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The Marginal Source of Finance^{*}

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Abstract

This paper addresses the ongoing debate on which view of equity, traditional or new, that best describes firm behavior. According to the traditional view, the marginal source of finance is new equity, whereas under the new view, marginal financing comes from retained earnings. In the theoretical part, we set up a model where the firm faces a cost of adjusting the dividend level because of an aggravated free cash flow problem. The existence of such a cost - which has been used in arguing the traditional view - does not invalidate the core of the new view, namely that the marginal investment may be financed with retained earnings. The combination of costly changes in dividends and retained earnings as the marginal source of funds actually defines an *extended new view* of equity. In the empirical part, we test the implication of the new view that dividends and investments are negatively related. The overall conclusion is that the implication of the new view is supported for traded Swedish firms during 1980-98.

Keywords: the traditional view of equity, the new view of equity, financing policy, payout policy

JEL classification: G32, G35, H32

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1 Introduction

There is a broad consensus among economists that taxes do affect firm investments and financial decisions and, from a purely tax-oriented perspective, that debt is the most favorable source of finance, since interest payments are tax deductible at the firm level and shareholders' required return is not. When it comes to the choice between new equity and retained earnings, the consensus has completely vanished. Until the late sixties and the beginning of the seventies, the distinction between new equity and retained earnings was largely ignored in tax policy research. The works of Harberger (1962, 1966), which constituted the benchmark for a great volume of papers focusing on tax incidence, implicitly assumed that firms finance investments with new share issues. That new issues provided the marginal source of equity finance was designated as the *traditional view* by Poterba and Summers (1985), which is to be compared to the *new view*, where firms are assumed to use retained earnings as the marginal source of finance. Ever since then, there has been an ongoing debate about which view best describes the firms' actual behavior.

The notion of the new view, as described in Auerbach (1979) and Bradford (1981), rests upon purely tax-based arguments. More specifically, the new view hinges on the tax discrimination between dividends and capital gains. Even in those cases where the statutory tax rates are the same, the effective capital gains rate is lower since capital gains are taxed upon realization. For ease of presentation, let us assume that the capital gains tax equals zero. It is then clear that when a firm undertakes one additional unit of investment, the shareholders must immediately forgo one unit of personal income when the investment is financed with new equity, but only $1 - \tau_{pd}$ units when it is financed with retained earnings (τ_{pd} denotes the personal tax rate on dividends). Using less expensive retained earnings as the marginal source of finance implies a lower corporate cost of capital, as compared to the alternative of issuing new equity. Hence, tax discrimination gives rise to a clear tax-based pecking order between retained earnings and new equity, and the rationale for using retained earnings as the marginal source of finance, which is the essence of the new view, rests upon this understanding.

The theoretical argument why new equity should still be regarded as the marginal source of finance draws on non-tax factors. Advocates of the traditional view claim that shareholders derive a positive benefit from receiving dividends that offsets the tax-penalty implied by

higher effective taxes on dividends than on capital gains. This benefit can take different forms, with the common feature that it is a result of asymmetric information between informed managers and less informed owners. The benefit may arise from the signaling value of dividend distribution, see Bhattacharya (1979) among others, or as a reduction in the cost of free cash flow, see Jensen (1986). Regardless of the interpretation, the positive non-tax benefit from dividends will abolish the tax-based pecking order, i.e. owners will prefer capital income in the form of dividends to capital gains. Hence, new equity becomes the source of finance at the margin.

Empirical findings supporting the use of dividends as a signal or as a tool for reducing the amount of free cash flow within the firm have been interpreted as evidence of the traditional view. But, is it really the case that these empirical findings invalidate the new view? In this paper we argue that the use of dividends for handling the problem of asymmetric information is in accordance with an *extended new view*.¹ In the pure form of the new view (cf. Auerbach (1979)) dividends (at least over a certain threshold, often defined as a fixed fraction of the corporate profit) are costless to adjust. Under the extended new view, the firm faces a cost of adjusting the dividend level, because of negative signaling effects or aggravated free cash flow problems. Based on the free cash flow hypothesis we show that the non-tax benefits used for arguing the traditional view do not invalidate the core of the new view, namely that the marginal investment may be financed with retained earnings. What is known as the traditional view appears as a special and temporal case of the extended new view.

