

A TEST OF THE PECKING ORDER THEORY OF CAPITAL STRUCTURE IN CORPORATE FINANCE

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ABSTRACT

This paper utilises a cross section of 12,244 publicly traded corporations in the U.S. from the time period 1999 to 2009 to test the pecking order theory of capital structure. Applying the methodology of Frank and Goyal (2003), limited evidence to support pecking order theory is found. Consistent with Frank and Goyal (2003), a much stronger relationship between net equity issued and financing deficit is observed than net debt issuance and financing deficit. Whereas, the pecking order theory suggests that firms should exhaust all debt issuing capacity before they issue any equity and equity should only be used as a last resort.

JEL: G3

KEYWORDS: Pecking Order Theory, Capital Structure, Financing Deficit

INTRODUCTION

Pecking order theory is a prominent hypothesis put forward to explain corporate financing flows. The main purpose of this paper is to test how well the pecking order theory can actually explain the corporate financing patterns during the testing period. The data is obtained from the Compustat database which contains all financial statements of US public-listed companies for 1999-2009. The formal tests are based on the methodologies used by Frank and Goyal (2003), and the dataset begins at the approximate time at which theirs concluded. The correlation coefficients between net equity, debt financing and firm financing deficit are examined and it is found that equity financing is highly correlated with financing deficit (0.87). As a starting point for formal testing, separate regressions were ran for net debt and net equity on financing deficit, and being essentially a difference in means test, the result is consistent with our first correlation test. The coefficient ratio and R^2 of the net equity issues on financing deficit regression are much higher than the net debt issues on financing deficit regression. Overall, neither test shows significant support for pecking order theory as the primary hypothesis to explain corporate financing flows. This conclusion is consistent with the testing of Frank and Goyal (2003) for the sample period of 1971-1998.

LITERATURE REVIEW

The pecking order theory developed by Myers and Majluf (1984) hypothesises that firms faced with a financing need follow a financial hierarchy which dictates that firms will rank funding sources based on cost. Internal funds would be used first until exhausted, and then firms would seek out external debt and finally equity issuance as a last resort. Debt would be considered a relatively “cheap” source of capital due to the value of the tax shield, while equity a more expensive source. According to Myers and Majluf (1984), the cost of equity is further exacerbated due to the information asymmetry between managers and investors. Due to this informational asymmetry, investors are unable to ascertain the true value the company and its projects and therefore, undervalue the stock. Hence, it will not be in the interest of existing shareholders to sell stock undervalued by the market, and issuing additional equity will be viewed by the firm as the most

expensive source of capital. Shyam-Sunder and Myers (1999) propose that if costs of financial distress are ignored, keeping in mind the information asymmetry and pecking order hierarchy, firms will first issue the safest possible security i.e. investment grade debt before issuing any equity. However, if costs of financial distress are non-trivial, equity will be issued to finance favourable projects or pay off debt. If the market price of equity issue is too low, the manager's may forego the issue and this will lead to persistence in overwhelmingly high debt ratios and curtailing of profitable investment for the firm. They add that lesser optimistic managers will issue highly under-priced equity just to stay afloat. Furthermore, Shyam-Sunder and Myers (1999) develop a simple model to define financing deficit on which they then regress net debt to formally test for evidence of pecking order theory. This model forms the cornerstone of further testing done by Frank and Goyal (2003). Chirinko and Singha (2000) point out a potential pitfall in this regression model and how it may lead to misinterpretation of the results.

When regressing net debt on financing deficit and the estimated coefficient for financing deficit is high, one may conclude that indeed debt is preferred over equity and pecking order holds. However, it may just be the case that in fact static trade off theory holds and the optimal capital structure being maintained by the firm is largely composed of debt. Leary and Roberts (2008), develop a novel empirical model which has higher statistical power and eradicates some of the issues cited by Chirinko and Singha (2000). In their approach they take a more liberal modified form of the pecking order where equity issuances are allowed beyond a certain threshold debt level.

