The Cyclical Behavior of Debt and Equity Finance

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Debt and equity issuance are procyclical for most size-sorted firm categories of listed U.S. firms and the procyclicality of equity issuance decreases monotonically with firm size. At the aggregate level, however, the results for equity issuance are not conclusive due to different behavior of the largest firms, especially those in the top 1%. During a deterioration in economic conditions, firms limit the impact of the reduction in external financing on investment by shedding financial assets. This is true for a worsening in aggregate as well as firm-specific conditions.
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It is important to know how firm financing varies over the business cycle, since a decline in the amount of funds firms raise during an economic downturn is likely to reduce firm investment and the ability to continue operations, which in turn would worsen the recession. The literature often focuses on debt finance.[1] It is important, however, to include equity finance, because Eugene F. Fama and Kenneth R. French (2005) document that firms frequently issue equity and equity issues are quantitatively important. Moreover, the analysis should focus on both financing variables separately and not simply the sum, since debt and equity contracts have quite distinct features, and financing constraints during economic downturns may impact these variables in different ways. In fact, existing theories on firm financing imply procyclicality of total firm financing, but either debt or equity issuance could be *counter*cyclical due to substitution between these two forms of financing.[2]

In this paper, we shed light on these different theories of firm financing by documenting the cyclical behavior of both debt and equity issuance. There are already a few papers that study the cyclical behavior of debt and equity issuance, but they rely on aggregate data and their results seem to contradict each other.[3] We document that the use of aggregate data gives a misleading picture of the cyclicality of debt and equity issuance at the firm level, because the aggregate data is strongly influenced by a small subset of very large firms. By sorting firms into size-based portfolios, we provide a set of empirical facts that is much more relevant to evaluate different theories of firm financing and their implications for the business cycle. In particular, we find that both debt and equity

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[1] For example, the role of (bank) credit in the monetary transmission mechanism has received a lot of attention. See Ben S. Bernanke and Mark L. Gertler (1995) for a discussion.

[2] In fact, Urban Jermann and Vincenzo Quadrini (2006) build a theory in which the constraint on *debt* financing is relaxed during an expansion and equity financing is reduced and Amnon Levy and Christopher Hennessy (2007) build a theory in which it is the constraint on *equity* financing that is relaxed during a boom.

[3] Whereas Jermann and Quadrini (2006) find that debt is procyclical and equity issuance is countercyclical, Robert A. Korajczyk and Amnon Levy (2003) find that equity issuance is procyclical and debt issuance is countercyclical.

issuance by listed US firms are procyclical *as long as* the largest firms are excluded. Moreover, the procyclicality of equity issuance depends on firm size; the procyclicality is stronger for the smaller firms.

The different behavior of the largest firms is remarkable. For example, for several measures of equity issuance we find that equity issuance of firms in the top 1% is *counter*cyclical. Although small in number, the amounts of funds raised by these firms are so big that they have a large impact on the results for the aggregate series. Whether the countercyclical behavior of the largest firms is strong enough to offset the procyclical behavior of the other firms in the aggregate series depends on particular choices such as the specific measure of equity issuance or the empirical methodology used. That is, our results for aggregate series are not robust—just like the results in the literature based on aggregate series are not robust—even though for firm groups covering the overwhelming majority of firms both debt and equity issuance are found to be procyclical.

We use two distinct approaches to describe the cyclical behavior of debt and equity finance and both lead to similar conclusions. The first approach forms firm groups based on firm size and then constructs time series that are based on the debt and equity issuance in each group. Cyclicality of debt and equity issuance is then established by looking at the correlation between the cyclical components of these time series and the cyclical component of output, where the HP-filter is used to calculate the cyclical component. The purpose of using firm groups is to average out firm-specific events.[4] Conditioning on firm size is interesting in itself, since firm size is often taken as a proxy for the extent to which firms are subject to frictions in obtaining firm finance. But conditioning on firm size also allows us to separate the largest firms from the others, which is desirable given that the cyclical properties of debt and equity issuance has been quite different for the largest firms.

The first approach characterizes cyclicality in a way that is typical in the macroeconomics literature. But for our purposes it has two disadvantages. First, the correlation coefficients do not provide a quantitative assessment of the magnitude of the cyclical fluctuations. Second, it does not control for the possibility that the financing needs of small and large firms differ over the business cycle. We deal with both issues by adopting a panel data approach that relates firm financing measures to both firm-specific variables and a business cycle indicator.

We also look at the cyclical behavior of retained earnings, firm assets, and firm investment. The most interesting finding is that firms safeguard their investment during a worsening of economic conditions by shedding financial assets. This is true during a deterioration in aggregate conditions, but also during a deterioration of firm-specific conditions, which we characterize using firm cash flows and Tobin's Q.

The rest of this paper is organized as follows. In Section I, we describe our data sources, the methodology used to construct cyclical measures, and our procedure to condition on firm size. In Section II, we document the cyclical behavior of debt and equity using cyclical components constructed using the HP-filter, which is the most common way in the macroeconomics literature to study cyclicality. In addition to debt and equity, we also look at internal finance and real firm variables, such as investment, inventories, and employment. In Section III, we use panel regressions to quantify the cyclical variations of our set of firm variables. Section IV discusses the related literature and Section V discusses how our empirical findings can be used to build and evaluate models that analyze the role of financial factors in business cycles.

[4] The top 1% contains on average only 32 firms and firm specific events clearly still affect the group aggregate for this one particular group. In fact, these firms are so large that firm-specific events even affect the *aggregate* series. See footnote 9 for details.

I. Data set and methodology

This section describes the variables used in the analysis discussed in the main text as well as the methodology used to construct cyclical measures for the different firm groups. The Web Appendix (available at http://www1.feb.uva.nl/mint/wdenhaan/papers/codappendix.pdf) describes the data used in more detail and also documents that our results are robust to numerous robustness checks.

Data series used and summary statistics.

The full data set consists of annual Compustat data from 1971 to 2006 for publicly listed firms, excluding financial firms and utilities. In the main text, we report results for the period from 1980 to 2006, since several empirical studies have documented a change in the behavior of several economic variables, starting in the beginning of the eighties.[5]

The two main equity measures are the total net amount of equity raised and this measure minus dividends paid. Following Fama and French (2005), we measure the total net amount of equity raised with the change in the book value of equity. For our purposes it is important to use the book value, because we are interested in measuring how much funds firms raise, not in changes in the valuation of existing equity. In Compustat, retained earnings are recorded in a separate account and, thus, do not become part of the book value of equity.

Our equity measures are (*i*) all encompassing and (*ii*) avoid measurement problems of the "net sale of stock" measure. They are all encompassing, because they not only capture the sale of stock and repurchases, but also equity raised through, for example, options and warrants being exercised. These are important forms of raising equity. For example, Fama and French (2005) argue that using a comprehensive equity measure strongly affects the frequency of equity issues. Selling stock to the public is, of course, not equivalent to reducing cash outflows by paying employees with stock. For example, asymmetric information problems are likely to be less important for the latter. Our focus, however, is on cyclical changes in the amount of funds raised through different forms of finance, which provides a strong argument in favor of using a comprehensive measure.

For completeness, we also report results for two other available measures, namely the gross sale of stock and the net sale of stock, which is defined as the difference between gross sale of stock minus repurchases. As pointed out by Eugene F. Fama and Kenneth R. French (2001) and Fama and French (2005), however, the available Compustat net sale of stock measure is problematic. For example, if a firm repurchases shares and then reissues them to remunerate their employees, then the net sales measure would take on an erroneous negative value, because the first transaction is included and the second is not.[6] But this is just a change in share ownership and the funds the firm spends on stock repurchases simply take the place of wage payments.

The two main debt measures considered are the net change in total debt and the net change in liabilities. The net change in total debt (short-term plus long-term debt)

[5] Excluding the seventies also has the advantage of avoiding issues related to possible bad coverage of Compustat during this period for some variables. The Appendix documents, however, that our results are robust to including the seventies, except for the procyclicality of profits and retained earnings of the smallest firms. The results are also robust to changing the beginning of the sample to 1984.

[6] In Compustat, the reissues of stocks are not taken into account, because they do not lead to a positive cash inflow. In addition to repurchasing shares to issue equity for employee stock ownership plans, firms also repurchase shares to issue stock for executive stock options and to issue stock to purchase firms in mergers. In all these cases, the firm repurchases shares and then *re*issues them. The motivation is often related to tax benefits. For example, by financing a merger with a stock exchange instead of cash, the shareholders of the firm that is taken over can postpone paying a capital gains tax.

is a good measures to describe the amount of funds firms actively raises through debt contracts (and captures most of the change in total liabilities). The change in total liabilities also includes liabilities such as accounts payable and deferred taxes. Using such a broad measure is attractive from a macro perspective, because it sheds light on the cyclical changes in all non-equity external funds raised by firms.

