Testing the pecking order theory: the impact of financing surpluses and large financing deficits

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Abstract

This paper extends the basic pecking order model of Shyam-Sunder and Myers (1999) by separating the effects of financing surpluses, normal deficits, and large deficits. Using a broad cross-section of publicly traded firms for 1971 to 2005, we find that the estimated pecking order coefficient is highest for surpluses (0.90), lower for normal deficits (0.74), and lowest when firms have large financing deficits (0.09). These findings shed light on two empirical puzzles: first, small firms – although having the highest potential for asymmetric information – do not behave according to the pecking order theory, and second, the pecking order theory has lost explanatory power over time. We provide a solution to these puzzles by showing that the frequency of large deficits is higher in smaller firms and increasing over time. As a result, our findings support a pecking order theory that considers firms' debt capacities.

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1. Introduction

In explaining firms' financing behavior, the pecking order theory has become a generally accepted model of capital structure choice. According to this pecking order theory, firms have no well-defined optimal debt ratio (Myers, 1984). Instead, due to asymmetric information, firms adopt a hierarchical order of financing preferences: internal financing is preferred to external financing. If external financing is needed, firms first seek debt funding. Equity is only issued as a last resort.

The seminal paper by Shyam-Sunder and Myers (1999) introduces an empirical test for the pecking order theory. According to this test, the pecking order implies that firms issue or retire an amount of debt equal to the funds flow deficit, which is the inadequacy of internal cash flows for real investments and dividend commitments. In a simple regression of a firm's net debt issued on the financing deficit, the slope coefficient provides information on the proportion financed by debt of a one dollar increase in deficits and the pecking order implies that this coefficient is close to unity. Using a small sample of firms that survive the entire 1971-1989 period, Shyam-Sunder and Myers conclude that the pecking order model is an excellent first-order descriptor of financing behavior, as they find an estimated pecking order coefficient of 0.75. Frank and Goyal (2003) test the pecking order model using a more comprehensive data set. They find substantially lower coefficients and show that larger firms exhibit more pecking order behavior than smaller firms. This size effect is corroborated by Fama and French (2002). From a pecking order perspective, this relation is counterintuitive as small firms have the highest potential for asymmetric information, which is the actual driver of the pecking order in the Myers and Majluf (1984) model. We refer to the size anomaly as the first

pecking order puzzle. Another finding of Frank and Goyal is that the pecking order model has lost its explanatory power over the years. For the period 1971-1989 their estimated coefficient is 0.28, while for 1990-1998 it is as low as 0.15. Frank and Goyal's analysis does not explain this trend. We consider the decreasing pecking order coefficient over time to be the second pecking order puzzle.

In this paper, we examine whether two modifications in Shyam-Sunder and Myers' (1999) model can solve the puzzles. Our first modification relates to the fact that the model does not discriminate between the effects of financing deficits and financing surpluses. Instead, the model is typically estimated over both surpluses and deficits, and imposes a common homogeneous pecking order coefficient. However, the implications of deficits and surpluses are different: in case of a deficit, a firm has to issue securities, while it repurchases securities when having a surplus. As Myers and Majluf's (1984) theory for the pecking order for issuance decisions differs from a theory on repurchase decisions in Shyam-Sunder and Myers, we allow for an asymmetry between the effects of surpluses and deficits. Our second modification results from Chirinko and Singha (2000), who argue that Shyam-Sunder and Myers' empirical model is flawed for firms with large deficits. In case these firms follow the pecking order, the large financing needs may exceed the unused debt capacity and firms will finance the remainder of the financing needs with equity. However, Chirinko and Singha do not test their predictions. Therefore, our model distinguishes three situations, i.e., firms with surpluses, firms with "normal" deficits, and firms with large deficits. We hypothesize that the pecking order test yields coefficients reasonably close to unity for firms with "normal" deficits, but expect lower coefficients for firms with larger deficits, as these firms are more likely to reach their debt capacity.

We test our capital structure models by using a large panel of US firms taken from Compustat over the period 1971-2005. We corroborate the results of Frank and Goyal (2003) as the estimated pecking order coefficient is 0.26 over the full period, lower in small firms, and decreasing over time. Next, we extend the analysis by estimating the pecking order model for subgroups with deficits and surpluses. We find a strong asymmetry in pecking order behavior. For surpluses the estimated pecking order coefficient is 0.90, while for deficits it is only 0.15. This finding shows that the average estimate of 0.26 hides a substantial degree of asymmetry across financing surpluses and deficits. Next, we test the pecking order model for different deficit sizes. In firms with normal deficits, the pecking order coefficient is around 0.74. In contrast, large deficit firms exhibit a coefficient of 0.09. We find that this low coefficient can be explained by firms' debt capacities: as the financing of large deficits with debt would result in a substantial increase of the debt ratio, firms opt for issuing equity.

The distinction between surpluses, normal deficits, and large deficits appears to explain both pecking order puzzles. The size anomaly results from the fact that large financing deficits are much more common for relatively small firms, while financing surpluses are scarcer for small firms. The second puzzle – that the pecking order model loses explanatory power over time – is also explained by large deficits, as these have become more common in recent years.

Our results are consistent with a pecking order model of financing that incorporates firms' debt capacities. First, the asymmetry between surpluses and deficits is in line with (1) different rationales underlying the pecking order in issue and repurchase decisions, and (2) the fact that a debt capacity is only relevant when firms issue debt, and not when debt is repurchased. Second, the asymmetry between normal deficits and large

deficits is consistent with the limited debt capacity of firms, as firms with large deficits have a higher probability of needing more debt financing than their debt capacity allows for.

The remainder of this paper is organized as follows. In Section 2 we present the pecking order model and its empirical implications. In Section 3 the data are described, and Section 4 describes the empirical results of this study. Finally, we present our conclusions in Section 5.

2. Theory

This section describes some of the empirical and theoretical studies on the pecking order theory, and explains how our paper relates to these studies.

2.1. Pecking order theory

Donaldson (1961) is the first to describe firms' preferences for internal funds over external funds, and firms' preferences for issuing debt over issuing equity. Myers and Majluf (1984) explain these preferences in a theoretical model that deals with capital structure decisions of firms with external financing needs. Myers and Majluf show that firms' managers, when acting on behalf of the current shareholders, pass up good investments in case the new shareholders will capture the benefits of the investment. Consequently, investors will reason that an investment decision without an equity issue signals good news, while issuing shares signals bad news. The latter signal reduces the

price investors are willing to pay for the equity issue, which results in a pecking order of corporate financing: managers will prefer debt to equity.

A pecking order model for repurchase decisions is presented in Shyam-Sunder and Myers (1999). They assume that firms' managers differ in their degree of being optimistic. Managers who are less optimistic than investors do not want to repurchase shares, as they perceive the price as being too high. The optimistic managers, however, want to repurchase shares, hence forcing up stock prices if they try to do so. With the new stock price, there will be fewer managers who are more optimistic than the investors, and the stock price impact of an attempted repurchase increases. In the end, the repurchase price reaches such a high level that none of the managers wants to repurchase equity. Accordingly, all managers end up paying down debt.

When one compares the pecking order theory for issue decisions with the pecking order theory for repurchase decisions, it becomes clear that both theories provide differing rationales. For example, the level of optimism of firms' managers is not required for explaining issuance decisions, while it is an essential part of the pecking order theory for repurchase decisions. An empirical test of the pecking order model should therefore distinguish between issuance and repurchase decisions.

