Demirguc Kun, Asli, and Ross Levin (2000), "Bank-based and market-based financial systems; cross-country comparisons," paper presented at the World Bank conference on "Financial structure and economic development," 10-11 February 2000
- Eichengreen, Barry, and Michael D. Bordo, 2002, "Crises Now and Then: What Lessons from the Last Era of Financial Globalization," NBER Working Paper No. w8716, January.
- Fazzari, Steven, Glenn Hubbard, and Bruce Petersen, 1988, "Financing constraints and corporate investment," *Brookings Papers on Economic Activity*, 1, 141-95.
- Gertler, Mark, and Simon Gilchrist, 1992, "The cyclical behavior of short term business lending; implications for financial propagation mechanisms," mimeo.
- Gertler, Mark, and Glenn Hubbard, 1989, "Taxation, corporate capital structure and financial distress," NBER Working Paper No 3202.
- Gertler, Mark, and Simon Gilchrist, 1994, "Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms," *Quarterly Journal of Economics*, 59, 309-40.
- Gertler, Mark, Simon Gilchrist, and Fabio Massimo Natalucci, 2000, "External Constraints on Monetary Policy and the Financial Accelerator," mimeo.
- Goldfajn, Ilan, and Valdes, Rodrigo O., 1995, "Currency Crises and Collapses," *Brookings Papers on Economic Activity*, June, No. 2, pp. 219-70.
- Greenspan, Alan, 1999, "Do Efficient Financial Markets Mitigate Financial Crises?" speech to the 1999 Financial Markets Conference of the Federal Reserve Bank of Atlanta, October.
- Hoggarth, Glenn, Roberto Reis, and Victoria Sapporta, 2001, "Costs of banking system instability, some empirical evidence," forthcoming Bank of England Working Paper
- James Christopher, 1987, "Are bank loans special?," FRBSF Economic Letter, 1987, issue Jul 24
- Jorgensen, Dale, 1963, "Capital Theory and Investment Behavior," *American Economic Review*, Vol. 53, p.247-57.
- Kim, Se-Jik, and Mark R. Stone, 1999, "Corporate Leverage and Output Adjustment in Post-Crisis East Asia," IMF Working Paper No. 99/143 (Washington: International Monetary Fund).
- King, Robert G., and Ross Levine, 1993, "Finance and growth, Schumpeter might be right," *Quarterly Journal of Economics*, 108, 713-737
- Kiyotaki, Nobuhiro, and John Moore, 1997, "Credit Cycles," *Journal of Political Economy*, April.
- Krugman, Paul, 1979, "A Model of Balance-of-Payments Crises," *Journal of Money, Credit, and Banking*, August 1979, Vol. 11 (3), pp. 311-25.
- Levine, Ross, 2000, "Bank based or market based financial systems – which is better?" Paper presented at the World Bank conference on "Financial structure and economic development," 10-11 February 2000
- Levine, Ross, and Sara Zervos, 1998, "Stock markets, growth and economic development," *American Economic Review*, 88, 537-58

- Mishkin, Frederic S., 1997, "The Causes and Propagation of Financial Instability: Lessons for Policymakers," in *Maintaining Financial Stability in a Global Economy: A Symposium*, U.S. Federal Reserve Bank of Kansas City, August.
- Modigliani, F, and M. Miller, 1958, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review* 48, 261-297.
- Mulder, Christian, Roberto Perrelli, and Manuel Rocha, 2001, "The Role of Corporate, Legal and Macro Balance Sheet Indicators in Crisis Detection and Prevention," mimeo, International Monetary Fund.
- Rajan, Ragu, and Luigi Zingales, 1998, "Financial dependence and growth," *American Economic Review*, 88, 559-586
- Rajan, Ragu and Luigi Zingales, (2000), "The great reversals; the politics of financial development in the 20<sup>th</sup> century", Working paper No 265, Economics Department, OECD
- Stone, Mark, and Melvyn Weeks, 2001, "The Role of Private Sector Balance Sheets in the Financial Crises of the 1990s," IMF mimeo.
- Stone, Mark, 2000, "The Corporate Sector Dynamics of Systemic Financial Crises," IMF Working Paper No. 00/114 (Washington: International Monetary Fund).
- Stone, Mark, 2001, Corporate Sector Policies to Enhance Financial Stability, Banco de Guatemala's "Tenth Cycle of Economic Lectures," June.
- Tobin, James, 1969, "A general equilibrium approach to monetary theory," *Journal of Money, Credit and Banking*, 1, 15-29
- Velasco, Andres, 1987, "Financial Crises and Balance of Payments Crises: A Simple Model of the Southern Cone Experience," *Journal of Development Economics*, October, Vol. 27 (1-2), pp. 263-83.