However, even after making an allowance for the liberal form, they find the model is unable to explain more than 50% of the financing decisions of firms. Fama and French (2005) show that over 50% of firms in the U.S. issue equity in such a manner that implies a violation of pecking order theory. They observe cases in which firms issue net equity even when capital expenditure can be covered by internal funds or debt financing. Firms with moderate leverage, financing surpluses (earnings exceed dividends and investment) still issue equity each year and this is a difficult result to reconcile with pecking order theory. Their argument is that information asymmetry is not always significant enough to deter firms from issuing equity. Rather than issuing ordinary stock, firms can issue equity through private placements, mergers, convertible debt, rights issues, warrants, employee options to name a few, which can reduce the company's cost of equity. From the above literature, we can see that pecking order theory is at best, an incomplete explanation of what drives corporate financing behaviour.

DATA AND METHODOLOGY

We observe a sample of 12,244 firms from the Compustat database over the period of 1999 - 2009. The sample contains monthly data, however each firm reports on a yearly basis, with some minor exceptions. To allow for comparison across firms we eliminate observations with missing book value of assets and those firms which report in Canadian dollars. Consistent with adjustments made by Frank and Goyal (2003), we subsequently replace selected items on each respective firm's balance sheet and income statement with zero in instances where there are missing values. Financial firms (SIC codes 6000-6999) and regulated utilities (SIC codes 4900-4999) have been excluded, consistent with standard practice, as their capital structure decisions are different and utilities are often influenced by regulatory concerns.

Furthermore, the agricultural, forestry and fishing industries (SIC codes 0001-0999) are highly subsidized within the United States. We acknowledge that these subsidies may have an effect on the firm's capital structure decisions. As a result, to avoid any potential bias in our sample we have excluded these firms from our analysis. To avoid nonsensical results, similar to Peter and Welch (2010) we have eliminated observations in which both equity and debt are equal to zero. In addition, we have set the book value of equity to be the largest of: Zero, 1% of the firm's debt, 0.1% of the firm's assets or 0.01% of the reported

book value. The pecking order theory, as described by Myers (1994), states that a firm's choice of funding source is a result of adverse selection problems due to informational asymmetries between potential investors and the firm. In this simplified example a firm has three sources of funding available: retained earnings, debt and equity. In the case of retained earnings, there are no information asymmetries leading to adverse selection problems, hence this is the preferred source of funding. In the case of equity, investors require a relatively large premium due to potential risk and informational asymmetries. Debt also commands a similar premium, however this premium is generally smaller in magnitude. As a result, if there are inadequate retained earnings to finance the required investments, the firm will exhaust its debt funding before finally attempting to raise equity. In order to explore this theory, we employ a similar disaggregation technique as used by Frank and Goyal (2003), with notation defined as follows:

DIV_t : Cash dividends in year t;

I_t : Net investment in year t (i.e. $I_t =$ capital expenditures + increase in investments + acquisitions + other use of funds – sale of PPE – sale of investments)

ΔW_t : Change in working capital in ear t ($\Delta W_t =$ change in operation working capital + change in cash and cash equivalents + change in current debt)

C_t : Cash flow after interest and taxes ($C_t =$ income before extraordinary items + depreciation and amortisation + extraordinary items and discontinued operations + deferred taxes + equity in net loss – earnings + other funds from operations + gain (loss) from sales of PPE and other investments)

ΔD_t : Net debt issued in year t ($\Delta D_t =$ debt issuance – debt reduction) (long term only)

ΔEt : Net equity issued in year t ($\Delta Et =$ sale of common stock - stock repurchases)

We can hence define financial deficit in year t (DEF_t) as follows, representing a partially aggregated form of the accounting cash flow identity:

$$DEF_t = DIV_t + I_t + \Delta W_t - C_t = \Delta D_t + \Delta Et \quad (1)$$

In line with Shyam-Sunder and Myers (1999), under the pecking order hypothesis, after an Initial Public Offering (IPO), debt and retained earnings are generally used as sources of funds, with equity only being raised in extreme circumstances. This can be empirically represented as follows:

$$\Delta D_t = a + b * DEF_t + e_t \quad (2)$$

The hypothesis under the pecking order theory is that $a = 0$ and $b = 1$.

Also, since the theory implies that equity issuance should be a last resort, the relationship is:

$$\Delta Et = a + b * DEF_t + e_t \quad (3)$$

Where, $b \approx 0$, i.e. 'b' should be approximately 0.