2.2. Testing the pecking order theory

Shyam-Sunder and Myers (1999) aim to capture the pecking order theory in an empirical model that relates financing deficits to net debt issues[1]:

[1] Prior to this model, the pecking order was usually tested with the event study methodology. Most studies find an insignificant market reaction to debt issues, a significantly negative market reaction to equity issues,

$$\Delta D_{it} = \alpha + \beta_{po} * DEF_{it} + \varepsilon_{it}, \quad (1)$$

where DEF_{it} is the financing deficit of firm *i* in year *t*, and ΔD_{it} is the net debt issued for firm *i* in year *t*. Both variables are scaled by assets. In case firms have unconstrained access to debt, the pecking order theory predicts that the amount of debt issued equals the deficit, and hence the pecking order coefficient (β_{po}) equals one, and the intercept term α is zero. In reality, a firm's debt capacity is limited due to financial distress costs. Therefore, Shyam-Sunder and Myers hypothesize that β_{po} is close to one, but not precisely one. For a sample of 157 firms with continuous data over the period 1971-1989, Shyam-Sunder and Myers find an estimated coefficient of 0.75 and conclude that the pecking order model is "an excellent first-order descriptor of corporate financing behavior." Frank and Goyal (2003) substantially extend the sample of firms used to test the pecking order model. Estimating Shyam-Sunder and Myers' regression specification using a comprehensive data set with over 140,000 observations over the period 1971-1998, Frank and Goyal find substantially lower coefficients. Furthermore, they test whether small firms issue less equity than large firms, as investors of smaller firms face more information asymmetry (e.g., Collins et al., 1987; Brennan and Hughes, 1991), and information asymmetry increases firms' reluctance to issue equity (Korajczyk et al.,

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and a significantly positive market reaction to equity repurchases. For overviews of this literature, see Eckbo and Masulis (1995) and Ritter (2003). Another way of testing the pecking order theory is by conducting a survey. Graham and Harvey (2001) survey 392 CFOs and interpret the reported importance of financial flexibility and equity undervaluation in managers' financing decisions as support for the pecking order theory.

1991; Choe et al., 1993). Contrary to this hypothesis, Frank and Goyal find that large firms exhibit more pecking order behavior than small firms. This size anomaly is also found by Fama and French, who consider it a "deep wound" (Fama and French, 2002, p. 30) on the pecking order theory.

Frank and Goyal (2003) also find that the pecking order model loses its explanatory power over the years. Because the average publicly traded firm becomes smaller over time (Fama and French, 2005), the size and time effects can be related. However, Frank and Goyal conclude that the time period effect is not entirely due to the higher amount of small firms in the 1990s: for each of the size quartiles, the pecking order model coefficients are lower after 1989 than before 1989.

2.3. Large deficits and firms' debt capacities

In a critical comment on Shyam-Sunder and Myers' (1999) pecking order model, Chirinko and Singha (2000) show that the pecking order coefficient can be significantly smaller than one even when firms follow the financing hierarchy prescribed by the pecking order model. The rationale is that, if deficits are sufficiently large, firms might be constrained in their ability to issue debt and have to finance the remainder of the deficit with equity. According to Chirinko and Singha, these constraints are specifically high when firms have high leverage ratios. We elaborate on the critique of Chirinko and Singha by empirically showing the influence of large deficits.

Lemmon and Zender (2004) also take firms' debt capacities into account when testing the pecking order theory. They consider a firm as not being financially constrained when it has rated debt outstanding, regardless of the level of the specific

rating. We choose to take an alternative proxy – the size of a deficit – because this proxy is more closely related to the description of a firm's debt capacity, as in Myers (1984) and Chirinko and Singha (2000). In these descriptions of the debt capacity, high levels of debt increase firms' proximity to their debt capacity. We therefore examine the relation between large deficits, firms' leverage ratios, and firms' debt capacities.

3. Data

In our empirical analysis, we employ a broad cross-section of US firms from the Compustat database covering the period 1971-2005. The starting point is 1971 because we require flow of funds data to compute the financing deficit, and these data are not available prior to 1971. We compute the financing deficit as the sum of the change in working capital, the investments, and the cash dividends, minus the internal cash flows. By definition, the financing deficit is equal to the sum of net debt issues and net equity issues. Financing deficits (surpluses) and issues (repurchases) are scaled by the book value of total assets. Regulated utilities (SICs 4900-4999), financial firms (SICs 6000-6999), and individual firm-years with missing values for the financing deficit/surplus, the net debt issues, and the net equity issues are excluded. We further exclude firm-years for which the financing deficit, the change in working capital, the investments, the cash dividends, the internal cash flows, the net debt issues, or the net equity issues exceed 400% of the firm's total book assets. While these requirements make our sample comparable to Frank and Goyal (2003), we deviate from the criteria in Shyam-Sunder and Myers (1999), in which firms are required to provide data in each year of their

sample period. We will revisit this issue in Section 4. Our final sample contains 22,197 firms and covers 233,909 firm-year observations.[2]

[Please insert Table 1 here]

Table 1 presents summary statistics of the fund flow and financing variables in our analysis, and how they are computed from Compustat items. As our data set resembles the data set of Frank and Goyal (2003), Table 1 closely corresponds to their Table 2 (p. 229). Table 1 also shows the composition of the financing deficit and the magnitude of these components in different years. The average internal cash flows and the average working capital decline over the years, while the average cash dividends remain relatively stable over the time period.

Table 2 provides detailed information on the financing deficits and surpluses over the sample period.

[Please insert Table 2 here]

Although the yearly percentage of firms with financing deficits varies between 44% (in 1976) and 65% (in 1997), it does not portray a strong time trend. The average size of the deficits varies substantially over time: it fluctuates around 0.10 over the first ten years of

[2] Several cash flow statement items are recoded as zero if they were reported missing or combined with other data items in Compustat. The data are often coded as missing when a firm does not report a particular item or when it combines items. See Frank and Goyal's Table 8 (2003, p. 242) for the specific cash flow statement items that are recoded.

our sample period, but is around 0.26 over the last ten years. This trend is caused by the growing magnitude of the deficits at the 75th percentile. In the seventies, about 25% of the deficits is larger than 0.12, while in the late nineties this quartile has increased to 0.40.

The average size of the surpluses hardly fluctuates over time. The median is 0.02 or 0.03. Furthermore, the average surplus size is lower than the average deficit size: the overall mean surplus is 0.06 and the overall mean deficit is 0.21. This difference is again caused by the levels of the largest deficits, as large surpluses are virtually absent.

4. Empirical tests

In this section we test the pecking order theory for groups with financing surpluses, non-large deficits and large deficits. We also show the impact of these segregations on the pecking order puzzles.

4.1. The pecking order puzzles

We first replicate Frank and Goyal's (2003) key findings that illustrate the pecking order puzzles. Table 3 shows a replication of Frank and Goyal's Table 6 using our sample of Compustat firms, and provides updated results for the second sub-period starting in 1990. In this table, we present pooled OLS estimates of the pecking order coefficients for different time periods and size quartiles.

[Please insert Table 3 here]

For the entire sample period 1971-2005, the estimated pecking order coefficient is 0.255, which is comparable to the estimates reported in Frank and Goyal. The interpretation of this coefficient is that an increase of the deficit of one dollar will on average be financed with 25.5 cents of debt. Although this pecking order coefficient is significantly different from zero, it is actually evidence against the pecking order model. Apparently, on average 74.5 cents of a one dollar increase in deficits is met by an equity issue.

The additional results in Table 3 highlight the two pecking order puzzles. Before 1989, the estimated pecking order coefficient for the quartile containing the smallest firms is 0.223, while for the largest firms it is considerably higher, viz. 0.763. After 1989, the pecking order coefficient of the largest firms remains relatively high with an estimate of 0.667, against 0.207 for the smallest firms. As the differences in the average pecking order coefficients before and after 1989 are possibly caused by only a few years, Fig. 1 shows the evolution over the years of the estimated pecking order coefficients, using the entire sample of firms.

[Please insert Figure 1 here]

It can be seen that the pecking order model describes most of firms' financing behavior in the seventies, but is a poor descriptor of firms' financing behavior in the eighties and nineties. Although the pecking order coefficient does not decline linearly, Fig. 1 shows a trend of a decreasing impact of the deficit on firms' debt issues over time.

4.2. Deficits and surpluses

To investigate the differences in pecking order behavior for firm-years with financing deficits and firm-years with financing surpluses, we estimate a regression specification that allows for an asymmetry between positive and negative deficits. The following model allows for such an asymmetry

$$\Delta D_{it} = \alpha + \beta_1 * d_{it} + \beta_{po} * DEF_{it} + \beta_{sur} * d_{it} * DEF_{it} + \varepsilon_{it,} \quad (2)$$

where d_{it} is a dummy variable that equals one if $DEF_{it} < 0$, and zero otherwise. The term $\beta_1 * d_{it}$ allows for different intercepts for the samples of deficits and surpluses.