**Table 1. Key Aggregate Corporate Balance Sheet Indicators, 1999 or Latest Year**

	Total corporate liabilities to GDP	Shares of corporate liabilities				Debt-equity ratio	Liquidity ratio	Debt-GDP ratio
		Loans	Bonds	Equity	Trade credit			
<i>Median</i>								
G-7 countries	2.48	0.23	0.08	0.63	0.06	0.59	0.21	0.50
Small industrial countries	1.96	0.30	0.04	0.57	0.08	0.61	0.26	0.76
Emerging market countries	1.75	0.27	0.21	0.40	0.14	0.73	0.42	0.66
<i>Standard deviation</i>								
G-7 countries	0.80	0.15	0.06	0.16	0.07	0.52	0.39	0.21
Small industrial countries	1.00	0.15	0.03	0.16	0.04	1.05	0.07	0.13
Emerging market	0.51	0.17	0.16	0.23	0.42	1.59	0.50	0.37
<i>G-7 countries</i>								
Canada (2000)	1.63	0.21	0.16	0.51	0.12	0.72	0.17	0.50
France (1997)	3.43	0.12	0.02	0.75	0.10	0.19	0.21	0.48
Germany (1998)	1.37	0.53	0.02	0.42	0.03	1.29	0.26	0.63
Italy (1999)	1.43	0.36	0.01	0.63	0.00	0.59	0.13	0.50
Japan (2000)	2.54	0.38	0.12	0.31	0.20	1.60	1.20	1.03
UK (1999)	2.95	0.23	0.08	0.64	0.06	0.47	0.27	0.73
USA (1999)	2.48	0.09	0.12	0.74	0.05	0.28	0.08	0.46
<i>Small and medium industrial countries</i>								
Australia (1998)	1.78	0.24	0.12	0.57	0.07	0.62	0.19	0.63
Austria	1.06	0.69	0.07	0.20	0.04	3.87	0.17	0.81
Belgium	2.18	0.31	0.05	0.60	0.04	0.60	0.35	0.79
Denmark	1.44	0.44	0.02	0.53	0.01	0.87	0.27	0.66
Finland	4.57	0.12	0.01	0.85	0.02	0.16	0.15	0.61
Netherlands	3.05	0.30	0.02	0.58	0.10	0.54	0.31	0.97
Norway	1.84	0.38	0.07	0.45	0.10	0.98	0.25	0.82
Portugal	1.99	0.32	0.06	0.52	0.11	0.72	0.35	0.74
Spain	1.93	0.28	0.02	0.61	0.09	0.50	0.20	0.58
Sweden	2.79	0.30	0.03	0.57	0.10	0.59	0.30	0.93
<i>Emerging market countries</i>								
Croatia (2000)	1.49	0.13	0.21	0.52	0.14	0.66	0.02	0.50
Czech Republic	2.27	0.27	0.02	0.40	0.31	0.73	0.20	0.66
Israel	1.15							
Korea	2.01	0.38	0.33	0.20	0.09	3.46	0.64	1.21

Note: Portfolio share data for individual countries do not add to 100 owing to omitted miscellaneous assets. Medians also do not relate to the same country across the row.