When the regressions on equations 2 and 3 are run, we should obtain the respective values of regression constant 'a' and coefficient 'b' as implied by the pecking order theory. We note that Shyam-Sunder and Myers (1999) include the current portion of long-term debt as an additional variable in the financing deficit equation. However, we further note that Frank and Goyal (2003) concluded that the current portion of

long-term debt does not appear to belong to the definition of DEF_t . As a result, we have subsequently excluded the current portion of long-term debt from our measure of financing deficit. Taking equation 2 and substituting the value of DEF_t in equation 2 with the value of DEF_t from equation 1, we obtain the following equation which will be the basis of our empirical test regression:

$$\Delta D_t = a + b_{div}DIV_t + b_I I_t + b_{\Delta W} \Delta W_t - b_C C_t + e_t \tag{4}$$

This regression will calculate the coefficient b_{div} , b_I , $b_{\Delta W}$ and b_C respectively and will tell us how much of the financing deficit is actually funded using debt and what role debt has in the hierarchy of financing required by firms. If Pecking order theory were to hold we should obtain a high R^2 for the regression. Also, we will analyse each coefficient to further infer the applicability of the pecking order theory.

The empirical tests will be performed in three phases on sample data of 12244 U.S. firms from 1999-2009. Phase 1 will run pair wise correlation of net debt issued, net equity issued and financing deficit respectively. Phase 2 will run separate regressions of net debt issued (Equation 1) and net equity issued (Equation 2) on financing deficit. Phase 3 will run the regression on Equation 4, which is the regression of net debt issued and gross debt issued on the components of the financing deficit.

RESULTS

Table 1 provides pairwise correlation coefficients of net debt issued, net equity issued and financing deficit. For the pecking order theory to hold, we would expect the correlation of net debt issued and financing deficit to be close to one. The results in the table 1 below, however, provide evidence against the pecking order theory as the correlation between net debt issued and the financing deficit is only 0.45.

Table 1: Pairwise Correlation tests

	Net Equity Issued	Net Debt Issued	Financing Deficit
Net equity issued	1.0000		
Net debt issued	0.0464	1.0000	
Financing deficit	0.8732	0.4477	1.0000

Table 1 shows pairwise correlation tests for net equity issued and financing deficit, net debt issued and financing deficit and net debt issued and net equity issued. The results are for a sample of 12244 U.S. firms obtained from Compustat database for the time period 1999-2009. Financial firms and regulated utilities have been excluded from the sample. The data is winsorised at 1st and 99th percentile.

Furthermore, the correlation of net equity issued and financing deficit is 0.87, which is significantly larger than that of net debt issued. From these results we can conclude that those firms within our sample are more likely to issue equity than debt to fund their financing deficit, providing strong evidence against the pecking order theory. The next table (Table 2) shows results of the regression of net debt issued ($\Delta D_t = a + b * DEF_t + e_t$) and net equity issued ($\Delta E_t = a + b * DEF_t + e_t$) on financing deficit. According to the pecking order theory, the coefficient ‘b’ obtained for regression of net debt on financing deficit should be equal to 1 and it should be extremely small or zero for regression of net equity issued on financing deficit. However, as we see here, the empirical findings suggest quite the opposite. The coefficient of regression ‘b’ is bigger (0.69) for net equity and smaller for net debt (0.14).

The results in table 2 show that the net equity issued during the period 1999-2009 is much higher than the net debt issued when regressed on the financing deficit. Similar to Frank and Goyal (2003), this does not support the pecking order theory. According to Myers, a major advantage of the pecking order theory is that it can explain why firms are more willing to finance externally through debt as opposed to equity issues. However, from the data reported in table 2, the coefficient for net equity is 0.69 and R^2 is 0.76 which provides strong evidence that firms in this period preferred to issue equity as opposed to debt. The coefficient for debt issued is 0.14 and R^2 is 0.20 which suggests that only a small amount of external

financing takes the form of debt. Moving on to the third phase of our empirical testing, Table 3 provides results of the regression with net debt issued and gross debt issued as the dependant variable; which is in turn a function of the components of the financing deficit. As you can see in table 1, R^2 is only 0.1679 and 0.0696 for Net debt issued and Gross debt issued respectively. This is to say that below 20% of the financing deficit is covered through debt issuance. This is particularly not supportive of the Pecking order theory.