[Please insert Table 4 here]

Table 4 shows our estimation results for Eq. (2). The pecking order coefficient (β_{po}) of 0.155 implies that firms with deficits issue on average 15.5 cents of debt for each additional dollar of the financing deficit. Accordingly, most of the deficits are covered with equity issues. The coefficient estimates are similar in the pre-1989 and post-1989 periods. The coefficient β_{sur} represents the difference in the pecking order coefficients for deficits and surpluses, and is significantly different from zero at the 1% level. For firms with financing surpluses the estimated pecking order coefficient is 0.746 higher than for firms with deficits, and again the effect is similar in the two sub-periods. These results imply that the pecking order coefficient is 0.901 (β_{po}+ β_{sur}) for surpluses. That is, on average 90 cents of a dollar increase of the financing surplus are used to repurchase debt. Overall, firms seem to have a strong preference for buying back debt when there is a

surplus, but do not seem to follow the pecking order when they have a deficit. Hence, we conclude that a correct empirical pecking order specification requires a differentiation between financing deficits and financing surpluses.

The financing deficit is calculated by subtracting the internal cash flows of a firm in a particular year from the sum of the cash dividends, net investments, and changes in working capital in that year. We decompose the deficits and surpluses in Table 5 to investigate how the components differ for firm-years with deficits and firm-years with surpluses. Table 5 also shows means and medians of several other firm characteristics for firm-years with deficits and those with surpluses.

[Please insert Table 5 here]

The results in Table 5 illustrate that – even though the average firm with deficits has lower cash flows – the key determinant for firms to have a deficit is that they invest a large proportion of their capital. Cash dividends do not strongly depend on whether a firm has a positive or a negative deficit. Apparently, firms do not use dividend cuts to finance capital expenditures. Table 5 also shows that median asset sizes do not differ much for firms-years with financing deficits (median of 68 million dollars) and firm-years with financing surpluses (median of 71 million dollars). The average issue size of 0.21, however, is significantly different from the average repurchase size of 0.06. This issue size is likely to have an effect on firms' financing behavior, particularly in case of a deficit, due to firms' debt capacities (Chirinko and Singha, 2000). We investigate the effect of having a large deficit on the pecking order coefficient in Table 6.

[Please insert Table 6 here]

Table 6 presents the pooled OLS estimates of the pecking order model over the full sample period 1971-2005, across different subsamples by deficit and surplus size (excluding firm-years with DEF = 0). We separate firm-years with deficits and surpluses and within these two sets we distinguish between quartiles. The effects of the repurchase sizes show that the estimated pecking order coefficient is 0.789 for the smallest repurchases, 0.881 and 0.815 for repurchases that are around the median size, and 0.923 for the largest repurchase sizes. Apparently, for each quartile of the surplus distribution the pecking order model is a good and similar descriptor of firms' financing behavior. For deficits, we observe a very different pattern. Although the pecking order model appears to provide a reasonable description for smaller issues (pecking order coefficients of 0.601 and 0.741), it is only a weak explanation for somewhat larger issues (coefficient of 0.429). The most striking result, however, is found for the largest deficits. For these largest deficits the estimated pecking order coefficient is only 0.089. This result implies that when firms face large deficits, they issue on average far more equity than debt.

According to Chirinko and Singha (2000), the debt capacity will particularly restrict firms' debt-equity choice when the financing of a deficit with debt causes a firm's leverage ratio to become sufficiently high. However, they do not test this prediction empirically. By computing the leverage ratios that firms would have had if they financed their deficits exclusively with debt, we can investigate whether firms' debt capacities are likely to have a strong influence on firms' financing decisions. Table 7 presents the average and median hypothetical new debt ratios of all firms that have nonzero deficits, and for each quartile of the deficit distribution.

[Please insert Table 7 here]

The median new long-term debt ratio that firms would have had if they covered their deficits exclusively with debt is 0.286. For firms with small, medium small, and medium large deficits these median debt ratios would have been 0.087, 0.225, and 0.297, respectively. For firms with large deficits, the median new debt ratio would have been substantially higher: 0.599. Such a high debt ratio is likely to get the firm into financial distress (e.g., Molina, 2005). Table 7 also compares firms' new debt ratios with the debt ratios of peers, i.e., firms in the same industry (Fama-French 30 industry classification), in the same size quartile (based on assets), and in the same time period (periods of 5 years). If the largest deficits are exclusively financed with debt, the resulting debt ratios are higher than the median of the debt distribution of the firm's peers in 82% of the cases. Furthermore, these hypothetical new debt ratios move 41% of the firms into the top 5% of the distribution of their peers. Therefore, it is likely that firms with large deficits are limited in their ability to issue debt.

4.3. Large financing deficits

Tables 6 and 7 make a somewhat ad hoc distinction between smaller and larger deficits on the basis of the quartiles of the distribution. As a result, a "large deficit" in these tables is empirically defined as being larger than 0.237. To investigate the impact of this cut off point on the resulting estimates for the pecking order coefficient, we extend the pecking order model in Eq. (1) by allowing a different intercept and slope coefficient

for larger deficits, where the threshold between "large" and "non-large" is varied over all possible values. That is, we estimate

$$\Delta D_{it} = \alpha + \beta_1 * b_{it} + \beta_{po} * DEF_{it} + \beta_{largedef} * b_{it} * DEF_{it} + \varepsilon_{it}, \quad (3)$$

with $b_{it} = I(DEF_{it} > x)$, where I(.) is an indicator function (equal to 1 if the condition in parentheses is satisfied, and zero otherwise), and x is a threshold value for the financing deficit that is chosen a priori. Because x is unknown, we vary x between 0.0001 and 2, and investigate the impact on the resulting pecking order coefficients. This procedure is similar to allowing a structural break in the coefficients of a linear model, where the breakpoint is unknown (see Stock and Watson, 2003, Chapter 12). For each value of x, the specification in Eq. (3) provides two pecking order coefficients: one coefficient for observations below a certain deficit level (β_{po}), and one coefficient for observations above a certain deficit level ($\beta_{po} + \beta_{largedef}$). In our estimation we exclude firm-years with financing surpluses. The results of this exercise are summarized in Panel A of Figure 2.

[Please insert Figure 2 here]

Any specific financing deficit level in Fig. 2 represents a threshold level. The solid line gives the coefficient for deficits below this threshold and the dotted line is the coefficient for deficits above the threshold. In the below-threshold sample, we find that as more observations with large deficits are included in the estimation of β_{po}, this pecking order

coefficient decreases.[3] The maximum estimate for β_{po} is 0.734, which corresponds to a financing deficit of 0.059. Hence, if we define a deficit to be large if it exceeds 5.9% of total assets, the estimated pecking order coefficient of the observations with deficits below 0.059 is maximized.[4] Adding firm-years with higher deficits would decrease this pecking order coefficient.

Panel B of Fig. 2 shows the results of a similar regression specification for financing surpluses:

$$\Delta D_{it} = \alpha + \beta_1 * b_{it} + \beta_{po} * SUR_{it} + \beta_{largesur} * b_{it} * SUR_{it} + \varepsilon_{it}, \quad (4)$$

where SUR_{it} is the financing surplus of firm *i* in year *t*, and b_{it} is one if SUR_{it} is larger than a certain surplus level, and zero otherwise. The results confirm the findings of Table 6, as we do not find evidence that the magnitude of the financing surplus has a strong effect on the pecking order coefficients. The findings of Fig. 2 are in line with a pecking order theory that incorporates a firm's debt capacity: the debt capacity limits the debt that can be issued, but does not pose restrictions on the debt that can be repurchased.

To summarize our main findings, we specify and estimate an extended regression model of the pecking order theory, which allows for differential coefficients for firm-years with surpluses (DEF < 0), small deficits (DEF < 0.059), medium deficits (in which

[3] For very small deficits, the pecking order coefficient is highly volatile. This volatility is caused by the observations for which the deficit is practically zero, but where a firm still repurchases an amount of debt.