**Table 2. Aggregate Corporate Flow of Funds, 1995–99**

	Net financing to GDP	Gross financing to GDP	Share of total financing			Liq accum to GDP
			Loans	Bonds	Equities	
<i>Median</i>						
G-7 countries		3.4	34.5	24.0	41.2	0.6
Small industrial countries	-0.2	5.3	54.3	10.1	35.8	1.2
Emerging market countries	-11.7	18.6	44.9	21.5	26.9	1.7
<i>G-7 countries</i>						
Canada		5.8	21.2	24.0	41.2	1.9
France (1995-97)		4.9	10.5	6.2	59.4	0.6
Germany (1995-98)		3.2	75.7	3.5	17.8	1.5
Italy		3.4	52.7	-1.4	48.7	0.2
Japan		0.2	54.2	24.4	14.3	0.6
United Kingdom		5.5	21.9	26.3	48.2	1.2
United States		2.9	34.5	76.1	-39.9	0.6
<i>Small and medium industrial countries</i>						
Australia	-2.9	8.0	25.2	18.1	41.5	1.8
Austria	-0.3	0.6	55.1	12.8	28.6	0.1
Belgium	-0.1	0.3	35.0	12.8	47.2	0.1
Denmark	1.6	2.9	100.6	-46.7	42.2	0.6
Finland	0.5	4.3	33.0	-0.4	84.5	0.4
Netherlands	1.6	10.1	58.0	3.5	24.5	2.6
Norway	-4.7	13.9	37.1	10.1	46.8	2.3
Portugal	-3.0	12.7	53.5	10.2	30.1	3.5
Spain	-0.1	1.4	57.7	-0.8	25.4	0.3
Sweden	-0.3	6.3	57.1	13.7	2.9	2.0
<i>Emerging market countries</i>						
Czech Republic		23.2	38.5	5.3	24.9	1.7
India (1990-97)	-0.4	0.7	51.2	18.4	29.1	0.0
Korea	-11.7	16.5	31.6	32.0	28.8	5.1
Thailand	-19.3	20.8	58.7	24.6	15.5	1.7

**Table 3. Crisis Episodes**

	Banking	Currency
<i>G-7 countries</i>		
US	1984	1985
UK		1976, 1982, 1992
Canada		1981, 1986
France	1994	1992
Italy	1990	1976, 1992, 1995
Japan	1992	1979
Germany	1977	
Sub Total:	5	11
<i>Small and medium industrial countries</i>		
Australia	1989	1976, 1983, 1985
Austria		
Belgium		1982
Denmark	1987	1976, 1992, 1993
Finland	1991	1986, 1991, 1993
Netherlands		
Norway	1987	1986
Portugal		1976, 1978, 1983
Spain	1977	1976, 1982, 1992, 1995
Sweden	1991	1992
Sub Total:	6	20
<i>Emerging market countries</i>		
Croatia		
Czech		
India	1994	1991
Israel	1977	1977
Korea	1998	1980, 1998
South Africa	1977, 1985	1975, 1981, 1988, 1992, 1995
Thailand	1983, 1998	1998
Sub Total:	7	10
<b>TOTAL</b>	<b>18</b>	<b>41</b>

**Table 4. Cumulative Change in Expenditure Components Relative to Trend in Banking and Currency Crisis Years T and T+1 (Measured in Contribution to Change in GDP)<sup>1/</sup>**

Percent		GDP	Total domestic demand	Total public domestic demand	Total private domestic demand	Private consumption	Private investment	Change in inventories	Foreign balance
Total	average	-1.5	-2.6	0.1	-2.9	-0.7	-1.7	-0.4	1.1
	median	-1.0	-1.1	-0.1	-1.8	-0.7	-1.1	0.0	0.5
EME	average	-3.2	-6.4	-0.4	-5.6	-1.3	-3.2	-1.1	2.7
	median	-3.3	-4.3	-0.3	-4.1	-2.0	-1.9	-0.1	1.6
OECD	average	-0.9	-1.5	0.2	-2.0	-0.5	-1.3	-0.1	0.6
	median	-0.2	-0.7	-0.1	-0.9	-0.5	-0.4	0.1	0.4
Currency	average	-1.1	-1.9	-0.1	-2.0	-0.5	-1.2	-0.3	1.0
	median	-0.2	-0.7	-0.1	-0.9	-0.5	-0.4	0.0	0.5
Banking	average	-3.1	-5.1	0.2	-5.0	-1.4	-3.1	-0.4	1.9
	median	-2.8	-4.1	0.3	-4.0	-0.8	-3.1	-0.1	1.6

Notes: Average data do not always sum precisely to the change in GDP owing to gaps in data coverage. Median data do not sum since they are a combination of different crisis events.