Although most emphasis is on the cyclical behavior of equity and debt financing, we also discuss the cyclical behavior of retained earnings, profits, dividends, change in assets, investment, inventories, and change in employment. Finally, our measure for real activity is real GDP of the corporate sector filtered with the HP filter.

Table 1 provides a set of summary statistics. It documents that smaller firms grow much faster than larger firms and smaller firms finance a much larger fraction of asset growth with equity.

[Table 1 around here]

Correlations of group aggregates and panel regressions.

The correlation between an individual firm variable and aggregate economic conditions is likely to be small because of idiosyncratic shocks. Some aggregation, thus, needs to take place, before an assessment of the cyclical behavior can be made.

We adopt two approaches to do this. The first approach consists of constructing group categories that sort firms by size and generates time series for the size-sorted group aggregates. This approach makes it possible to measure cyclicality using standard statistics used in the macro literature, namely the correlation of HP-filtered residuals.[7] We use the *flow* and the *level* approach to construct time series for the size-sorted firm groups and these are discussed below.

The second approach consists of estimating panel regressions in which size dummies allow the cyclical indicator to affect firms of different sizes differently. There are several differences between the two approaches. One difference is that in the panel regressions each firm has the same weight, whereas in the correlation statistics the larger firms within a group obtain a larger weight. Despite these differences, the two approaches lead to the same conclusions.

Flow approach.

In the flow approach, the period t observation of group j is the amount of funds raised in period t by the firms in group j, scaled by an appropriate variable to indicate the size of the firm group. To be precise, in the flow approach we use the cyclical component of

$$\frac{\sum_{i\in j_t} S^{\$}_{i,t}/p_t}{\sum_{i\in j_t} K_{i,t}}, \tag{1}$$

where $S^{\$}_{i,t}$ is the period t nominal value for firm i for the variable of interest, p_t is the producer price level, $K_{i,t}$ is the period t capital stock of firm i, and j_t indicates the set of firms that belong in group j at the beginning of period t. It is important that the scaling variable is not cyclical, because we are interested in the question whether firms raise more or less funds through the different forms of external finance, not in how relative magnitudes. In the main text, we use the beginning-of-period capital stock, which is fairly acyclical. In the Appendix, it is shown that the results are robust to using a trend value of assets.

[7] Throughout this paper we use a smoothing coefficient of 100 to filter annual data.

A disadvantage of this approach is that the constructed series can be quite volatile and seem to highlight high frequency movements. In particular, the series display several sharp changes that are reversed in the next period, possibly because firms have targets for the firm's debt and equity level. The level approach does not suffer from this problem.

Level approach.

In the level approach, the initial equity value for firm group j is set equal to

$$L_1(j) = \frac{\sum_{i \in j_1} E^{\$}_{i,1}}{p_1}, \tag{2}$$

where $E^{\$}_{i,t}$ is equal to the level of equity for firm i in period t. Subsequent values are defined using

$$L^E_t(j) = L^E_{t-1}(j) + \frac{\sum_{i \in j_t} \Delta E^{\$}_{i,t}}{p_t}, \quad t = 2, \cdots, T. \tag{3}$$

This level variable is then logged and the cyclical component is obtained by applying the HP filter. $L^E_t(j)$ thus measures the accumulated value of the (deflated) amount of funds raised through equity. The level approach for the debt measures follows the exact same steps. If a firm group would consist of a single firm, then the level approach would simply measure accumulated net debt (or equity) issuance, that is, the current debt (or equity) level.

Constructing firm groups.

Firm categories are based on last period's end-of-period book value of assets. We use acyclical boundaries to define firm groups to avoid spurious cyclical behavior. They are constructed by fitting a deterministic trend through the asset values that correspond to the lower and upper percentiles defining the group. The fraction of firms in each quantile is now no longer constant, but the fluctuations of the fractions of included firms are small. The results in which lower and upper bounds are defined by fixed percentiles are similar to those reported here and are discussed in the Appendix.

Firm entry could distort the size dependence of the cyclical properties. For example suppose that new firms are typically small firms and that new firms issue more equity, both plausible assumptions. Then one would find that equity issuance by small firms is cyclical, even if equity issuance by existing firms is not cyclical at all. The decision to go public is likely to be an important factor in obtaining external finance, however, and likely to be cyclical. Therefore, we consider a sample in which firms are only included after they have been in the Compustat data set for more than three years and we consider a sample in which new firms are included.[8]

II. Results using standard business cycle statistics

This section documents the cyclical behavior of firm finance using the correlation between the HP-filtered group aggregates and HP-filtered corporate GDP.

[8] Compustat often records the year the firm goes public as well as the two years prior to the initial public offering.

Cyclical behavior of debt.

The results for the cyclical behavior of debt when recently listed firms are included are reported in Table 2. The results are similar when recently listed firms are excluded; therefore we report these results in the Appendix. Throughout this paper, coefficients that are significant at the five percent level are displayed using a bold font. The top (bottom) half of the table reports the results for the level (flow) approach. As documented in Table 2, we find for both debt measures, for both the level and the flow approach, and using both current lagged and next year's GDP that debt issuance is significantly procyclical for the [0,95%] group. Moreover, for the subgroups that are part of the bottom 95% most of the correlation coefficients are also significantly positive. Results for both the top 5% and the top 1% are different. For these firm groups we find significant negative coefficients for some debt measures and approaches.

Figure 1 plots the cyclical components of total debt issuance for the bottom quartile and the [75%,90%] firm group. As documented in the figure, the cyclicality of debt issuance is quite similar for both firm groups despite the difference in size. The magnitude of the cyclical debt fluctuations is somewhat larger for the larger firms, but the panel regressions discussed in Section 4 are better suited to measure the magnitudes of cyclical swings.

[Figures 1 & 2 around here]

[Tables 2 & 3 around here]

Cyclical behavior of equity for the bottom 90%.

The differences between the different firm groups are larger for equity. Therefore, we review the results for the bottom 90% and the top 10% separately.

We start with the sample that includes the recently listed firms for which the results are reported in Table 3. The first equity measure is the net change in total equity (excluding retained earnings). The second equity measure, referred to as "equity*", is the first measure minus dividends. We find that all 48 correlation coefficients for the firm groups in the bottom 90% are positive and 34 of them are significant; of the 16 contemporaneous correlation coefficients 14 are significant at the 5 percent level.

For the flow approach, the correlation of equity issuance with next period's GDP is more significant than the correlation with current GDP, a pattern that is not observed for the level approach. This makes sense given that an increase in the net change in equity in period t will affect the level of firm equity for several periods.

Figure 2 plots the cyclical components of the net change in equity for the firm groups with the smallest and the largest firms in the bottom 90% together with the cyclical component of GDP. It shows that the different cyclical behavior of the larger firms is especially clear in the second half of the nineties. Both firm groups were slow to increase equity issuance during this particular economic expansion, but the [75%,90%] group only increased equity issuance after the bottom group had done so and only after the cyclical component of GDP had reached its peak.

Now consider the sample that excludes recently listed firms for which the results are reported in Table 4. We find that all contemporaneous correlation coefficients are positive for each of the bottom three quartiles for both equity definitions and for both the level and the flow approach. For the level approach, we find that these contemporaneous correlation coefficients are significant at the 5 percent level. There are also several significant coefficients using last and next period's value of GDP. Significance levels are lower using the flow approach. For example, for the change in equity the contemporaneous correlation is significant at the 5 percent level for the second quartile, but only significant at the 12 (10) percent level for the first (third) quartile.

[Tables 4 & 5 around here]

For the fourth group in the bottom 90% the correlation coefficients are substantially lower; for the change in equity minus dividends the correlation coefficients are even negative for the level approach, although insignificantly so.

Cyclical behavior of equity for the top 10%.

The results for the three groups in the top 10% are not very robust. But there are several indications of *counter*cyclical equity issuance, especially for the top 1%. For example, Tables 3 and 4 document that for the level approach three of the four contemporaneous correlation coefficients are significantly negative and all correlation coefficients between the two equity measures and next period's GDP are significantly negative. The number of firms in this group is very small (around 30) and results are affected by specific events such as the enormous equity issuance of AT&T in the run up of its forced breakup in 1983 (i.e., during an economic downturn).[9]

Cyclical behavior of aggregate equity issuance.

The results for the bottom 90% indicate that equity issuance is procyclical, but this is clearly not the case for the aggregate series. In particular, there are several negative correlation coefficients for aggregate equity issuance. This is caused by the different behavior of firms in the top 10% and in particular by firms in the top 1%. As mentioned above, several coefficients for the top 1% are significantly *negative*. There are only a few firms in the top 1%, but their size is so enormous that their behavior strongly affects the behavior of the aggregate series.

Alternative equity measures.

Table 5 reports the results for the gross and net sale of stock, both when recently listed firms are excluded and included.[10] The sale of stock measure is clearly procyclical in the bottom 95%. A difference with our preferred equity measures is that the sale of stock measure tends to lead the cycle. For the net sale of stock measure, i.e., the one criticized in Fama and French (2001) and Fama and French (2005), several coefficients are significantly negative. Interestingly, even for this measure there is evidence of procyclical equity issuance for the smaller firms. In particular, when recently listed firms are included, then the correlation of net sale of stocks and next period's GDP is significantly positive for the two firm categories in the bottom 50%.