[4] This pattern is stable over time. We compute the correlation coefficients for seven time intervals of five years for deficit values between 0.01 and 1, and find an average correlation coefficient of 0.96.

firms' debt capacities do limit the firm to some extent) and deficits that have a high probability of posing constraints on firms' use of debt (DEF > 0.237).

$$\Delta D_{it} = \alpha + \beta_1 * d_{it} + \beta_2 * b_{it} + \beta_3 * c_{it} + \beta_4 * DEF_{it} + \beta_5 * d_{it} * DEF_{it} + \beta_6 * b_{it} * DEF_{it} + \beta_7 * c_{it} * DEF_{it} + \varepsilon_{it}, \quad (5)$$

where, d_{it} is a dummy variable that equals one if $DEF_{it} < 0$, and zero otherwise, b_{it} is a dummy variable that equals one if $0.059 < DEF_{it} < 0.237$, and c_{it} is a dummy variable that equals one if $DEF_{it} \geq 0.237$, and is zero otherwise. This regression specification allows the distinction of four effects: an effect of surpluses ($\beta_4 + \beta_5$), an effect of deficits for which firms are not restricted by their debt capacities (β_4), an effect of deficits in which firms' debt capacities do limit the firm to some extent ($\beta_4 + \beta_6$), and an effect of deficits that have a high probability of posing constraints on firms' use of debt ($\beta_4 + \beta_7$). The estimation results for this modified regression model are as follows:

$$\Delta D_{it} = \underset{(0.000)}{-0.002} + \underset{(0.001)}{0.004} * d_{it} + \underset{(0.001)}{0.019} * b_{it} + \underset{(0.005)}{0.088} * c_{it} + \underset{(0.008)}{0.690} * DEF_{it} + \underset{(0.014)}{0.211} * d_{it} * DEF_{it} - \underset{(0.013)}{0.218} * b_{it} * DEF_{it} - \underset{(0.012)}{0.601} * c_{it} * DEF_{it}.$$

White standard errors appear in parentheses. As expected, the pecking order coefficient increases for firms with surpluses, and decreases for firms with high levels of deficits.[5]

[5] We have tested whether the significance of the coefficients in the estimation of Eq. 5 are not driven by variations in firms' market-to-book ratio, total assets, profitability, and tangibility. We estimate Eq. 5 for quartiles of these variables, which results in 16 regression outcomes. We find that the interaction term for large deficits remains significant at the 1% level in all of the 16 regression outcomes. The interaction term

4.4. Explaining the time and size effect

The deviant results for large deficits on firms' financing behavior potentially explain the size and time puzzles, in case the presence of a large deficit is related to firm size and differs over time. We investigate the distributions of deficit sizes for subsamples of firm sizes in Panel A of Fig 3. Panel B shows the distribution of the deficit sizes for subsamples of periods. We calculate the cumulative percentages of observations for financing deficits between zero and two. The lines in Fig. 3 show the percentages of observations that are below the deficit levels on the x-axis. The closer the line is to the x-axis, the higher the proportion of relatively high deficits in a subsample.

[Please insert Figure 3 here]

Panel A of Fig. 3 shows that, given that a large firm has a deficit, this deficit will be above 0.2 in about 10% of the cases, whereas small firms face deficits above 0.2 in about 50% of the cases. The results indicate that large firms (the solid line) face the lowest number of large deficits, followed by medium large firms and medium small firms. The smallest firms face most of the large deficits.

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for surpluses loses its significance at the 1% level for one quartile of total assets, tangibility, and profitability, but remains significant in the other 13 regression outcomes.

To examine what causes the relation between firm size and deficit size, we describe in Table 8 the means and standard deviations of the components of the financing deficits for each size quartile.

[Please insert Table 8 here]

The group of small firms has more volatile internal cash flows: the standard deviation of small firms' internal cash flows is 0.598 against 0.084 for large firms. The volatilities of the other components of the deficit are also higher for small firms. Hence, small firms have more volatile deficits, which means that small firms are more often confronted with considerably large deficits. As these large deficits are almost exclusively covered with equity issues, small firms do not appear to act according to the pecking order model, despite the findings of Collins et al. (1987) and Brennan and Hughes (1991) that small firms have a larger likelihood of high information asymmetry.

Our analysis on financing surpluses and large financing deficits also allows us to examine why net debt issues decreasingly cover the financing deficits over time. Panel B of Fig. 3 shows that firms face the lowest number of large deficits in the seventies (the dotted line), followed by the firms in the eighties. In the nineties, the distribution of firms' deficits is mostly skewed towards large deficits, even more than in the period 2001-2005. Hence, the pecking order coefficient is expected to be higher in the period 2001-2005 than in the period 1991-2000. Furthermore, the coefficients should be at their highest level in the seventies. To illustrate this, Fig. 4 shows the pecking order coefficients based on estimating Eq. (1) by OLS for each year separately, together with

the percentages of firms with financing surpluses and large financing deficits (above 0.237).

[Please insert Figure 4 here]

Indeed, the estimated pecking order coefficients are higher in the period 2001-2005 than in the period 1991-2000. In general, a rise in the percentage of financing surpluses increases the pecking order coefficient, see for example the years 1975 and 2005. The percentage of firms with large deficits is highly correlated with the change of the pecking order coefficient. For instance, the downfall of the pecking order coefficient in 1983 and the rises in 1982 and 2001 relate to an increase of the percentage of firms with large deficits in 1983, and a decrease in 1982 and 2001. Overall, the time effect can largely be explained by our analysis of financing surpluses and large financing deficits.

The asymmetry between surpluses, normal deficits, and large deficits potentially explains the findings of prior studies. For example, Shyam-Sunder and Myers (1999) find that the pecking order coefficient is 0.75. Apart from the fact that their sample period ends in 1989, Shyam-Sunder and Myers' sample differs from other papers on the pecking order specification in only including firms that have continuous data on flow of funds for the whole sample period. This requirement decreases their sample to 157 firms. In following their data selection procedure, we obtain a sample of 690 firms, for which we find a pecking order coefficient of 0.77. While Frank and Goyal (2003) already highlight the severe sample selection bias in the sample of Shyam-Sunder and Myers, an inspection of the resulting sample reveals that large financing deficits occur much more often when gaps in the data are permitted. This is due to the fact that firms with large financing

deficits are less likely to survive the whole sample period. For example, when examining the frequency of financing deficits above 0.237, we find that these deficits only occur in 3% of Shyam-Sunder and Myers' firm-years, compared to 14% in our original sample. Also, the percentage of firms with large deficits is low as their sample is biased towards relatively large firms because these firms have more data available. The lack of large financing deficits substantially increases Shyam-Sunder and Myers' pecking order coefficient. Additionally, the pecking order coefficient is enhanced by the relatively large percentage of firm-years with financing surpluses (47%) in their sample.

5. Conclusion and implications

Frank and Goyal (2003) test the pecking order theory of corporate leverage with a model developed by Shyam-Sunder and Myers (1999), and conclude that net equity issues track the financing deficit more closely than net debt issues do. They find two puzzling results: the net debt issues decreasingly explain the deficits over time and especially small firms do not behave according to the pecking order theory. Especially the latter result is counterintuitive, as the pecking order relies on the existence of information asymmetry, and this asymmetry is higher for investors of small companies. We explain the relations between size, time, and pecking order behavior by separating financing deficits from financing surpluses and by taking issue sizes into account. We show that the debt issues provide an excellent fit for financing surpluses, a reasonable fit for small and medium financing deficits, and an extremely poor fit for large financing deficits. As small firms have more large deficits and fewer surpluses, they are found to

issue relatively more equity than large firms do. The pecking order coefficient decreases over time because of an increasing number of firms with large deficits in the Compustat data set.

Our findings are consistent with the predictions of a pecking order model that considers firms' debt capacities: since large financing needs have the potential of exceeding the unused debt capacity of firms, these firms are restricted in the issuing of debt. In case of a surplus, firms' debt capacities do not pose any restrictions on the repurchase of debt.

The differences in pecking order coefficients between financing surpluses, normal deficits, and large deficits have implications for other empirical tests in the capital structure literature that apply the Shyam-Sunder and Myers (1999) technique. Examples are Litov (2006), who examines the debt-equity choice for firms in different quintiles of managerial entrenchment, and Bharath et al. (2006), who examine the debt-equity choice for firms into deciles that are based on the market's assessment of their adverse selection risk. As managerial entrenchment and the risk of adverse selection relate to firms' sizes and risk-taking, the distributions of financing surpluses and large deficits are likely to differ among these papers' quintiles and deciles. For instance, firms with more managerial entrenchment are more likely to be large, which results in a lower frequency of large deficits. Hence, including the effects of surpluses and large deficits in their tests will help in interpreting their results, or might provide an alternative explanation for their results altogether.