<sup>1/</sup> Reflecting lack of disaggregated investment data for emerging market countries, “private domestic demand” for emerging market countries includes total investment, while “private investment” is replaced by total investment. See Appendix I of Davis and Stone (2004) for details of individual crisis episodes

**Table 5. Change in Flow of Funds/GDP in year of Crisis**

All crises (27)						
	External finance	Bank loans	Bond issues	Equity issues	Trade credit	Liquidity
Average	-0.6	-0.5	0.1	-0.1	-0.1	-0.7
OECD	-0.1	0.0	0.1	-0.2	0.5	-0.1
EME	-1.4	-1.4	0.0	-0.1	-1.0	-1.6
Banking crises (9)						
	External finance	Bank loans	Bond issues	Equity issues	Trade credit	Liquidity
Average	-2.0	-2.2	0.3	0.2	0.1	-1.7
OECD	-0.5	-0.6	0.3	-0.3	1.7	-0.1
EME	-3.4	-4.3	0.3	0.6	-1.5	-3.6
Currency crises (19)						
	External finance	Bank loans	Bond issues	Equity issues	Trade credit	Liquidity
Average	-0.7	-0.4	-0.1	-0.2	-0.4	-0.8
OECD	0.1	0.3	0.0	-0.1	0.1	0.0
EME	-1.8	-1.4	-0.1	-0.3	-1.2	-1.9

**Table 6. Tobin's Q Investment Function**

Dependent variable: difference of log of real private investment  
 Fixed effects, GLS, cross section weights, White standard errors in brackets

All			
DLY	2.3 (0.11)**	2.3 (0.11)**	2.3 (0.11)**
DLY(-1)	-0.38 (0.16)**	-0.41 (0.15)**	-0.42 (0.15)**
DLIP (-1)	0.26 (0.049)**	0.29 (0.05)**	0.28 (0.05)**
LIY(-1)	-0.14 (0.02)**	-0.16 (0.023)**	-0.16 (0.023)**
LTOBIN(-1)	0.016 (0.0024)**	0.017 (0.003)**	0.019 (0.003)**
BDUM(-1)	-0.027 (0.014)*	-0.033 (0.015)**	-0.18 (0.09)**
CDUM(-1)	-0.028 (0.009)**	-0.033 (0.008)**	-0.022 (0.013)*
LBDEBT(-1)		0.056 (0.024)**	0.051 (0.024)**
BDUM*LBDEBT(-1)			-0.207 (0.12)*
CDUM*LBDEBT(-1)			0.015 (0.03)
Adjusted R2	0.77	0.74	0.74
SE	0.041	0.039	0.039
Observations	258	227	227
Crisis	5 banking, 12 currency	5 banking, 12 currency	5 banking, 12 currency
Countries	19	18	18
OECD			
DLY	2.27 (0.12)**	2.26 (0.11)**	2.27 (0.11)**
DLY(-1)	-0.41 (0.16)**	-0.3 (0.15)**	-0.34 (0.15)**
DLIP (-1)	0.25 (0.05)**	0.29 (0.05)**	0.28 (0.05)**
LIY(-1)	-0.141 (0.023)**	-0.2 (0.022)**	-0.193 (0.02)**
LTOBIN(-1)	0.016 (0.003)**	0.017 (0.003)**	0.019 (0.003)**
BDUM(-1)	-0.02 (0.015)	-0.036 (0.016)**	-0.18 (0.11)*
CDUM(-1)	-0.026 (0.01)**	-0.036 (0.009)**	-0.019 (0.02)
LBDEBT(-1)		0.126 (0.027)**	0.114 (0.027)**
BDUM*LBDEBT(-1)			-0.214 (0.156)
CDUM*LBDEBT(-1)			0.024 (0.04)
Adjusted R2	0.72	0.73	0.73
SE	0.037	0.034	0.034
Observations	233	215	215
Crisis	4 banking, 11 currency	4 banking, 11 currency	4 banking, 11 currency
Countries	17	16	16

Key: DLY, change in log of real gross domestic product, DLIP change in log of real private fixed investment, LIY log of investment less log of GDP, LTOBIN, log of the ratio of the stock of corporate equity to the capital stock, BDUM dummy for banking crisis, CDUM dummy for currency crisis, LBDEBT log of the ratio of corporate bank borrowing to total debt.

**Table 7. Jorgensen Investment Function**

Dependent variable: difference of log of real private investment  
 Fixed effects, GLS, cross section weights, White standard errors in brackets