This paper is divided into two parts, one theoretical and one empirical, both of which draw on the work by Auerbach and Hassett (2000). In the theoretical part we set up a simple model of firm behavior based on the sketch of a model presented in Auerbach and Hassett, where dividend distribution will partly be determined by the owners' desire to reduce the amount of free cash flow within the firm.² Such a reduction limits the scope for so-called *perk consumption* by the managers, i.e. consumption or investment activities solely in their interest. We show that the managers' propensity to indulge in perk consumption may affect the firm's financial policy. For instance, with a high propensity for perk consumption, the

¹ The expression *extended new view* is used in Auerbach and Hassett (2000), although in a slightly different sense.

² However, we emphasize that the result can also be interpreted as a consequence of the signaling hypothesis.

owner will be reluctant to retain income within the firm and other sources of funds (debt or new equity) become more attractive.

The distinction between the new and traditional views then follows from the managers' propensity for perk consumption. With a low propensity, the cost of free cash flow is low, meaning that a firm with small costs can reduce the amount of income distributed as dividends, i.e. retain more income, whenever there is a need to finance additional investments. This scenario is in accordance with the new view, whereas the traditional view would be the case where a (infinitely) high propensity of perk consumption implies that the firm decides to distribute its entire income in order to eliminate the cost of free cash flow. With a limited supply of retained earnings, the firm may then be forced to seek other sources of finance, i.e. debt or new equity.

The theoretical model gives a very simple and intuitive solution, capturing the implication of the new view that dividends are negatively related to investments, and that the traditional view follows as a special case of the extended new view. To make the model more realistic and to put the cost of perk consumption in relation to other costs of funding, we also include debt in the model. By using debt, the firm can smooth dividend payments. However, using debt as an instrument for dividend smoothing will also incur a cost. A higher debt level is assumed to cause higher interest expenses due to a higher probability of bankruptcy, and the fact that the bank must spend resources on monitoring to eliminate the risk of perk consumption. The aim of the theoretical part is to present a self-contained model illustrating the core implication of the new view of equity. However, we are not in a position to derive an exact specification to be used for econometric estimation. The model should rather be seen as a theoretical motivation for why, and to what extent, dividends and investments are negatively related.

In the empirical part of the paper, we will test the implication of the new view that dividends are negatively related to investments. For comparison, we first run the same basic tobit specifications as in Auerbach and Hassett (2000) on Swedish data. However, Swedish firms only distribute dividends once a year and the number of zero observations in the dependent variable is considerable lower than that found in the U.S. data. For that reason, we will also run some linear specifications, which enables us to make full use of the panel properties of the data. When replicating the tobit specifications, it is shown that dividends do respond

negatively to investments and positively to cash flow when controlling for the firm's market value and stock of debt. This conclusion remains under the linear specifications, where a change in dividends is determined by a change in investments as well as changes in cash flow, market value and debt. Hence, the empirical analysis offers support to the new view. Due to the setup of analyzing an implication of the new view, we are not in a position to reject the traditional view, however.

The remainder of the paper is organized as follows. In section 2, we set up a simple model of firm behavior where the firm faces a cost for adjusting the dividend level. Numerical simulations in section 3 illustrate the negative relationship between dividends and investments according to the extended new view. Section 4 presents the data and the empirical specifications, while the result of the empirical work is found in section 5. Finally, a short summary is offered in section 6.