Cyclical behavior of retained earnings, profits, and dividends.

As documented in Table 1, retained earnings are an important form of firm finance. Although retained earnings play on average no role in financing assets for firms in the

[9] In the period from 1971 to 1983, equity issuance by AT&T Corp is always a large part of equity issuance in the top 1% and is never less than 21 percent of equity issuance in this group. In the years before the break-up of AT&T, equity issuance of AT&T as a fraction of equity issuance of the top 1% reaches 72 percent. Equity issuance of other firms in the top 1% also increase during this downturn. During the recession of the early nineties, equity issuance in the top 1% again increases sharply, whereas equity issuance of AT&T displays a moderate increase. The 20001 recession resembles the downturn of the early eighties in that equity issuance of the top 1% displays a sharp increase, which in large part is due to an increase in equity issuance by AT&T.

[10] We only report results for the flow approach, because the level approach is less appropriate for variables that are not net measures. The gross sale of stock measure is obviously not a net measure, and—as pointed out in footnote 6—the net sale of stock is not a true net measure either.

bottom and second quartile, they finance on average 14 and 19 percent of asset growth for the [50%,75%] and the [75%,90%] firm group, respectively. This raises the question, whether internal, like external, finance is procyclical. To answer this question, we analyze the cyclical behavior of profits and its two components, retained earnings and dividends. The results are reported in Table 6. It is shown that these three variables are procyclical and leading the cycle for most firm categories. For firms in the first two quartiles, however, there is evidence of countercyclical behavior for all three variables.

[Tables 6 & 7 around here]

The countercyclicality of profits for the smaller firms is due to behavior in the second half of the nineties when this group's profits plummet while the cyclical component of GDP still rises. Interestingly, the cyclical component of aggregate profits also does not rise during this period and also falls before GDP drops, although it lags the drop in profits of the small firms. In the Appendix, we show that for profits and retained earnings the results change when the sample is extended to include the seventies. In particular, the procyclicality and volatility are substantially higher in the seventies (and early eighties).

Cyclical behavior of real firm variables.

In Table 7, the results for assets, investments, inventories, and employment are reported. Almost all variables are strongly and significantly procyclical for all firm groups. The exception is again the top 1%; for example, the correlation between assets and next period's GDP is significantly negative.

III. Panel regressions

The correlation coefficients discussed so far characterize cyclical behavior using standard business cycles measures. What is lacking is a quantitative assessment of the cyclical movements, how the magnitude of the cyclical movements in the financing variables compare to the magnitude of the cyclical movements in variables such as assets and firm investment, and how the magnitudes of the changes in these variables over the business cycle compare to the magnitudes of the changes in response to idiosyncratic shocks. In this section, we use panel regressions to provide such an assessment.

A. Background and motivation

We adopt the well known regression specification used to study the effect of cash flows (i.e., profits) and Tobin's Q on investment. We allow coefficients to vary with firm size and replace the time fixed effect, that is used in the typical specification, by a business cycle measure to analyze cyclical dependence.[11] As dependent variables we consider the change in total assets, its three financing sources, and investment. This approach not only allows us to provide a quantitative assessment of the cyclical variations in firms' financing sources, but also to compare these variations with those associated with changes in lagged cash flows and changes in Tobin's Q. We adopt a relatively simple regression equation with only a few control variables. The simplicity enhances the transparency of our empirical results, but limits us in giving a structural interpretation. In particular, we cannot establish whether size is important in itself or proxies for not-included firm characteristics.

[11] In the Appendix, we document that the effects of cash flows and Tobin's Q on the regressands are hardly affected by this replacement of the time fixed effects with the cyclical indicator, except for the coefficients of some of the largest firms.

Steven M. Fazzari, R. Glenn Hubbard and Bruce C. Petersen (1988) argue that positive effects of cash flows on investment can be explained by the presence of agency problems that prevent firms from obtaining external finance for all profitable projects. The literature has pointed out, however, that changes in cash flows can also be a measure of changes in future profitability.[12] Although we find that cash flows are only weakly correlated with Tobin's Q, our results indicate that cash flows have—at least in the short term—predictive power for profitability. Tobin's Q as well as cash flows are, thus, likely to be indicators of future firm profitability. Similarly, Guido Lorenzoni and Karl Walentin (2007) point out that changes in Tobin's Q can—like cash flows—signal changes in the importance of agency problems. Our analysis does not allow us to disentangle the different reasons that cause cash flows and Tobin's Q to change. Nevertheless we think it is important to establish the empirical comovement of the firms' financing sources with Tobin's Q and cash flows and that useful insights can be gained from these empirical findings.

B. Specification of regressions

The specification of the regression equation is the following

$$\frac{V_{i,t}}{A_{i,t-1}} = \alpha_{0,i} + \sum_{j=1}^{J} I_{i,t}(j) \left\{ \begin{array}{c} \alpha_{j,t}t + \alpha_{j,t^2}t^2 + \alpha_{j,Y^c}Y_t^c \\ +\alpha_{j,CF}\left(\frac{CF_{i,t-1}}{A_{i,t-2}} - \overline{\frac{CF_{j,t-1}}{A_{j,t-2}}}\right) \\ +\alpha_{j,Q}\left(Q_{i,t-1} - \overline{Q_{j,t-1}}\right) \end{array} \right\} + u_{i,t}. \tag{4}$$

$V_{i,t}$ is the variable of interest and we consider investment, change in equity, change in total liabilities, retained earnings, and change in total assets. $I_{i,t}(j)$ is an indicator function that takes on a value equal to 1 if firm i is a member of group j and we use the same seven firm groups as used above. For the cyclical measure, Y_t^c, we use HP-filtered GDP scaled so that its minimum observed value is equal to 0 and its maximum observed value is equal to 1.[13] The scaling ensures that the coefficient α_{j,Y^c} measures the change in the dependent variable when the economy moves from the worst to the best observed aggregate conditions. We use lagged cash flows, $CF_{i,t-1}$, and end of last period's value of Tobin's Q, $Q_{i,t-1}$.[14] To remove the effect of aggregate conditions on these two variables, we subtract from each the group mean in the corresponding period. That is, we measure how the firms' cash flow and Tobin's Q measures behave *relative* to the observed values of the other firms in the same group. Firm level variables are scaled by end of last period's total assets. Even though the variables are scaled by total assets, they display trends. Therefore, we add a linear and a quadratic trend as explanatory variables.

C. Results using panel regressions

Table 8 reports the results for investment and asset growth and Table 9 reports the results for retained earnings, debt finance, and equity finance. Each cell contains a

[12] In fact, methodologies have been developed to disentangle the role of cash flows as a predictor of future profitability and the availability of internal finance. Exemplary papers are Simon Gilchrist and Charles P. Himmelberg (1995) and Simon Gilchrist and Charles P. Himmelberg (1998).

[13] HP-filtered GDP is the most common way to characterize the stance of the business cycle. Since it is a two-sided filter, it could be correlated with future observations of $u_{i,t}$, but this is only a minor problem in a panel regression. In fact, results are very similar when we use a quadratic trend to estimate the cyclical component of GDP.

[14] The literature often uses current cash flows, but we use lagged cash flows to reduce endogeneity problems.

column with three numbers. The first number is the regression estimate, the second number reports the effect on the dependent variable of a one standard deviation change in the regressor,[15] and the number in italics is the t-statistic. In the main text, we discuss the results when recently listed firms are not included in the sample. By excluding newly listed firms, we make the sample less representative, but by not considering IPOs the results are better suited to evaluate theories about the frictions that existing firms face in raising external finance over the business cycles. In the Appendix, we document that the cyclicality of debt and equity issuance only become stronger if newly listed firms are included.

[Tables 8 & 9 around here]

Cyclicality.

Scaling the financing variable by total assets makes it more difficult to find a procyclical pattern, since total assets are itself procyclical. Nevertheless, equity issuance is procyclical for the five categories in the bottom 95% with the α_{j,Y^C} coefficients of the bottom two quartiles being highly significant. As documented in the Appendix, if recently listed firms are included in the sample then the α_{j,Y^c} coefficients for each of the firm groups in the bottom 95% are significant at the 5 percent level. Debt issuance is also procyclical and in fact significantly so for all firm categories.

For equity financing, we find that the cyclical changes are larger for smaller firms. In particular, equity issuance as a fraction of assets increases by 4.0 (0.83) percentage points for firms in the bottom (third) quartile, when the economy moves from the lowest observed level of Y_t^c to the highest observed level and increases with 1.0 (0.2) percentage points when Y_t^c increases with one standard deviation. Although debt issuance is more cyclical, the differences across the different groups are smaller. Moreover, the magnitude of the coefficients does not decrease monotonically with firm size.