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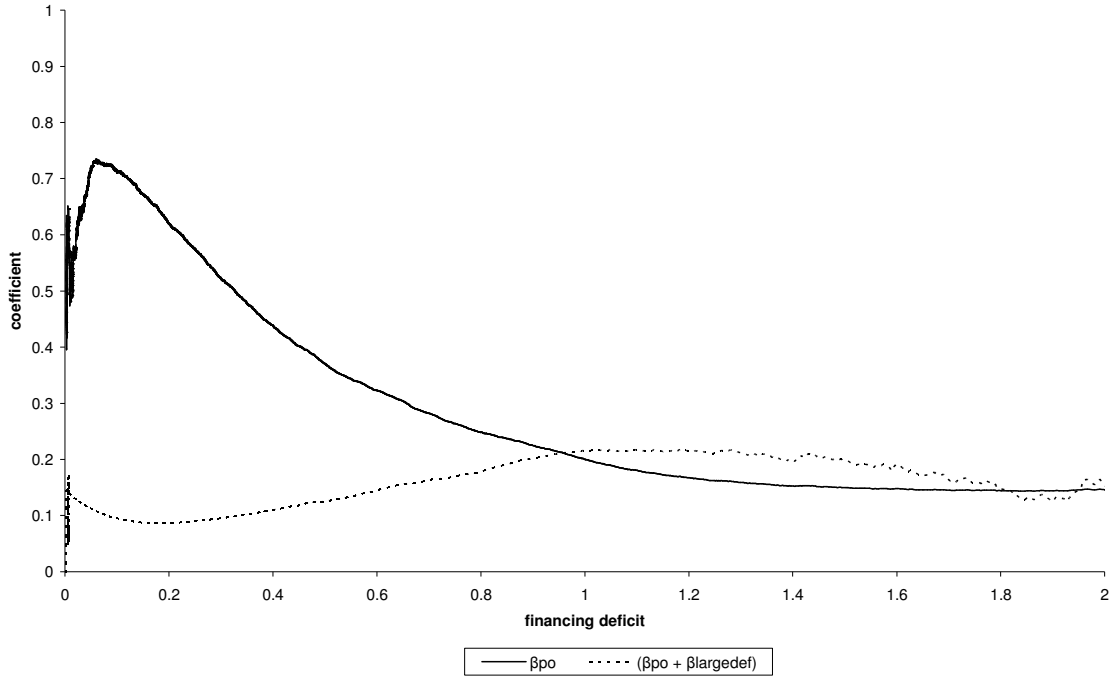
Figure 1

Figure 1. The pecking order coefficients, 1971 to 2005. This figure shows the pecking order coefficients (β_{po}) over the years. We determine the pecking order coefficient by estimating the regression specification $\Delta D_{it} = \alpha + \beta_{po} * DEF_{it} + \varepsilon_{it}$ on a yearly basis, where ΔD_{it} is the net debt issued by firm *i* in year *t* and DEF_{it} is the financing deficit of firm *i* in year *t*.

Figure 2

Panel A



Panel B

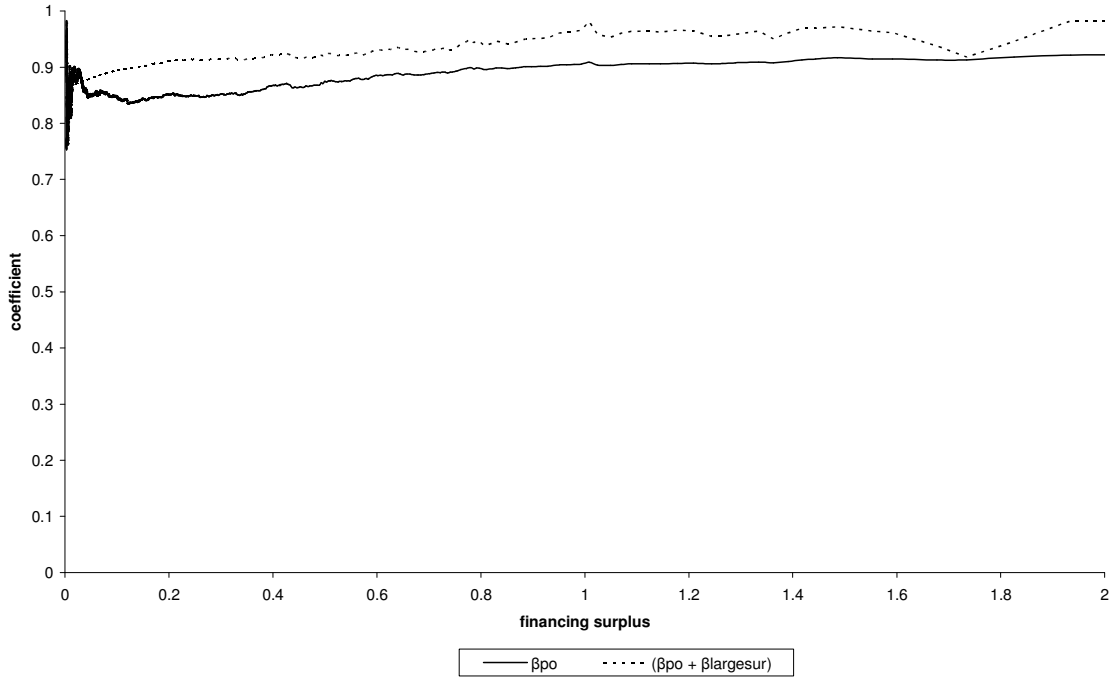
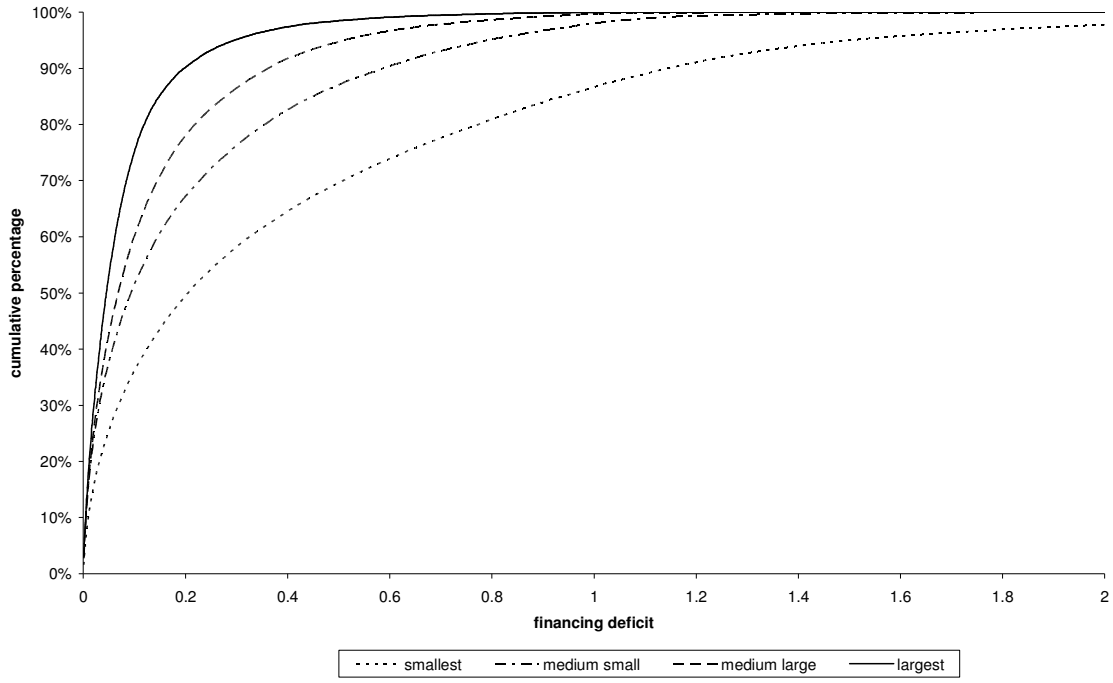


Figure 2. The pecking order coefficient for varying threshold levels of large financing deficits and large financing surpluses, 1971 to 2005. The solid line in Panel A represents the pecking order coefficient for observations with a financing deficit between zero and the corresponding value at the x-axis. This pecking order coefficient corresponds to β_{po} in the regression specification $\Delta D_{it} = \alpha + \beta_1 * b_{it} + \beta_{po} * DEF_{it} + \beta_{largedef} * b_{it} * DEF_{it} + \varepsilon_{it}$, where ΔD_{it} is the net debt issued by firm *i* in year *t*, DEF_{it} is the financing deficit of

firm *i* in year *t*, and b_{it} is one if DEF_{it} is larger than a certain deficit level, and zero otherwise. The dotted line represents $\beta_{po} + \beta_{largedef}$, which is the pecking order coefficient for observations above the financing deficit on the x-axis. The solid line in Panel B represents the pecking order coefficient for observations with a financing surplus between zero and the corresponding value at the x-axis. This pecking order coefficient corresponds to β_{po} in the regression specification $\Delta D_{it} = \alpha + \beta_1 * b_{it} + \beta_{po} * SUR_{it} + \beta_{largesur} * b_{it} * SUR_{it} + \varepsilon_{it}$, where ΔD_{it} is the net debt repurchased, SUR_{it} is the financing surplus ($-DEF_{it}$), and b_{it} is one if SUR_{it} is larger than a certain surplus level, and zero otherwise. The dotted line represents $\beta_{po} + \beta_{largesur}$, which is the pecking order coefficient for observations above the surplus level on the x-axis. Financing deficits, financing surpluses, and net debt issues are scaled by total assets.