2 The Model

We examine the economic behavior of the firm by setting up a dynamic model, where the market value of the firm in period t , V_t , is

$$V_t = \sum_{s=t}^{\infty} \frac{1}{(1+\beta)^{s-t}} (1-\tau_{pd}) D_s, \quad (1)$$

where β equals the owner's discount rate, D_t denotes the actual dividends distributed in period t and τ_{pd} is the personal tax rate on dividends. Without loss of generality we ignore the personal capital gains tax. The amount of cash dividends follows from the firm's budget constraint

$$\begin{aligned} D_t = & (1-\tau)\theta F(K_t) - I_t - \frac{1}{2}\alpha(D_t^* - D_t)^2 \\ & + B_{t+1} - (1+(1-\tau)i)B_t - (1-\tau)\frac{1}{2}\rho B_t^2. \end{aligned} \quad (2)$$

The production function $F(K_t)$, net the corporate tax τ , also represents the firm's income. Parameter θ represents the productivity level. If θ increases, a positive productivity shock has occurred, implying that the existing capital stock in the current period becomes more productive and thereby raises the total income. The last three terms in (2) reflect the net change in the stock of debt B between two consecutive periods. Besides interest expenses, captured by i , there is also a cost ρ related to the (quadratic) magnitude of the stock of debt. This cost can be considered as capturing a higher bankruptcy cost or the cost of monitoring the bank will bear when lending to the firm. To keep the model simple, capital depreciation is ignored, which implies that investment I_t in (2) is given by the change in the capital stock

$$I_t = K_{t+1} - K_t. \quad (3)$$

In (2), D_t^* represents the firm's target dividend level defined as

$$D_t^* = (1 - \tau)\theta F(K_t) - (1 - \tau)\left(iB_t + \frac{1}{2}\rho B_t^2\right), \quad (4)$$

and parameter α in (2) captures the cost associated with free cash flow within the firm.³ As is clear from (4), the target dividend level equals the total after-tax income of the firm net debt-associated costs.⁴

By rewriting the budget constraint (2) in terms of investments and substituting for the target dividend level from (4) we have

³ Note that the term $D_t^* - D_t$ in (2) represents retained earnings.

⁴ The most common way of considering the target dividend level is that it constitutes a fraction of the reported income of the current period, and thereby representing the long-run income potential of the firm. However, this interpretation of D^* means that the firm withholds income and, as a consequence, increases its assets over time. The assets may take the form of increases in the capital stock, i.e. investments, or in the bank account. In one way or the other, the income remains within the firm and cannot be distributed. Using this interpretation in a neoclassical model of firm behavior, the steady-state solution implies that the firm will grow in infinity, a scenario that appears unrealistic.

$$I_t = (B_{t+1} - B_t) + (D_t^* - D_t) - \frac{1}{2}\alpha(D_t^* - D_t)^2. \quad (5)$$

Expression (5) shows that investments will be financed by new borrowing or by retained earnings, i.e. the difference between target and actual dividend levels. However, the funds available for investment are reduced by the cost of free cash flow that follows from the use of retained earnings.

Following a productivity shock, i.e. an exogenous increase in θ , the target dividend level increases, as follows from (4). There are two different mechanisms driving the target dividend level to its new higher value. First, the target level will increase as a direct consequence of a higher θ . Second, since the productivity shock will cause the firm to raise its capital stock, the target level also increases due to this effect.

Making use of an Euler equation approach, the optimization problem becomes

$$\begin{aligned} \max V_t = & \sum_{s=t}^{\infty} \frac{1}{(1+\beta)^{s-t}} \left\{ (1-\tau_{pd}) D_s \right. \\ & + \lambda_s^D \left[(1-\tau) \theta F(K_s) - I_s - \frac{1}{2} \alpha (D_s^* - D_s)^2 + B_{s+1} - (1+(1-\tau)i) B_s - (1-\tau) \frac{1}{2} \rho B_s^2 - D_s \right] \\ & + \lambda_s^{D^*} \left[(1-\tau) \theta F(K_s) - (1-\tau) \left(i B_s + \frac{1}{2} \rho B_s^2 \right) - D_s^* \right] \\ & \left. + \lambda_s^K [I_s - K_{s+1} + K_s] \right\}, \end{aligned}$$