Investment is procyclical for all firm categories and significantly so for all groups. Mark Gertler and Simon Gilchrist (1994) argue that the responses following a monetary tightening are stronger for smaller firms. We find a non-monotone pattern of responses. The increase in investment when the cyclical indicator increases is actually somewhat smaller for firms in the bottom quartile then for firms in the second quartile. When firms in the bottom quartile are excluded, however, the coefficients of investment are monotonically declining for firms in the bottom 90%. In particular, when Y_t^c increases from 0 to 1, i.e., the maximum observed change, then investment as a fraction of total assets increases with 1.5 percentage points for firms in the bottom quartile. For the other three groups in the bottom 90% the increases are 2.2, 2.0, and 1.7 percentage points, respectively. As documented in the Appendix, we find a monotonic negative relationship between firm size and the magnitude of the investment response to the cyclical indicator, when the sample is extended to include the seventies.

Interestingly, changes in (the book value of) total assets vary much more over the business cycle than investment. For example, when Y_t^c increases from 0 to 1, then investment of firms in the second (third) quartile increases with 2.2 (2.0) percentage points (as a fraction of firm assets), while assets increase with 13.1 (9.1) percent. The relationship between firm size and the cyclical change in assets follows the same non-monotonic pattern as observed for investment. During a boom, firms, thus, acquire a substantial amount of financial assets in addition to more real assets. Since the change in total assets equals the sum of additional financing (internal plus external), total additional financing,

[15] For output this is the standard deviation of Y_t^c across time and for the two firm variables this is the average (across time) of the cross-sectional standard deviation.

thus, also exceeds the increase in investment.[16]

For all firm categories, this increase in assets is mainly financed by an increase in liabilities. For smaller firms a substantial fraction is also financed by equity issuance. For example, for firms in the first quartile we find that 54 percent of the increase in assets is financed by equity, 74 percent by an increase in liabilities, and there actually is a substantial reduction in internal finance. As firm size increases, equity issuance becomes less cyclical and internal finance becomes more cyclical; for firms in the third quartile, only 9 percent of the increase in assets is financed by equity, 70 percent by debt, and 13 percent by retained earnings.[17]

Our finding that there is pressure on profits and retained earnings for small firms during an expansion is likely to be related to our finding discussed in the previous section that investment of firms in the bottom quartile are not as cyclical as investment of firms in the second quartile. As discussed in detail in the Appendix, these results are driven to a large extent by what happened during the IT boom and bust in the nineties.

Comovement investment and assets with lagged cash flows & Tobin's Q.

Lagged cash flows have a positive and significant effect on investment for all firm groups. A one standard deviation increase in firm cash flows increases investment with roughly one percentage point for all firm groups. When we look at a one percentage point increase in cash flows (scaled by assets), then we find that the effects are increasing with firm size.[18]

Most interesting for our purposes is to analyze how cash flows and Tobin's Q affect financing sources and how changes in these financing sources relate to the observed changes in investment. We start by looking at the change in total assets, which of course equals the combined change in the three financing sources.

Increases in both cash flow and Tobin's Q are associated with large significant increases in assets. There is a strong dependence on firm size. For firms in the bottom quartile, changes in Tobin's Q have a large impact on assets, whereas the effect of cash flows on assets is much smaller. In particular, a one standard deviation increase in Tobin's Q corresponds to a 19.2 percent increase in assets and a one standard deviation increase in cash flows corresponds to a 1.6 percent increase in assets. The coefficients for Tobin's Q decrease sharply with firm size, whereas the coefficients for cash flows are increasing with firm size. A possible explanation for the latter result is that cash flows are a better indicator for future long-term profitability for larger firms.

Interestingly, we find for both regressors and for all firm categories that the increase in assets is substantially larger than the increase in investment, similar to the effects of changes in Y^c. This means that increases in cash flows as well as increases in Tobin's Q are associated with firms obtaining a lot more financing than is needed to finance the increase in current-period investment.

Comovement retained earnings with lagged cash flows & Tobin's Q.

The effects of lagged cash flows and Tobin's Q on profits, i.e., the *potential* amount of internal finance, turns out to be very similar to the effects of these two variables on

[16] The difference is too large to be explained by changes in other real assets such as inventories, short-term investments, and intangibles.

[17] Because we winsorize the data, the observations are not exactly the same in each regression, which in turn implies that the coefficients of the three financing sources do not exactly add up to the corresponding coefficient in the asset equation. In the Appendix, we report the results when the data are not winsorized.

[18] The two results are consistent with each other, because the standard deviation of cash flows is higher for smaller firms.

retained earnings, i.e., the *actual* amount of internal finance. To save space we only report the results for retained earnings.

First, consider all firm groups except the bottom quartile. Increases in both lagged cash flows and Tobin's Q are associated with increases in retained earnings (and current-period cash flows) that exceed the increase in investment, but *not* the increase in assets.[19] That is, for all these firm groups, we find that increases in lagged cash flows and Tobin's Q are associated with increases in external finance.

Next, consider firms in the first quartile. An increase in lagged cash flows leads, just as it does for larger firms, to an increase in retained earnings that exceeds investments. In fact, this increase in internal finance is so large that it exceeds the increase in assets, which means that external finance actually decreases. The increase in Tobin's Q has virtually no effect on retained earnings, which means that the total increase in assets is financed with external funds.

Comovement external finance with lagged cash flows & Tobin's Q.

The consequences of the above results for the total change in external finance can be summarized as follows. The effects of changes in Tobin's Q on assets are decreasing with firm size. The fraction of these increases in assets that is financed with retained earnings is equal to 0, 19, 29, and 37 percent for the first three quartiles and the [75%,90%] group, respectively. Thus, changes in Tobin's Q are associated with large changes in external finance, especially for the smaller firms. In contrast, the effects of lagged cash flows on assets are *increasing* with firm size. How the fraction that is financed with internal funds varies with firm size also differs from the results for Tobin's Q. In particular, the fraction of the increase in assets following an increase in lagged cash flow that is financed with retained earnings is equal to 481, 64, 25, and 22 percent for the first three quartiles and the [75%,90%] group respectively. Thus, in contrast to the results for Tobin's Q, the effects of changes in lagged cash flows on external finance is increasing with firm size and starts with a negative effect for firms in the bottom quartile.

We now turn to the question how these changes in external finance are split between changes in equity and debt financing. We start with changes in Tobin's Q. It is not surprising that an increase in the valuation of future earnings is seen as an opportunity for firms to raise new equity. This is especially the case for smaller firms. The fraction of the increase in assets associated with an increase in Tobin's Q that is financed by an increase in equity is equal to 71, 51, 37, 24 percent for firms in the [0, 25%], [25%,50%], [50%,75%], and [75%,90%] firm groups, respectively. The fraction financed by liabilities increases from 21 percent for the smallest firms to 35 percent for firms in the [75%,90%] group.

For firms in the bottom quartile, a one standard deviation increase in lagged cash flows corresponds to a 1.6 percent increase in assets and a 7.8 percentage point increase in retained earnings (scaled by lagged assets), so at least one of the external financing categories has to decrease. We find that debt increases with 1.8 percentage points and equity decreases with 7.6 percentage points, both highly significant. Additional cash flows, thus, lead to a strong substitution out of equity for the smallest firms in our sample.

For the other groups, increases in last-period's cash flows are associated with increases in assets that exceed those in retained earnings. For the second quartile we find, like we do for the bottom quartile, that the change in equity finance is negative. For the other firms groups it is positive, but it never is a substantial fraction of the increase in assets.

[19] The only exception is the [90%,95%] group for which the effect of cash flows on retained earnings is slightly less than the increase in investment.

In particular, the increases in equity are 15 percent and 20 percent of the increase in assets for the third quartile and the [75%,90%] group.

Robustness exercises.

As documented in the Appendix, the results are similar when the firm's capital level is used as the scaling factor. Scaling by the lagged capital stock has the advantage that the variables of interest are expressed relative to a less cyclical variable, but has the disadvantage that it becomes harder to interpret the magnitudes of the estimated coefficients.

Ideally we would use firm-specific trends, but this is difficult given that firms enter and exit and some are only in the sample for a short period. As a robustness exercise, we estimate a system in first differences, but still include a firm fixed effect, which then captures a linear firm-specific trend. The results are very similar to those based on Equation (4) and are reported in the Appendix.