	All	EME	OECD
DLY	2.4 (0.112)**	3.2 (0.25)**	2.11 (0.13)**
DLY(-1)	-0.23 (0.14)*	0.26 (0.44)	-0.27 (0.16)*
DLIP(-1)	0.26 (0.04)**	0.16 (0.095)*	0.23 (0.05)**
LIY(-1)	-0.144 (0.014)**	-0.203 (0.03)**	-0.127 (0.015)**
DIRD	-0.0004 (8E-5)**	-0.00027 (7.6E-5)**	0.0006 (0.0008)
IRD(-1)	-0.0006 (0.0002)**	-0.0005 (8.3E-5)**	-0.0028 (0.0006)**
BDUM(-1)	-0.02 (0.009)**	-0.073 (0.035)**	-0.016 (0.0085)*
CDUM(-1)	-0.025 (0.006)**	-0.0074 (0.018)	-0.027 (0.0068)**
Adjusted R2	0.69	0.77	0.69
SE	0.06	0.08	0.05
Observations	517	105	412
Crises	14 banking, 36 currency	5 banking, 7 currency	9 banking, 29 currency
Countries	23	6	17

Key: DLY, change in log of real gross domestic product, DLIP change in log of real private fixed investment, LIY log of investment less log of GDP, DIRD change in the domestic money market interest rate, IRD level of the domestic money market rate, BDUM dummy for banking crisis, CDUM dummy for currency crisis

	All	All	All
DLY	2.4 (0.11)**	2.23 (0.11)**	2.33 (0.107)**
DLY(-1)	-0.388 (0.153)**	-0.236 (0.14)*	-0.27 (0.15)*
DLIP(-1)	0.239 (0.054)**	0.25 (0.053)**	0.214 (0.059)**
LIY(-1)	-0.133 (0.024)**	-0.187 (0.027)**	-0.162 (0.026)**
DIRD	0.0005 (0.0009)	0.0006 (0.001)	0.0012 (0.001)
IRD(-1)	-0.0014 (0.0008)*	-0.0023 (0.0007)**	-0.0013 (0.0008)**
BDUM(-1)	-0.026 (0.013)**	-0.143 (0.102)	-0.178 (0.082)**
CDUM(-1)	-0.036 (0.01)**	-0.003 (0.02)	-0.026 (0.02)
LDER(-1)	-0.0092 (0.0032)**		-0.015 (0.004)**
BDUM*LDER(-1)	-0.02 (0.01)**		-0.0176 (0.01)*
CDUM*LDER(-1)	-0.034 (0.013)**		-0.038 (0.011)**
LBDEBT(-1)		0.115 (0.029)**	0.115 (0.03)**
BDUM*LBDEBT (-1)		-0.17 (0.04)	-0.214 (0.118)**
CDUM*LBDEBT (-1)		0.05 (0.04)	0.028 (0.031)
Adjusted R2	0.74	0.76	0.78
SE	0.04	0.04	0.038
Observations	255	237	237
Crises	14 banking, 36 currency	14 banking, 36 currency	14 banking, 36 currency
Countries	19	18	18

Key: as above with LDER log of debt-equity ratio

**Table 8. Inventory Adjustment Function**

Dependent variable: change in inventories/GDP

Fixed effects, GLS, cross section weights, White standard errors in brackets

	All	EME	OECD
DLY	0.06 (0.008)**	0.17 (0.04)**	0.049 (0.007)**
IY(-1)	0.46 (0.13)**	0.38 (0.28)	0.5 (0.108)**
DIRD	2.1E-5 (1.2E-5)**	1.9E-5 (1.1E-5)*	0.00011 (3.4E-5)**
IRD(-1)	2.4E-6 (1.3E-5)**	8.6E-6 (1.4E-5)	-1.2E-7 (2E-5)
BDUM	0.0002 (0.0007)	-0.02 (0.008)**	0.001 (0.0006)*
CDUM	-9.7E-6 (0.0003)	0.0006 (0.003)	-4.2E-5 (0.0003)
BDUM(-1)	0.0008 (0.0004)**	0.004 (0.009)	0.00036 (0.00036)
CDUM(-1)	-5.9E-6 (0.0003)	-0.0027 (0.003)	-5E-5 (0.0003)
Adjusted R2	0.49	0.49	0.53
SE	0.009	0.018	0.006
Observations	569	108	461
Crises	15 banking, 40 currency	5 banking, 8 currency	10 banking, 31 currency
Countries	23	6	17

Key: DLY, change in log of real gross domestic product, DLIP change in log of real private fixed investment, IY ratio of real inventory accumulation to GDP, DIRD change in the domestic money market interest rate, IRD level of the domestic money market rate, BDUM dummy for banking crisis, CDUM dummy for currency crisis