Figure 3

Panel A



Panel B

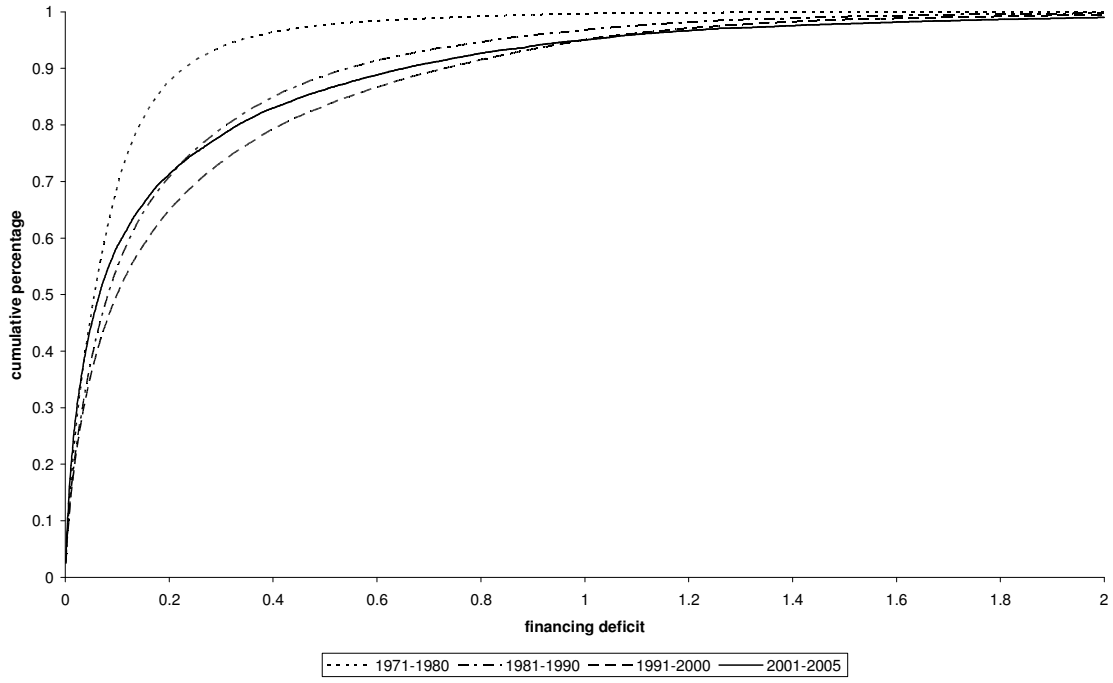


Figure 3. Distribution of deficit sizes for different firm sizes and periods, 1971 to 2005. The lines represent the percentages of observations with deficits between zero and the corresponding value on the x-axis. Panel A shows the lines for different size quartiles. The dotted line represents firm-years in the first size quartile, the dashed and dotted line (third line from above) represents firm-years in the second size

quartile, the dashed line represents firm-years in the third size quartile, and the solid line represents firms-years in the fourth size quartile. Panel B shows the lines for different time periods. The dotted line in Panel B represents firm-years for the period 1971-1980, the dashed and dotted line (second line from above) represents firm-years for the period 1981-1990, the dashed line represents firm-years for the period 1991-2000, and the solid line represents firms-years for the period 2001-2005. The financing deficits are scaled by total assets.

Figure 4

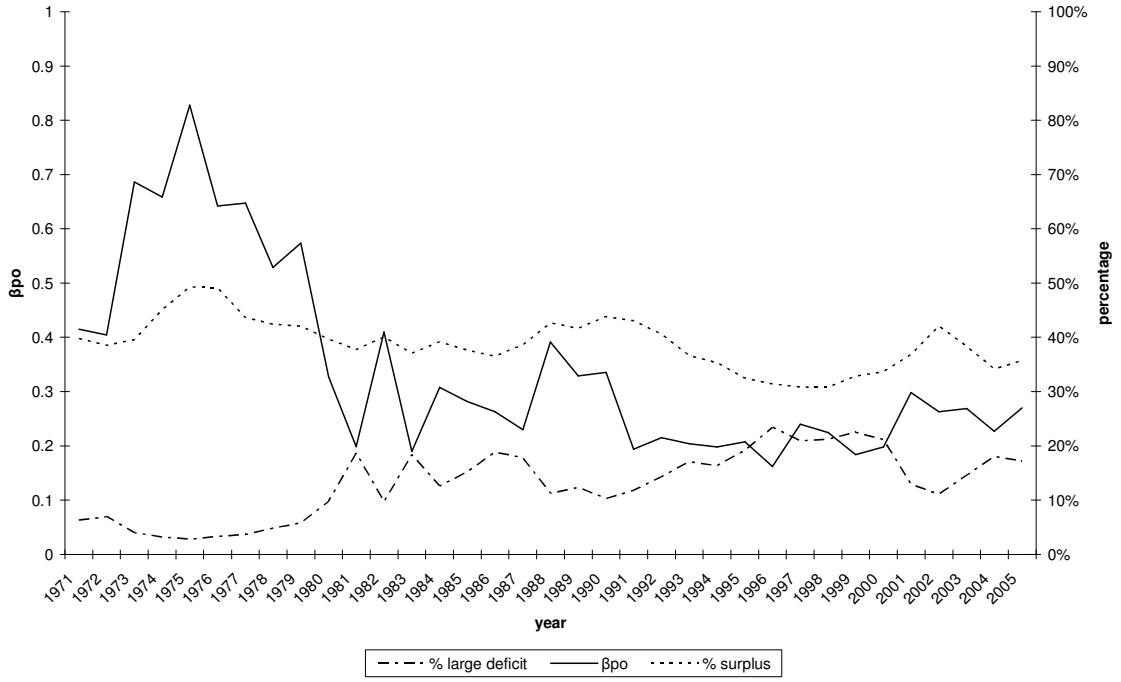


Figure 4. Financing surpluses, large financing deficits, and the pecking order coefficients, 1971 to 2005. The solid line represents the pecking order coefficients (β_{po}), which can be determined by estimating the pecking order specification $\Delta D_{it} = \alpha + \beta_{po} * DEF_{it} + \varepsilon_{it}$ on a yearly basis, where ΔD_{it} is the net debt issued by firm *i* in year *t* and DEF_{it} is the financing deficit of firm *i* in year *t*. Values of the pecking order coefficient can be found on the left-hand axis. The dotted line represents the percentage of firms with a financing surplus in a given year. The dashed line represents the percentage of firms with a financing deficit that is larger than 23.7% of the total assets in a given year. Values of these variables are on the right-hand axis.

Table 1

Corporate cash flows

This table shows the corporate cash flows and the issuance of securities for the sample period 1971–2005. Financial firms and utilities are excluded. The sample additionally excludes firm-years with gaps in the reporting of relevant flow of funds data. The net debt issues are computed as Item 111 – Item 114, and the net equity issues are computed as Item 108 – Item 115. All variables are scaled by total assets. The table is a replication of Table 2 of Frank and Goyal (2003).