Our benchmark specification is based on the data set that excludes firms that have been in the sample for three years or less and we exclude the seventies. As documented in the Appendix, the results are very similar when the full sample, that starts in 1971, is used and when new entrants are included in the sample.[20]

IV. Relation to the literature

Consistent with our results, Hyuk Choe, Ronald W. Masulis and Vikram Nanda (1993) document that both the volume and the frequency of equity issuance is higher during NBER expansions than NBER recessions.[21] Using the flow of funds data from the Federal Reserve Board, Jermann and Quadrini (2006) find that aggregate equity issuance is countercyclical.[22] The equity issuance series from the flow of funds are affected by leveraged buyouts.[23] Merger financing is often much larger than normal financing activities and, as pointed out by Andrea L. Eisfeldt and Adriano Rampini (2006), merger activity is strongly procyclical. Malcom Baker and Jeffrey Wurgler (2002) even claim that *"mergers tend to drive the flow of funds series"*. Another reason why the net equity issuance series of the flow of funds is not the most suitable for our purpose is that, like the net sale of stock measure, it is not a comprehensive measure and does not include all possible ways through which firms raise equity.[24]

To document the quantitative importance of mergers, we obtained from the Federal Reserve Board some of the data used to construct the published series.[25] The starting

[20] All variables used in the regressions are winsorized at the bottom and top 1% of their respective distributions. In the Appendix, it is shown that the results are similar when the data are not winsorized.

[21] Figures 1 and 2 make clear that there is a strong correlation between NBER recessions and next period's value of the cyclical component of GDP. However, Choe, Masulis and Nanda (1993) use a narrow gross sales series, namely common stock issues, which limits the relevance of their findings.

[22] Jermann and Quadrini (2006) express their measure as a fraction of GDP, which make it more likely to find a countercyclical equity measure. This modification is less important than the use of aggregate data.

[23] We correct for mergers by excluding firms involved in a major merger, that is, a merger occurs and the increase in sales of the surviving entity is greater than 50 percent. Mergers mainly affect the behavior of the data series of large firms. Although we correct for mergers, there still is evidence of countercyclical equity issuance for the very largest firms.

[24] This issue is discussed in more detail in the Appendix, which also documents that there are important quantitative differences between the Compustat net change in equity and the flow of funds series for net equity issuance even though we modify our filters to make the Compustat series as similar as possible to the flow of funds series.

[25] We are very grateful to Missaka Warusawitharana for helping us understand the flow of funds data and for providing us with the additional data. A more detailed comparison is given in the Appendix.

point is "gross new equity issuance" by the nonfarm non-financial corporate sector. The published net equity issuance series, available in Table F.102 from the flow of funds, is equal to this series minus retirements, which are equal to the sum of repurchases and retirements due to mergers. The correlation of GDP and gross issues is equal to 0.36, but when we subtract retirements due to mergers from gross issues, then the correlation drops to -0.22, an enormous difference. When we also subtract repurchases then the correlation drops to -0.41.

Using all seasoned convertible and non-convertible debt offerings, Choe, Masulis and Nanda (1993) find debt issuance to be countercyclical.[26] It is possible that by looking at seasoned offerings Choe, Masulis and Nanda (1993) overemphasize the largest firms.[27]

Korajczyk and Levy (2003) estimate a complex model with constrained and unconstrained firms and study the effect of macro variables on the probability of issuing equity or debt conditional on the firm having either an equity or debt issuance larger than 5 percent of book assets but not both. The macro variables used are not typical measures of the business cycle. This and the complex structure of their empirical analysis makes it difficult to compare their findings with ours.

V. Conclusion

This paper shows that one obtains a robust set of empirical findings about the cyclicality of firm financing as long as one controls for firm size. In addition, it provides a rich set of empirical findings that should be helpful to build and evaluate theoretical models about firm financing. The remainder of this section discusses this in more detail.

Theory has ambiguous predictions about the cyclicality of external finance. The reason is that there could be a substitution between the different forms of external finance; one financing component could, thus, be countercyclical *even* if the total amount of external financing is procyclical. In fact, Jermann and Quadrini (2006) build a theory in which the constraint on *debt* financing is relaxed during an expansion so that equity financing is predicted to be countercyclical. In contrast, Levy and Hennessy (2007) build a theory in which it is the constraint on *equity* financing that is relaxed during a boom. Francisco Covas and Wouter Den Haan (2007) build a model in which debt and equity are both procyclical and—consistent with the results in this paper—equity issuance is more procyclical for smaller firms.

Another important empirical result that should be taken into account in thinking about business cycles is that during economic expansions firms' external financing increases considerably more than investment. The increase in firms' financial assets during a boom can serve as a buffer to insure against future negative shocks. The counterpart of this observation is, of course, that the decline in financial assets during economic downturns will make it more difficult to withstand further negative shocks. These empirical findings suggest the need to develop models in which the ability of the firm to change its financial assets in response to shocks is taken seriously.

Current business cycle models with financial frictions in firm financing typically have a representative firm, but it is only a matter of time before heterogeneity across firms in theoretical models is more common. Our empirical findings on how firm variables such as debt and equity financing as well as total assets and investment respond to changes in

[26] They use data over the 1971-1991 period from the Registered Offering Statistics (ROS) data base provided by the Securities and Exchange Commission.

[27] The finding that large firms issue more debt on the public market during economic downturns is consistent with Anil K. Kashyap, Jeremy C. Stein and David W. Wilcox (1993), who point out that during a monetary tightening large firms substitute bank loans for commercial paper.

the firm's (lagged) cash flows and Tobin's Q should be useful in building and evaluating such models. We mention three (sets of) findings, which are particularly important.

First, similar to the responses of asset growth and investment to a change in aggregate conditions, we find that changes in lagged cash flows and Tobin's Q correspond to larger changes in assets than investment, again highlighting a buffer role for financial assets. Since we express the values for cash flow and Tobin's Q relative to the corresponding firm group averages, these changes in cash flows and Tobin's Q are idiosyncratic not aggregate shocks.

Second, following an increase in Tobin's Q the increase in firm assets is financed for a substantial part by equity and the share financed by equity is higher for smaller firms. For example, for firms in the bottom (second) quartile the increase in assets is financed 71 (51) percent with equity.[28] This relative increase in equity financing observed for small firms suggests that an increase in Tobin's Q reduces for these firms the frictions in raising equity relative to the frictions in raising debt.

Third, following an increase in lagged cash flows there is a relative decrease in equity financing and even an absolute decrease for firms in the bottom two quartiles. Given the persistence of cash flows it is not surprising that there is an increase in financing with internal funds, i.e., retained earnings, but it is interesting to observe that debt financing by firms in the bottom two quartiles increases whereas equity financing decreases. These results suggest that an increase in firm profitability that is *not* accompanied by an increase in Tobin's Q corresponds to an decrease in the frictions of raising debt relative to the frictions in raising equity. Obviously, this reasoning is speculative and is mainly meant to make clear how our empirical findings can be used to confront theory.

The use of firm level data allows us to form an estimate of the range of possible responses of firm variables during an economic downturn. Consider a severe recession, namely a three standard deviation decrease in Y^c. For firms in the bottom quartile, this implies on average a 5.5 percent drop in assets and a 3 percentage points drop in equity as a fraction of assets. Firms in the bottom quartile that face a one standard deviation drop in the value of Tobin's Q *relative* to the average firm group Tobin's Q face an additional 19.2 percent drop in assets and an additional 13.6 percentage points drop in equity as a fraction of assets. Combining these effects we roughly get a 25 percent drop in assets and a 17 percentage points drop in equity as a fraction of assets.