**Table 9. Bank Lending Function**

Dependent variable: difference of bank lending/GDP

Fixed effects, GLS, cross section weights, White standard errors in brackets

	All	EME	OECD
DLY	0.21 (0.028)**	0.13 (0.054)**	0.203 (0.032)**
DLY(-1)	0.078 (0.024)**	0.045 (0.032)	0.077 (0.04)*
BLY(-1)	-0.47 (0.046)**	-0.71 (0.117)**	-0.38 (0.052)**
DIRD	0.0014 (0.00016)**	0.0015 (9.8E-5)**	0.0017 (0.0004)**
IRD(-1)	0.0008 (0.0003)**	0.0013 (0.00027)**	0.00022 (0.00027)
BDUM	-0.0084 (0.0036)**	-0.019 (0.008)**	-0.0016 (0.0032)
CDUM	-0.0015 (0.0025)	-0.011 (0.0049)**	0.002 (0.0032)
BDUM(-1)	-0.0093 (0.0015)**	-0.013 (0.0028)**	-0.01 (0.0025)**
CDUM(-1)	-0.0039 (0.0011)**	-0.0046 (0.0028)*	-0.0057 (0.002)**
Adjusted R2	0.47	0.63	0.44
SE	0.025	0.032	0.019
Observations	362	120	242
Crises	10 banking, 20 currency	5 banking, 8 currency	5 banking, 12 currency
Countries	23	6	17

Key: DLY, change in log of real gross domestic product, BLY ratio of flow of bank lending to companies to GDP, DIRD change in the domestic money market interest rate, IRD level of the domestic money market rate, BDUM dummy for banking crisis, CDUM dummy for currency crisis

**Table 10. Bond Issuance Function**

Dependent variable: difference of bond issuance/GDP

Fixed effects, GLS, cross section weights, White standard errors in brackets

	All	EME	OECD
DLY	0.007 (0.006)	-0.0004 (0.017)	0.02 (0.01)**
DLY(-1)	0.032 (0.011)**	0.03 (0.035)	0.044 (0.008)**
BOY(-1)	-0.48 (0.08)**	-0.34 (0.14)**	-0.55 (0.096)**
DIRD	-0.00014 (6.3E-5)**	0.00022 (0.00029)	-0.00029 (6.6E-5)**
IRD(-1)	8.4E-5 (3.8E-5)**	0.00021 (0.00016)	0.00012 (5.1E-5)
BDUM	0.0014 (0.0007)**	0.0009 (0.0015)	0.0023 (0.0009)**
CDUM	-0.0009 (0.0005)*	-0.0037 (0.002)*	-0.00023 (0.0006)
BDUM(-1)	0.001 (0.0015)	-0.0032 (0.0057)	0.0021 (0.001)**
CDUM(-1)	-0.0015 (0.0005)**	-0.0042 (0.004)	-0.0008 (0.0002)**
Adjusted R2	0.22	0.14	0.27
SE	0.009	0.011	0.008
Observations	346	104	242
Crises	10 banking, 20 currency	5 banking, 8 currency	5 banking, 12 currency
Countries	22	5	17

Key: See Table 9, BOY ratio of flow of bond issuance by companies to GDP

**Table 11. Equity Issuance Function**

Dependent variable: difference of equity issuance/GDP

Fixed effects, GLS, cross section weights, White standard errors in brackets

	All	EME	OECD
DLY	-0.003 (0.005)	0.03 (0.017)*	-0.022 (0.005)**
DLY(-1)	0.0004 (0.005)	-0.015 (0.022)	0.002 (0.004)
EQY(-1)	-0.45 (0.057)**	-0.53 (0.13)**	-0.37 (0.052)**
DIRD	-0.0003 (9.3E-5)**	-0.0002 (0.0003)	-0.0006 (0.0001)**
IRD(-1)	-0.00013 (8.2E-5)	-3.8E-5 (0.00032)	-0.00027 (8.6E-5)**
BDUM	-0.0017 (0.0012)	0.00025 (0.0034)	-0.004 (0.0028)
CDUM	-0.0007 (0.0008)	-0.00014 (0.0034)	-0.0006 (0.001)
BDUM(-1)	0.0005 (0.0016)	0.0044 (0.0045)	-0.0042 (0.001)**
CDUM(-1)	0.0011 (0.0011)	0.0072 (0.0054)	-0.001 (0.00032)**
Adjusted R2	0.17	0.23	0.24
SE	0.01	0.01	0.009
Observations	339	104	235
Crises	9 banking, 20 currency	5 banking, 8 currency	4 banking, 12 currency
Countries	22	5	17