Table 2: Separate Regressions of Net Debt and Net Equity on Financing Deficit

	Net Debt Issued (1)	Net Equity Issued (2)
Constant	0.0025	0.0156
Financing Deficit	0.1367**	0.6882**
N	66576	68311
R ²	0.2005	0.7625

Table 2 – Separate regressions of net debt issued and net equity issued on financing deficit are run. All variables are scaled by total assets. Net debt issued is given by the equation $\Delta D_t = a + b * DEF_t + e_t$ and net equity issued is given by the equation $\Delta E_t = a + b * DEF_t + e_t$. ** is used to indicate significance at 5% level. The results are for a sample of 12244 U.S. firms obtained from Compustat database for the time period 1999-2009. Financial firms and regulated utilities have been excluded from the sample. The figure in each row of column 1 and 2 is the regression coefficient.

Table 3: Regression of Debt Issued on Disaggregated Financing Deficit

Components of Financing Deficit	Net Debt Issued (1)	Gross Debt Issued (2)
Constant	-0.0018** (0.0006)	0.0874** (0.0012)
Cash dividends	0.3946** (0.0250)	0.5948** (0.0494)
Investments	0.2386** (0.0029)	0.2076** (0.0057)
Δ Working Capital	0.0949** (0.0013)	0.1205** (0.0025)
Internal Cash flow	-0.0786** (0.0008)	-0.1056** (0.0016)
Number of Observations	66576	66576
R ²	0.1679	0.0696

Table 3 shows the regression estimates of the equation: $\Delta D_t = a + b_{div}DIV_t + b_{I_t}I_t + b_{\Delta W}\Delta W_t - b_C C_t + e_t$ where, ΔD_t is the amount of net or gross debt issued, DIV_t is the amount of cash dividends paid, I_t is the investments, ΔW_t is the change in working capital, C_t is the cash flow after interest and taxes. The dependant variable in column 1 is the net debt issued and in column 2 is the gross debt issued. The results are for a sample of 12244 U.S. firms obtained from Compustat database for the time period 1999-2009. Financial firms and regulated utilities have been excluded from the sample. The first figure in each row of column 1 and 2 is the regression coefficient; the figure in parentheses beneath each regression coefficient indicates the standard errors. ** is used to indicate significance at 5% level.

Analysing the coefficients of the above regression, it should be noted that the coefficient on investments is positive. The pecking order theory predicts a positive coefficient for investments in fixed assets, as seen in the above regression. According to the pecking order theory, once internal cash flows are taken into account, investments in fixed assets should correspond on a one-for-one basis with increase in debt. The negative coefficient of internal cash flow as seen in the above regression is supportive of the pecking order theory.

This can be explained by the notion that if retained earnings are the preferred source of capital, an increase in internally generated funds will decrease the need to draw down debt to fund the firm’s activities. Although, the coefficients do provide some support for the pecking order theory, the low R^2 falters the case for a strong form of pecking order theory. We do acknowledge seeing some support for the theory.

CONCLUDING COMMENTS

The main goal of this paper was to empirically test a sample of 12244 firm data from 1999-2009 for potential adherence to the pecking order theory. In Phase 1, we ran pair wise correlation of net debt issued, net equity issued and financing deficit respectively. Phase 2 ran separate regressions of net debt issued (Equation 1) and net equity issued (Equation 2) on financing deficit. Phase 3 ran the regression on Equation 4, which is the regression of net debt issued and gross debt issued on the components of the financing deficit. For Phase 1 of testing, we found net equity almost twice as highly correlated to financing deficit as opposed to net debt. In Phase 2, the regression coefficient for net equity on financing deficit was found to be 0.69 and R^2 is 0.76 as opposed to a coefficient of 0.14 and an R^2 of 0.2 for the regression of net debt on financing deficit. This evidence alone is enough to prove that pecking order theory doesn't hold and not only that, but equity issuance is a preferred method of raising funds. Our dataset commences precisely where that of Frank and Goyal (2003) concludes, and unsurprisingly we find that their conclusions roughly hold in the following decade. There is a lack of evidence that firm's behaviour when raising capital is solely determined according to pecking order theory. We find in fact, that firms are more likely to raise equity to fund capital expenditure than the "cheaper" debt financing. These results are puzzling and there are likely still some other undetermined factors that influence firm capital structure.

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BIOGRAPHY

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