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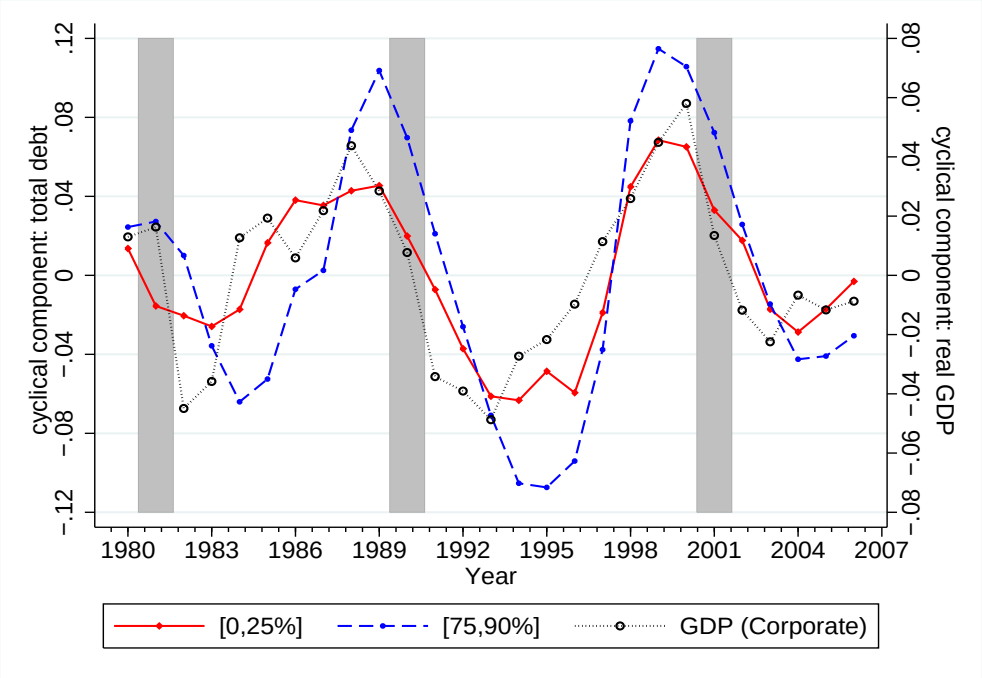
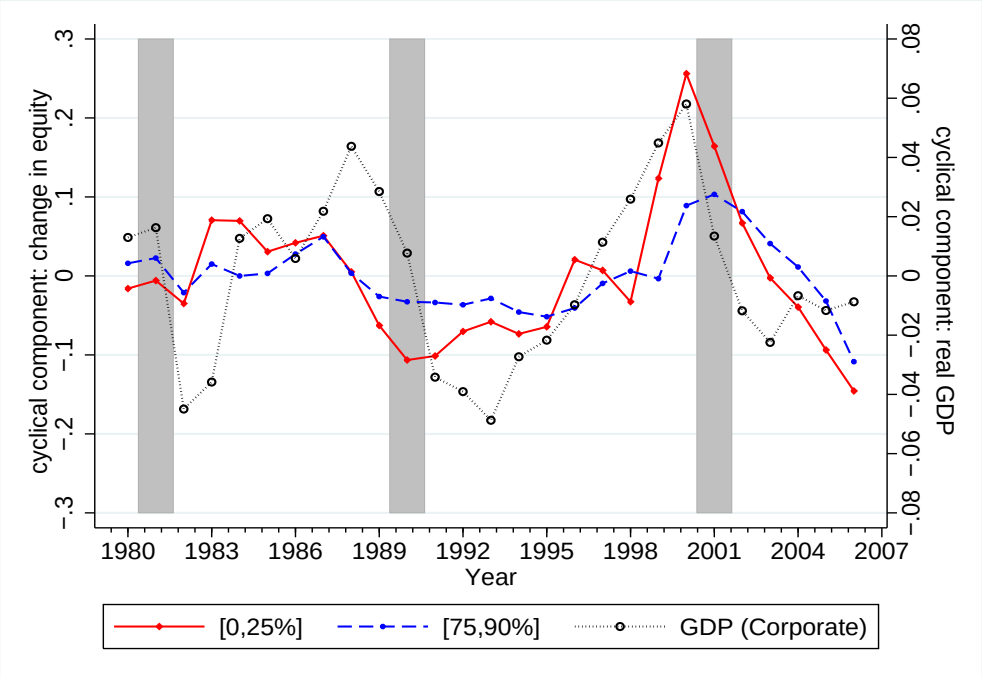
FIGURE 1. CYCLICAL BEHAVIOR OF NET TOTAL DEBT ISSUANCE



Notes: All series are logged and HP filtered. The shaded areas are NBER recessions.

FIGURE 2. CYCLICAL BEHAVIOR OF NET EQUITY ISSUANCE



Notes: All series are logged and HP filtered. The shaded areas are NBER recessions.

Table 1—Summary statistics

	size classes			
	$[0, 25\%]$	$[25\%, 50\%]$	$[50\%, 75\%]$	$[75\%, 90\%]$
# of firms	795	769	772	473
% assets	0.5	1.7	5.9	13.3
$\Delta E/\Delta A$	0.880	0.568	0.346	0.223
$\Delta E^*/\Delta A$	0.870	0.532	0.263	0.087
$\Delta S/\Delta A$	0.724	0.407	0.246	0.188
$\Delta L/\Delta A$	0.275	0.409	0.515	0.605
$\Delta D/\Delta A$	0.109	0.201	0.273	0.310
$\Delta LTD/\Delta A$	0.236	0.580	0.878	1.034
$\Delta RE/\Delta A$	-0.156	0.021	0.144	0.185
I/K	0.430	0.303	0.247	0.204
$\Delta IVT/K$	0.137	0.075	0.048	0.031
$\Delta N/N$	27.2	12.1	8.2	5.2
$\Delta A/A$	26.1	15.0	11.3	9.0

	size classes			
	$[90\%, 95\%]$	$[95\%, 99\%]$	$[99\%, 100\%]$	all firms
# of firms	155	132	32	3128
% assets	12.7	32.1	33.8	100.0
$\Delta E/\Delta A$	0.183	0.128	0.134	0.211
$\Delta E^*/\Delta A$	-0.025	-0.106	-0.338	-0.025
$\Delta S/\Delta A$	0.163	0.138	0.145	0.187
$\Delta L/\Delta A$	0.659	0.661	0.638	0.616
$\Delta D/\Delta A$	0.323	0.279	0.201	0.268
$\Delta LTD/\Delta A$	0.997	0.874	0.784	0.891
$\Delta RE/\Delta A$	0.174	0.225	0.243	0.186
I/K	0.197	0.176	0.151	0.176
$\Delta IVT/K$	0.019	0.013	0.004	0.015
$\Delta N/N$	3.2	1.5	0.0	3.5
$\Delta A/A$	7.7	6.7	4.1	6.9

Notes: A equals the book value of assets; ΔE equals the change in stockholders' equity, which excludes accumulated retained earnings; ΔE^* equals ΔE minus dividends; ΔS equals sale of common and preferred stock; ΔL equals the change in the book value of total liabilities; ΔD equals the change in total debt; ΔLTD equals gross long-term debt issuance; ΔRE is the change in the balance-sheet item for retained earnings; I/K equals capital expenditures divided by capital; ΔIVT equals the change in total inventories; K equals (net) property, plant and equipment; $\frac{\Delta N}{N}$ equals the percentage change in the number of workers. For further details on the data series used, see the Appendix.

TABLE 2—CYCLICAL BEHAVIOR OF DEBT ISSUANCE - ALL FIRMS

size classes	level approach correlation coefficients					
	Δ total debt and			Δ liabilities and		
	GDP_{t-1}	GDP_t	GDP_{t+1}	GDP_{t-1}	GDP_t	GDP_{t+1}
[0, 25%]	**0.87**	**0.81**	**0.57**	**0.85**	**0.85**	**0.58**
[25%, 50%]	**0.88**	**0.85**	**0.56**	**0.84**	**0.87**	**0.62**
[50%, 75%]	**0.88**	**0.76**	**0.45**	**0.86**	**0.83**	**0.52**
[75%, 90%]	**0.88**	**0.65**	0.26	**0.88**	**0.68**	**0.28**
[90%, 95%]	**0.89**	**0.64**	**0.22**	**0.88**	**0.67**	**0.22**
[95%, 99%]	**0.86**	**0.42**	-0.09	**0.69**	**0.29**	**-0.28**
[99%, 100%]	**0.52**	0.02	**-0.54**	**0.33**	-0.11	**-0.58**
[0, 95%]	**0.91**	**0.69**	**0.30**	**0.90**	**0.74**	**0.34**
[0, 99%]	**0.92**	**0.63**	0.18	**0.89**	**0.63**	0.13
All firms	**0.86**	**0.46**	-0.07	**0.76**	**0.37**	-0.18

size classes	flow approach correlation coefficients					
	Δ total debt and			Δ liabilities and		
	GDP_{t-1}	GDP_t	GDP_{t+1}	GDP_{t-1}	GDP_t	GDP_{t+1}
[0, 25%]	0.13	**0.46**	**0.70**	0.07	**0.57**	**0.75**
[25%, 50%]	0.12	**0.61**	**0.72**	0.01	**0.57**	**0.69**
[50%, 75%]	0.30	**0.65**	**0.80**	0.16	**0.66**	**0.81**
[75%, 90%]	**0.43**	**0.67**	**0.71**	**0.39**	**0.74**	**0.75**
[90%, 95%]	**0.49**	**0.71**	**0.77**	**0.44**	**0.77**	**0.81**
[95%, 99%]	**0.62**	**0.70**	**0.51**	**0.51**	**0.76**	**0.54**
[99%, 100%]	**0.66**	**0.68**	0.26	**0.62**	**0.60**	0.29
[0, 95%]	**0.40**	**0.69**	**0.78**	**0.33**	**0.75**	**0.83**
[0, 99%]	**0.52**	**0.74**	**0.73**	**0.44**	**0.82**	**0.78**
All firms	**0.64**	**0.81**	**0.64**	**0.57**	**0.81**	**0.65**

Notes: Coefficients significant at the 5 percent level are in bold.