Key: See Table 9, EQY ratio of flow of equity issuance by companies to GDP

**Table 12. External Financing Function**

Dependent variable: difference of external financing/GDP

Fixed effects, GLS, cross section weights, White standard errors in brackets

	All	EME	OECD
DLY	0.21 (0.048)**	0.12 (0.067)*	0.278 (0.097)**
DLY(-1)	0.057 (0.024)**	0.022 (0.035)	0.117 (0.048)**
EXTY(-1)	-0.38 (0.05)**	-0.37 (0.097)**	-0.386 (0.057)**
DIRD	0.013 (0.0003)**	0.0017 (0.00047)**	0.001 (0.0006)*
IRD(-1)	0.00012 (0.00025)	0.0003 (0.0005)	0.0003 (0.0005)
BDUM	-0.0072 (0.006)	-0.018 (0.01)*	0.0005 (0.0057)
CDUM	-0.0025 (0.0039)	-0.0187 (0.008)**	0.0039 (0.0047)
BDUM(-1)	-0.012 (0.0027)**	-0.0125 (0.005)**	-0.018 (0.004)**
CDUM(-1)	-0.0044 (0.0014)**	0.00085 (0.0006)	-0.0084 (0.0026)**
Adjusted R2	0.29	0.21	0.32
SE	0.028	0.033	0.025
Observations	324	104	220
Crises	8 banking, 20 currency	5 banking, 8 currency	3 banking, 12 currency
Countries	22	5	17

Key: See Table 9, EXTY ratio of flow of external financing to companies to GDP

**Table 13. Liquidity Accumulation Function**

Dependent variable: difference of liquidity accumulation/GDP

Fixed effects, GLS, cross section weights, White standard errors in brackets

	All	EME	OECD
DLY	0.038 (0.019)**	0.097 (0.048)**	0.024 (0.018)
DLY(-1)	0.0082 (0.012)	0.033 (0.022)	0.016 (0.015)
LIQY(-1)	-0.6 (0.06)**	-0.48 (0.09)**	-0.67 (0.076)**
DIRD	-0.00015 (0.00012)	6.9E-5 (0.00035)	-0.0005 (0.00017)**
IRD(-1)	-0.00012 (9.9E-5)	-0.00032 (0.00036)	-0.0001 (0.00015)
BDUM	-0.0034 (0.0029)	-0.0086 (0.0064)	0.0004 (0.00032)
CDUM	-0.0016 (0.0021)	-0.005 (0.007)	-0.00067 (0.0025)
BDUM(-1)	-0.002 (0.002)	-0.0032 (0.00035)	-0.0036 (0.0041)
CDUM(-1)	0.00025 (0.0007)	0.0067 (0.0052)	-0.0017 (0.0008)**
Adjusted R2	0.26	0.24	0.30
SE	0.014	0.017	0.013
Observations	346	104	242
Crises	10 banking, 20 currency	5 banking, 8 currency	5 banking, 12 currency
Countries	22	5	17

Key: See Table 9, LIQY ratio of flow of liquidity to companies to GDP

**Table 14. Summary Table of Significant Dummy Variables**

Equation	All	EME	OECD
Tobin	-0.033 BDUM(-1) -0.033 CDUM(-1)	n.a. n.a.	-0.036 BDUM(-1) -0.036 CDUM (-1)
Jorgensen	-0.02 BDUM(-1) -0.025 CDUM(-1)	-0.073 BDUM(-1)	-0.016 BDUM (-1) -0.027 CDUM (-1)
Inventories		-0.02 CDUM	0.001 BDUM
Bank lending	0.0008 BDUM(-1) -0.0084 BDUM	-0.019 BDUM -0.011 CDUM	
Bond issuance	-0.0093 BDUM(-1) -0.0039 CDUM(-1) 0.0014 BDUM -0.0009 CDUM	-0.013 BDUM(-1) -0.0046 CDUM(-1)	-0.01 BDUM(-1) -0.0057 CDUM(-1) 0.0023 BDUM
Equity issuance	-0.0015 CDUM(-1)		0.0021 BDUM(-1) -0.0008 CDUM(-1) -0.0042 BDUM(-1) -0.001 CDUM(-1)
External financing		-0.019 BDUM -0.019 CDUM -0.012 BDUM(-1) -0.004 CDUM (-1)	
Liquidity		-0.013 BDUM(-1)	-0.018 BDUM(-1) -0.008 CDUM(-1) -0.0017 CDUM(-1)