	Average funds flow and financing as a percentage of total assets							
	1971	1975	1980	1985	1990	1995	2000	2005
Cash dividends [a]	0.015	0.012	0.014	0.015	0.016	0.014	0.010	0.014
Investments [b]	0.101	0.077	0.110	0.132	0.067	0.094	0.084	0.069
Working capital [c]	0.033	0.015	0.033	-0.028	-0.016	0.023	-0.015	-0.014
Internal cash flow [d]	0.101	0.096	0.095	0.026	0.006	-0.006	-0.084	-0.051
Financing deficit (a + b + c – d)	0.048	0.009	0.062	0.093	0.061	0.137	0.162	0.120
Net debt issues	0.017	0.003	0.012	0.018	0.006	0.026	0.018	0.029
Net equity issues	0.030	0.006	0.050	0.075	0.055	0.111	0.144	0.091
Net external financing	0.048	0.009	0.062	0.093	0.061	0.137	0.162	0.120
N	2,992	5,802	5,709	6,488	6,668	9,009	8,562	5,900

[a] Item 127.

[b] For firms reporting format codes 1 to 3, investments equal Item 128 + Item 113 + Item 129 + Item 219 – Item 107 – Item 109. For firms reporting format code 7, investments equal Item 128 + Item 113 + Item 129 – Item 107 – Item 109 – Item 309 – Item 310.

[c] For firms reporting format code 1, change in net working capital equals Item 236 + Item 274 + Item 301. For firms reporting format codes 2 and 3, change in net working capital equals –Item 236 + Item 274 - Item 301. For firms reporting format code 7, change in net working capital equals –Item 302 – Item 303 – Item 304 – Item 305 – Item 307 + Item 274 – Item 312 – Item 301.

[d] For firms reporting format codes 1 to 3, internal cash flow equals Item 123 + Item 124 + Item 125 + Item 126 + Item 106 + Item 213 + Item 217 + Item 218. For firms reporting format code 7, internal cash flow equals Item 123 + Item 124 + Item 125 + Item 126 + Item 106 + Item 213 + Item 217 + Item 314.

Table 2

Deficits and surpluses, 1971 to 2005

This table shows the distribution of financing deficits and financing surpluses over time. A firm has a deficit if the sum of the firm's investments, cash dividends, and increase in working capital exceeds the firm's internal cash flows. A firm has a surplus if its internal cash flows in a year exceed the sum of the firm's investments, cash dividends, and increase in working capital. When a firm has a surplus it repurchases securities, while the firm has to issue securities when it faces a deficit. Next to means and medians, we also provide information on the 25th and 75th percentile, to portrait the distribution of the deficits and surpluses more accurately. Deficits and surpluses are scaled by assets. Under '%' we report the percentage of firms having a deficit or a surplus in that particular year. These percentages do not add up to 100% as some firm-years have a financing deficit of exactly zero.

		Deficits					Surpluses				
Year	N	%	Mean	25th perc.	Median	75th perc.	%	Mean	25th perc.	Median	75th perc.
1971	2,992	0.55	0.11	0.02	0.07	0.14	0.40	0.03	0.01	0.02	0.03
1972	3,200	0.57	0.11	0.02	0.06	0.14	0.39	0.03	0.01	0.02	0.03
1973	3,970	0.56	0.09	0.02	0.05	0.11	0.40	0.04	0.01	0.02	0.04
1974	5,638	0.48	0.09	0.02	0.06	0.11	0.45	0.05	0.01	0.02	0.05
1975	5,802	0.44	0.08	0.02	0.05	0.10	0.49	0.06	0.01	0.02	0.06
1976	5,871	0.44	0.09	0.02	0.05	0.11	0.49	0.05	0.01	0.02	0.05
1977	5,912	0.49	0.09	0.02	0.05	0.11	0.44	0.05	0.01	0.02	0.05
1978	5,779	0.51	0.10	0.02	0.05	0.12	0.42	0.05	0.01	0.02	0.05
1979	5,618	0.52	0.11	0.02	0.06	0.12	0.42	0.05	0.01	0.02	0.05
1980	5,709	0.55	0.15	0.02	0.07	0.17	0.40	0.06	0.01	0.02	0.05
1981	5,709	0.56	0.18	0.02	0.07	0.21	0.38	0.05	0.01	0.02	0.05
1982	5,948	0.53	0.16	0.02	0.07	0.17	0.40	0.06	0.01	0.02	0.06
1983	6,136	0.58	0.23	0.03	0.10	0.31	0.37	0.06	0.01	0.02	0.06
1984	6,168	0.56	0.18	0.02	0.08	0.21	0.39	0.06	0.01	0.02	0.06
1985	6,488	0.57	0.21	0.02	0.08	0.26	0.38	0.07	0.01	0.03	0.06
1986	6,657	0.58	0.25	0.03	0.11	0.33	0.37	0.08	0.01	0.03	0.07
1987	6,782	0.56	0.25	0.03	0.11	0.33	0.39	0.07	0.01	0.03	0.07
1988	6,747	0.50	0.18	0.02	0.08	0.21	0.43	0.07	0.01	0.03	0.07
1989	6,612	0.51	0.20	0.02	0.08	0.23	0.42	0.06	0.01	0.03	0.06
1990	6,668	0.48	0.18	0.02	0.07	0.20	0.44	0.06	0.01	0.03	0.06
1991	6,867	0.50	0.20	0.02	0.07	0.22	0.43	0.06	0.01	0.03	0.06
1992	7,102	0.53	0.22	0.02	0.08	0.27	0.41	0.06	0.01	0.03	0.06
1993	7,630	0.57	0.23	0.02	0.10	0.30	0.37	0.06	0.01	0.03	0.06
1994	8,184	0.59	0.22	0.02	0.09	0.27	0.35	0.05	0.01	0.02	0.06
1995	9,009	0.61	0.25	0.03	0.10	0.32	0.33	0.05	0.01	0.02	0.06
1996	9,179	0.63	0.28	0.03	0.13	0.39	0.31	0.05	0.01	0.03	0.06
1997	8,930	0.65	0.25	0.03	0.11	0.33	0.31	0.06	0.01	0.03	0.06
1998	9,164	0.64	0.28	0.03	0.12	0.35	0.31	0.06	0.01	0.03	0.07
1999	9,078	0.62	0.31	0.03	0.12	0.43	0.33	0.07	0.01	0.03	0.07
2000	8,562	0.61	0.30	0.03	0.10	0.41	0.34	0.07	0.01	0.03	0.07
2001	7,945	0.56	0.21	0.02	0.07	0.21	0.37	0.07	0.01	0.03	0.07
2002	7,541	0.51	0.21	0.01	0.06	0.20	0.42	0.07	0.01	0.03	0.07
2003	7,369	0.55	0.23	0.02	0.07	0.26	0.38	0.06	0.01	0.03	0.07
2004	7,043	0.60	0.26	0.02	0.07	0.32	0.34	0.06	0.01	0.03	0.07
2005	5,900	0.60	0.24	0.02	0.07	0.29	0.36	0.06	0.01	0.03	0.07
Avg	6,683	0.56	0.21	0.02	0.08	0.23	0.38	0.06	0.01	0.03	0.06
SD	1,536	0.05	0.07	0.00	0.02	0.09	0.05	0.01	0.00	0.01	0.01

Table 3

Pecking order tests for small and big firms before 1989 and after 1989

The sample period is 1971–2005. Financial firms and utilities are excluded. The sample additionally excludes firm-years with gaps in the reporting of relevant flow of funds data. Firms are yearly sorted into quartiles based on total assets. The estimated regression specification is $\Delta D_{it} = \alpha + \beta_{po} * DEF_{it} + \varepsilon_{it}$, where ΔD_{it} is the amount of net debt issued and DEF_{it} is the financing deficit. All variables are scaled by total assets. White standard errors appear in parentheses. * indicates significance at the 1% level.