Table 3—Cyclical behavior of equity issuance - all firms

size classes	level approach correlation coefficients: Δ equity and GDP_{t-1}	Δ equity and GDP_t	Δ equity and GDP_{t+1}	Δ equity* and GDP_{t-1}	Δ equity* and GDP_t	Δ equity* and GDP_{t+1}
[0, 25%]	0.41	**0.53**	**0.45**	0.39	**0.53**	**0.47**
[25%, 50%]	**0.56**	**0.57**	**0.36**	**0.52**	**0.59**	**0.42**
[50%, 75%]	**0.48**	**0.43**	0.23	0.32	**0.45**	**0.39**
[75%, 90%]	**0.50**	**0.41**	0.20	0.08	**0.37**	**0.61**
[90%, 95%]	**0.51**	**0.30**	0.03	0.30	0.06	-0.17
[95%, 99%]	0.24	0.13	0.02	**0.26**	-0.00	-0.26
[99%, 100%]	-0.00	**-0.36**	**-0.39**	0.03	**-0.30**	**-0.39**
[0, 95%]	**0.54**	**0.46**	0.23	-0.20	0.07	**0.40**
[0, 99%]	**0.44**	**0.35**	0.16	**0.42**	0.16	-0.16
All firms	0.36	0.17	0.01	**0.35**	0.06	-0.22

size classes	flow approach correlation coefficients: Δ equity and GDP_{t-1}	Δ equity and GDP_t	Δ equity and GDP_{t+1}	Δ equity* and GDP_{t-1}	Δ equity* and GDP_t	Δ equity* and GDP_{t+1}
[0, 25%]	0.17	**0.42**	**0.33**	0.17	**0.42**	**0.33**
[25%, 50%]	**0.25**	**0.45**	**0.26**	**0.24**	**0.44**	**0.26**
[50%, 75%]	0.31	**0.41**	**0.21**	0.29	**0.40**	**0.22**
[75%, 90%]	0.30	0.34	**0.13**	0.24	0.28	**0.13**
[90%, 95%]	**0.42**	**0.44**	**0.28**	0.20	0.12	-0.10
[95%, 99%]	0.25	0.23	-0.03	0.24	0.14	-0.16
[99%, 100%]	**0.53**	0.10	-0.15	**0.45**	0.04	-0.17
[0, 95%]	**0.31**	**0.45**	**0.28**	0.25	0.37	**0.19**
[0, 99%]	**0.30**	0.39	**0.19**	0.27	0.30	0.07
All firms	**0.41**	0.36	0.11	**0.36**	0.29	0.03

Notes: Δ equity* is the net change in equity, Δ equity, minus dividends; coefficients significant at the 5 perccent level are in bold.

TABLE 4—CYCLICAL BEHAVIOR OF EQUITY ISSUANCE - NEW FIRMS EXCLUDED

size classes	level approach correlation coefficients: Δ equity and GDP_{t-1}	Δ equity and GDP_t	Δ equity and GDP_{t+1}	Δ equity* and GDP_{t-1}	Δ equity* and GDP_t	Δ equity* and GDP_{t+1}
[0, 25%]	0.35	**0.37**	0.21	0.34	**0.37**	0.22
[25%, 50%]	**0.65**	**0.65**	0.40	**0.62**	**0.70**	**0.45**
[50%, 75%]	0.41	**0.28**	0.05	0.25	**0.32**	0.33
[75%, 90%]	0.06	0.03	-0.01	-0.01	-0.22	-0.34
[90%, 95%]	**0.46**	**0.21**	-0.02	0.16	-0.08	-0.21
[95%, 99%]	0.21	0.03	-0.08	0.17	-0.14	-0.36
[99%, 100%]	-0.19	**-0.40**	**-0.42**	0.08	-0.14	**-0.26**
[0, 95%]	**0.40**	**0.26**	0.06	**0.25**	-0.01	-0.25
[0, 99%]	0.31	0.14	-0.01	**0.22**	-0.07	-0.31
All firms	0.21	-0.03	-0.17	0.20	-0.09	-0.32

size classes	flow approach correlation coefficients: Δ equity and GDP_{t-1}	Δ equity and GDP_t	Δ equity and GDP_{t+1}	Δ equity* and GDP_{t-1}	Δ equity* and GDP_t	Δ equity* and GDP_{t+1}
[0, 25%]	0.06	0.24	0.06	0.06	0.24	0.08
[25%, 50%]	0.14	**0.42**	**0.36**	0.12	**0.45**	**0.38**
[50%, 75%]	0.23	0.31	0.13	0.21	0.29	**0.16**
[75%, 90%]	0.19	0.10	-0.03	0.16	0.06	-0.02
[90%, 95%]	**0.42**	0.29	0.09	0.19	0.02	-0.23
[95%, 99%]	0.35	0.17	**-0.13**	0.34	0.11	**-0.19**
[99%, 100%]	**0.25**	0.06	-0.08	**0.25**	0.04	-0.12
[0, 95%]	0.35	0.32	**0.10**	0.26	0.17	-0.11
[0, 99%]	0.37	0.28	0.01	0.32	0.17	-0.13
All firms	**0.40**	0.23	-0.03	**0.36**	0.15	-0.14

Notes: Δ equity* is the net change in equity, Δ equity, minus dividends; coefficients significant at the 5 percent level are in bold.

TABLE 5—CYCLICAL BEHAVIOR OF EQUITY ISSUANCE - ADDITIONAL EQUITY MEASURES

	correlation coefficients; new firms excluded					
size classes	Δ sale of stock and			Δ net sale of stock and		
	GDP_{t-1}	GDP_t	GDP_{t+1}	GDP_{t-1}	GDP_t	GDP_{t+1}
[0, 25%]	0.00	0.22	0.09	-0.19	0.01	-0.07
[25%, 50%]	0.12	**0.39**	**0.43**	-0.04	0.17	0.22
[50%, 75%]	-0.09	0.07	**0.28**	**-0.34**	**-0.40**	-0.21
[75%, 90%]	-0.04	0.07	**0.30**	**-0.38**	**-0.47**	-0.34
[90%, 95%]	**0.17**	**0.29**	**0.32**	0.08	**-0.31**	**-0.56**
[95%, 99%]	-0.05	-0.14	0.23	**-0.37**	**-0.67**	**-0.49**
[99%, 100%]	**0.46**	0.09	**-0.41**	-0.11	**-0.36**	**-0.59**
[0, 95%]	0.05	0.23	**0.36**	-0.25	**-0.42**	**-0.42**
[0, 99%]	0.01	0.12	**0.38**	**-0.36**	**-0.62**	**-0.50**
All firms	0.23	0.22	**0.23**	**-0.29**	**-0.56**	**-0.58**
	correlation coefficients; all firms					
size classes	Δ sale of stock and			Δ net sale of stock and		
	GDP_{t-1}	GDP_t	GDP_{t+1}	GDP_{t-1}	GDP_t	GDP_{t+1}
[0, 25%]	0.09	**0.37**	**0.35**	-0.00	0.27	**0.26**
[25%, 50%]	0.12	0.36	**0.27**	-0.04	0.20	**0.16**
[50%, 75%]	-0.07	0.24	**0.43**	-0.34	-0.12	0.15
[75%, 90%]	0.00	0.18	**0.32**	-0.26	**-0.28**	-0.22
[90%, 95%]	0.13	**0.28**	**0.42**	-0.06	**-0.36**	**-0.42**
[95%, 99%]	0.03	0.10	**0.38**	**-0.31**	**-0.58**	**-0.46**
[99%, 100%]	**0.52**	0.05	**-0.38**	-0.05	**-0.37**	**-0.61**
[0, 95%]	0.06	0.34	**0.44**	-0.23	-0.17	-0.11
[0, 99%]	0.03	0.29	**0.49**	-0.32	**-0.42**	**-0.29**
All firms	0.27	0.36	**0.34**	-0.22	-0.39	**-0.42**

Notes: Results are based on the flow approach; coefficients significant at the 5 percent level are in bold.

TABLE 6—CYCLICAL BEHAVIOR OF RETAINED EARNINGS, PROFITS, AND DIVIDENDS

size classes	flow approach correlation coefficients: retained earnings and GDP_{t-1}	GDP_t	GDP_{t+1}	profits and GDP_{t-1}	GDP_t	GDP_{t+1}
[0, 25%]	**-0.46**	**-0.45**	**-0.29**	**-0.60**	**-0.50**	**-0.38**
[25%, 50%]	**-0.40**	-0.19	0.04	**-0.41**	-0.15	0.16
[50%, 75%]	**-0.33**	0.18	**0.30**	**-0.32**	**0.28**	**0.38**
[75%, 90%]	**-0.30**	0.13	**0.18**	-0.16	**0.29**	**0.29**
[90%, 95%]	**-0.31**	**0.18**	**0.23**	-0.23	**0.34**	**0.42**
[95%, 99%]	-0.20	**0.24**	**0.38**	-0.22	**0.36**	**0.44**
[99%, 100%]	0.16	**0.36**	**0.45**	0.12	**0.50**	**0.48**
[0, 95%]	**-0.34**	0.15	**0.23**	**-0.25**	**0.29**	**0.38**
[0, 99%]	-0.29	**0.21**	**0.33**	-0.24	**0.34**	**0.42**
All firms	-0.12	**0.28**	**0.42**	-0.15	**0.39**	**0.45**

size classes	flow approach correlation coefficients: dividends and GDP_{t-1}	GDP_t	GDP_{t+1}
[0, 25%]	-0.16	-0.09	**-0.33**
[25%, 50%]	0.09	**-0.33**	**-0.30**
[50%, 75%]	0.14	0.10	**-0.23**
[75%, 90%]	0.07	0.14	-0.01
[90%, 95%]	0.05	**0.17**	**0.35**
[95%, 99%]	0.02	**0.54**	**0.60**
[99%, 100%]	0.05	**0.10**	0.14
[0, 95%]	0.06	**0.18**	**0.34**
[0, 99%]	0.07	**0.28**	**0.44**
All firms	0.08	**0.24**	**0.40**

Notes: Coefficients significant at the 5 percent level are in bold; recently listed firms are excluded.

TABLE 7—CYCLICAL BEHAVIOR OF INVESTMENT, ASSETS, AND EMPLOYMENT

	correlation coefficients					
	flow approach			level approach		
size classes	investment and			Δ assets and		
	GDP_{t-1}	GDP_t	GDP_{t+1}	GDP_{t-1}	GDP_t	GDP_{t+1}
[0, 25%]	-0.04	0.24	**0.17**	**0.66**	**0.65**	0.36
[25%, 50%]	**0.16**	**0.70**	**0.65**	**0.80**	**0.82**	**0.52**
[50%, 75%]	**0.35**	**0.55**	**0.41**	**0.85**	**0.82**	**0.49**
[75%, 90%]	**0.43**	**0.57**	0.30	**0.87**	**0.75**	**0.38**
[90%, 95%]	**0.48**	**0.64**	**0.46**	**0.88**	**0.69**	**0.23**
[95%, 99%]	**0.65**	**0.56**	0.08	**0.74**	**0.42**	-0.13
[99%, 100%]	**0.55**	**0.55**	0.17	**0.31**	-0.07	**-0.46**
[0, 95%]	**0.46**	**0.64**	**0.43**	**0.91**	**0.78**	**0.37**
[0, 99%]	**0.58**	**0.67**	**0.33**	**0.89**	**0.68**	**0.19**
All firms	**0.60**	**0.65**	0.28	**0.74**	**0.40**	-0.10
	level approach correlation coefficients					
size classes	Δ inventories and			Δ employment and		
	GDP_{t-1}	GDP_t	GDP_{t+1}	GDP_{t-1}	GDP_t	GDP_{t+1}
[0, 25%]	**0.80**	**0.90**	**0.67**	**0.74**	**0.64**	**0.20**
[25%, 50%]	**0.77**	**0.93**	**0.61**	**0.76**	**0.85**	**0.42**
[50%, 75%]	**0.65**	**0.86**	**0.57**	**0.64**	**0.82**	**0.63**
[75%, 90%]	**0.79**	**0.79**	**0.39**	**0.88**	**0.81**	**0.42**
[90%, 95%]	**0.75**	**0.75**	**0.28**	**0.82**	**0.75**	**0.41**
[95%, 99%]	0.16	0.05	**-0.35**	**0.53**	**0.33**	-0.08
[99%, 100%]	**0.36**	**0.41**	0.02	**0.61**	**0.25**	**-0.36**
[0, 95%]	**0.81**	**0.89**	**0.46**	**0.85**	**0.87**	**0.52**
[0, 99%]	**0.67**	**0.66**	0.15	**0.85**	**0.80**	**0.38**
All firms	**0.65**	**0.65**	0.11	**0.90**	**0.76**	**0.23**

Notes: Coefficients significant at the 5 percent level are in bold; recently listed firms are excluded.

TABLE 8—PANEL REGRESSION RESULTS FOR INVESTMENT AND ASSET GROWTH

	$\frac{I}{A}$	$\frac{\Delta A}{A}$	$\frac{I}{A}$	$\frac{\Delta A}{A}$	$\frac{I}{A}$	$\frac{\Delta A}{A}$
			continued		continued	
	Y^c		$\frac{CF}{A}$		Q	
	1.49	7.36	0.05	0.08	0.012	0.106
$[0, 25\%]$	0.37	1.84	1.00	1.63	2.097	19.245
	5.35	*4.73*	*12.6*	*2.86*	*19.75*	*29.99*
	2.19	13.1	0.08	0.32	0.011	0.089
$[25\%, 50\%]$	0.55	3.28	0.92	3.89	1.367	10.591
	8.97	*11.5*	*15.1*	*10.5*	*20.47*	*22.44*
	2.00	9.12	0.10	0.55	0.014	0.082
$[50\%, 75\%]$	0.50	2.28	0.90	4.93	1.488	8.588
	9.23	*9.69*	*15.1*	*15.2*	*20.48*	*19.15*
	1.69	9.09	0.14	0.70	0.009	0.046
$[75\%, 90\%]$	0.42	2.28	1.09	5.38	0.994	4.919
	6.24	*8.44*	*12.0*	*13.7*	*10.59*	*10.18*
	2.72	13.5	0.21	0.80	0.004	0.017
$[90\%, 95\%]$	0.68	3.37	1.24	4.85	0.478	2.079
	6.82	*6.56*	*10.2*	*8.59*	*3.82*	*2.94*
	1.74	8.71	0.23	0.95	0.001	0.011
$[95\%, 99\%]$	0.44	2.18	1.32	5.46	0.129	1.596
	4.69	*4.09*	*8.14*	*6.28*	*1.10*	*2.59*
	2.16	13.1	0.25	1.29	0.001	-0.001
$[99\%, 100\%]$	0.54	3.28	1.33	7.01	0.205	-0.232
	4.29	*3.86*	*6.30*	*5.52*	*1.24*	*-0.19*
R^2					0.037	0.072

Notes: The top number in each cell gives in percentage points the response when Y increases from the lowest (i.e., 0) to the highest (i.e., 1) value or when $\frac{CF}{A}$ (or Q) increases with 1 percentage point. The second number reports the effect in percentage points of a one-standard deviation change in the regressor. The bottom number in italics is the t-statistic.

TABLE 9—PANEL REGRESSION RESULTS FOR EXTERNAL AND INTERNAL FIRM FINANCE

	$\frac{\Delta E}{A}$	$\frac{\Delta L}{A}$	$\frac{RE}{A}$	$\frac{\Delta E}{A}$	$\frac{\Delta L}{A}$	$\frac{RE}{A}$	$\frac{\Delta E}{A}$	$\frac{\Delta L}{A}$	$\frac{RE}{A}$
				continued			continued		
		Y^c			$\frac{CF}{A}$			Q	
	4.02	5.42	-2.93	-0.36	0.09	0.37	0.075	0.022	-0.002
$[0, 25\%]$	1.01	1.36	-0.73	-7.63	1.82	7.82	13.641	4.013	-0.326
	3.92	*6.41*	*-4.77*	*-18.0*	*5.96*	*27.3*	*29.17*	*12.39*	*-1.25*
	3.92	7.10	1.43	-0.08	0.20	0.20	0.045	0.025	0.017
$[25\%, 50\%]$	0.98	1.78	0.36	-0.99	2.43	2.48	5.399	2.937	2.017
	5.59	*9.72*	*3.40*	*-3.80*	*10.9*	*12.7*	*15.36*	*11.18*	*10.64*
	0.83	6.43	1.23	0.08	0.30	0.14	0.030	0.028	0.024
$[50\%, 75\%]$	0.21	1.61	0.31	0.74	2.68	1.22	3.190	2.968	2.540
	1.72	*9.65*	*3.48*	*3.30*	*13.1*	*6.69*	*9.65*	*11.64*	*13.09*
	0.83	6.80	0.78	0.14	0.40	0.15	0.011	0.016	0.017
$[75\%, 90\%]$	0.21	1.70	0.196	1.07	3.09	1.17	1.201	1.752	1.844
	1.77	*8.39*	*1.92*	*4.58*	*11.7*	*4.90*	*3.86*	*6.12*	*7.93*
	1.65	9.80	1.62	0.01	0.55	0.18	0.002	0.006	0.009
$[90\%, 95\%]$	0.41	2.45	0.41	0.08	3.32	1.07	0.273	0.731	1.165
	1.76	*6.64*	*2.25*	*0.27*	*7.89*	*3.77*	*0.69*	*1.64*	*4.39*
	0.26	5.74	2.41	0.09	0.61	0.30	0.002	0.005	0.004
$[95\%, 99\%]$	0.07	1.44	0.60	0.50	3.50	1.75	0.344	0.738	0.622
	0.26	*4.02*	*4.23*	*1.41*	*8.52*	*3.63*	*1.09*	*1.83*	*2.71*
	-0.02	9.76	3.24	0.27	0.76	0.28	-0.003	0.002	0.002
$[99\%, 100\%]$	-0.01	2.44	0.81	1.48	4.13	1.53	-0.654	0.332	0.293
	-0.02	*3.93*	*3.73*	*2.04*	*4.77*	*2.92*	*-1.11*	*0.40*	*0.85*
R^2							0.295	0.011	0.223

Notes: The top number in each cell gives in percentage points the response when Y increases from the lowest (i.e., 0) to the highest (i.e., 1) value or when $\frac{CF}{A}$ (or Q) increases with 1 percentage point. The second number reports the effect in percentage points of a one-standard deviation change in the regressor. The bottom number in italics is the t-statistic.