	Overall	1971-1989					1990-2005				
		Overall	Smallest	Medium small	Medium large	Largest	Overall	Smallest	Medium small	Medium large	Largest
α	-0.007*	-0.007*	-0.025*	-0.015*	-0.007*	-0.001*	-0.008*	-0.027*	-0.019*	-0.007*	0.001
	(0.000)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.000)
β_{po}	0.255*	0.332*	0.223*	0.517*	0.672*	0.763*	0.226*	0.207*	0.205*	0.410*	0.667*
	(0.005)	(0.009)	(0.011)	(0.015)	(0.015)	(0.020)	(0.005)	(0.008)	(0.010)	(0.009)	(0.009)
N	233,909	107,738	26,656	27,000	27,009	27,029	126,171	30,763	31,783	31,791	31,802
R^2	0.234	0.298	0.191	0.498	0.648	0.756	0.209	0.200	0.169	0.340	0.650

Table 4

Pecking order tests for financing deficits and surpluses

The sample period is 1971–2005. We exclude financial firms, utilities, and firm-years with gaps in the reporting of relevant flow of funds data. This table determines the significance of a dummy for financing surpluses, and tests the model $\Delta D_{it} = \alpha + \beta_1 * d_{it} + \beta_{po} * DEF_{it} + \beta_{sur} * d_{it} * DEF_{it} + \varepsilon_{it,}$ where ΔD_{it} is the amount of net debt issued, DEF_{it} is the financing deficit, and d_{it} is a dummy variable that equals one if $DEF_{it} < 0$, and is zero otherwise. All variables are scaled by total assets. White standard errors appear in parentheses. * indicates significance at the 1% level.

	Overall	1971-1989	1990-2005
α	0.029*	0.035*	0.023*
	(0.001)	(0.001)	(0.001)
β_1	-0.027*	-0.034*	-0.021*
	(0.001)	(0.001)	(0.001)
β_{po}	0.155*	0.169*	0.153*
	(0.005)	(0.008)	(0.006)
β_{sur}	0.746*	0.765*	0.714*
	(0.013)	(0.018)	(0.018)
N	233,909	107,738	126,171
R^2	0.390	0.495	0.324

Table 5

Characteristics for financing deficits and surpluses

The sample period is 1971–2005. We exclude financial firms, utilities, and firm-years with gaps in the reporting of relevant flow of funds data. This table determines the differences between firm-years with financing deficits and firm-years with financing surpluses. Assets are determined by Compustat Item 6 and are reported in millions of dollars. The debt ratio is computed by dividing Item 9 by Item 6. The market-to-book ratio is (Item 24 * Item 25 – Item 60 + Item 6) / Item 6 and EBIT is Item 18 + Item 15 + Item 16. The issue size is equal to the net amount of equity issued/repurchased plus the net amount of debt issued/repurchased. Rated debt is a dummy variable that equals one if a firm has rated debt outstanding, as reported with Compustat Item 280, and zero otherwise. The variables change in working capital, investments, cash dividends, internal cash flows, EBIT and issue size are scaled by total assets. We estimate *t*-tests with equal variances not assumed to test for equality of means. * indicates significance at the 1% level.

	Deficit		Surplus		Differences of means (*t*-value)
	Mean	Median	Mean	Median	
Change in working capital	0.05	0.04	-0.05	-0.01	0.10* (73.25)
Investments	0.14	0.10	0.04	0.04	0.10* (128.21)
Cash dividends	0.01	0.00	0.01	0.00	0.00* (-9.43)
Internal cash flows	-0.03	0.07	0.07	0.09	-0.10* (-79.76)
Assets	2013	68	1653	71	360* (5.30)
Debt ratio	0.21	0.17	0.19	0.14	0.02* (24.35)
Market-to-book ratio	2.30	1.40	1.50	1.14	0.80* (83.37)
EBIT	-0.06	0.07	0.05	0.09	0.11* (-76.21)
Issue/repurchase size	0.21	0.08	0.06	0.03	0.15* (256.38)
Rated debt	0.17	0.00	0.18	0.00	0.01 (-2.14)
N	130,314		89,460		

Table 6

Pecking order tests for different issue sizes

The sample period is 1971–2005. We exclude financial firms, utilities, and firm-years with gaps in the reporting of relevant flow of funds data. Firm-years are sorted into firm-years with financing deficits and financing surpluses, and within this segregation quartiles (over all years) are based on the total issue/repurchase size. The estimated regression specification is $\Delta D_{it} = \alpha + \beta_{po} * DEF_{it} + \varepsilon_{it}$, where ΔD_{it} is the amount of net debt issued and DEF_{it} is the financing deficit. All variables are scaled by total assets. White standard errors appear in parentheses. * indicates significance at the 1% level.

	Deficit					Surplus				
	Overall	Smallest issue size	Medium small issue size	Medium large issue size	Largest issue size	Overall	Smallest repurchase size	Medium small repurchase size	Medium large repurchase size	Largest repurchase size
α	0.034*	-0.003*	-0.005*	0.024*	0.085*	0.002*	-0.002*	-0.001*	-0.002	0.013*
	(0.001)	(0.000)	(0.001)	(0.002)	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
βpo	0.149*	0.601*	0.741*	0.429*	0.089*	0.901*	0.789*	0.881*	0.815*	0.923*
	(0.005)	(0.030)	(0.017)	(0.012)	(0.009)	(0.012)	(0.076)	(0.064)	(0.026)	(0.015)
N	130,314	32,578	32,579	32,579	32,578	89,460	22,365	22,365	22,365	22,365
R^2	0.100	0.015	0.061	0.043	0.020	0.747	0.008	0.012	0.042	0.735

Table 7

Deficit size effects on firms' debt ratios

The sample period is 1971–2005. We exclude financial firms, utilities, and firm-years with gaps in the reporting of relevant flow of funds data. This table reports the long-term debt ratios that firms would have had if they financed their deficit completely with debt ((lagged item 9 + financing deficit) / item 6). These debt ratios are compared with the long-term debt ratios (lagged item 6 / lagged item 9) of peers. Peers are firms in the same industry (Fama-French 30 industry classification), in the same size quartile (based on assets) and in the same time period (periods of 5 years). We delete peer groups in which less than 30 firm-years are available (which leaves 752 peer groups). Quartiles are based on the size of a deficit, scaled by total assets. The smallest deficits are between zero and 0.022, the medium small deficits are between 0.022 and 0.078, the medium large deficits are between 0.078 and 0.237, and the largest deficits are above 0.237. The percentages of firms with relatively high debt ratios are determined by looking at the percentage of firms that would end up above the 50^{th}, 75^{th}, 90^{th}, and 95^{th} percentile of the debt ratios of peers.

	All deficits	Smallest deficits	Medium small deficits	Medium large deficits	Largest deficits
Average new debt ratio	0.370	0.158	0.263	0.346	0.764
Median new debt ratio	0.286	0.087	0.225	0.297	0.599
Percentage of firms above the median debt ratio of peers	67%	42%	65%	81%	82%
Percentage of firms above the 75^{th} percentile of the debt ratios of peers	43%	16%	30%	51%	78%
Percentage of firms above the 90^{th} percentile of the debt ratios of peers	24%	6%	10%	19%	59%
Percentage of firms above the 95^{th} percentile of the debt ratios of peers	15%	3%	6%	10%	41%
N	126,531	31,758	31,804	31,438	31,531

Table 8

Firm size effects on the mean and volatility of the financing deficits

The sample period is 1971–2005. We delete financial firms, utilities, and firm-years with gaps in the reporting of relevant flow of funds data. This table determines the mean and standard deviation (in parentheses) of firms' deficits, cash dividends, investments, change in working capital, and internal cash flows. Firms are yearly sorted into quartiles based on total assets. The variable deficits includes negative deficits (i.e., financing surpluses). All variables are scaled by total assets.

	Overall	Smallest	Medium small	Medium large	Largest
Averages (st.dev.)					
Deficits	0.094	0.207	0.087	0.054	0.031
	(0.298)	(0.485)	(0.251)	(0.174)	(0.113)
Cash dividends	0.013	0.011	0.011	0.013	0.019
	(0.071)	(0.115)	(0.064)	(0.044)	(0.033)
Investments	0.093	0.073	0.092	0.106	0.100
	(0.195)	(0.280)	(0.189)	(0.155)	(0.119)
Working capital	-0.004	-0.064	0.035	0.032	0.009
	(0.350)	(0.593)	(0.293)	(0.194)	(0.116)
Internal cash flow	0.009	-0.190	0.041	0.088	0.093
	(0.343)	(0.598)	(0.211)	(0.120)	(0.084)
Percentages					
Surpluses	38%	32%	40%	41%	41%
Financing deficits above 0.059	31%	39%	33%	30%	24%
Financing deficits above 0.237	14%	26%	16%	10%	4%