with the following first order conditions

$$I_t : \quad -\lambda_t^D + \lambda_t^K = 0, \quad (6)$$

$$K_{t+1} : \quad -\lambda_t^K + (1+\beta)^{-1} \left[(\lambda_{t+1}^D + \lambda_{t+1}^{D^*}) (1-\tau) \theta F_{K_{t+1}} + \lambda_{t+1}^K \right] = 0, \quad (7)$$

$$D_t : \quad (1-\tau_{pd}) - \lambda_t^D (\alpha (D_t^* - D_t) + 1) = 0, \quad (8)$$

$$B_{t+1} : \quad \lambda_t^D - (1+\beta)^{-1} \left[\lambda_{t+1}^D + (\lambda_{t+1}^D + \lambda_{t+1}^{D^*}) (1-\tau) (i + \rho B_{t+1}) \right] = 0, \quad (9)$$

$$D_t^* : \quad \lambda_t^D \alpha (D_t - D_t^*) - \lambda_t^{D^*} = 0. \quad (10)$$

Showing the interaction between the actual and the target dividend levels, it is illustrative to rewrite (8) as

$$D_t = D_t^* - \frac{1}{\alpha} \left(1 - \frac{1 - \tau_{pd}}{\lambda_t^D} \right). \quad (11)$$

In the long-run, actual dividends, by definition, equal target dividends, i.e. $D_t = D_t^*$. For this to hold, it is clear from (11) that $\lambda_t^D = 1 - \tau_{pd}$. Using (6) we therefore conclude that the marginal valuation of capital, or Tobin's marginal q , equals unity minus the personal tax rate on dividends, i.e. $\lambda_t^K = \lambda_t^D = 1 - \tau_{pd}$ in the long-run. It is also clear from (5) that in a long-run equilibrium, there is no cost of free cash flow since the entire income is distributed.⁵

Following a positive productivity shock, the marginal valuation of capital will increase from its long-run value, i.e. $\lambda_t^K > 1 - \tau_{pd}$, offering an incentive to increase the existing capital stock to match the new level of productivity. From (11), it then follows that actual dividend payments will be reduced below the target dividend level, i.e. $D_t < D_t^*$. The gap between the two dividend levels will depend on the magnitude of the cost of deviating from the target level, i.e. parameter α .

With a low value of α , the gap between the actual and the target dividend levels may be large, see (11). This gap determines the amount of earnings retained for investments. Note, however, that the use of debt enables the firm to maintain a higher level of actual dividends for a given investment volume, the effect of which is a lower cost of free cash flow. Still, with a low value of α , investments will have a strongly negative impact on dividends, which is in line with the new view.

With a higher value of α , it follows from (11) that actual dividends will deviate less from the target level. Retained earnings become less important as a source of finance, leaving a larger fraction of investments to be financed through debt, see (5). With α very high, actual dividends will closely follow the target level, thereby eliminating the cost of free cash flow.

Instead, the firm must resort to borrowing, or - though this is not explicitly incorporated in the model - issuing new equity as envisioned by the traditional view. Hence, investments should have no impact on dividends.

Technically, for new share issues to take place, the marginal valuation of capital must be larger than unity. If this is not the case (or if the marginal value has been suppressed to unity through the newly issued capital), a high - but not infinitely high - value of α still implies that investments will be financed through retained earnings. Compared to the case with a lower value of α , the adjustment process back to the new long-run equilibrium will be slower. The implication is then that the traditional view – which is mostly regarded as a unique separate case - could be interpreted as a special and temporal case (with α infinitely high) of the extended new view.

3 Numerical simulations

In order to shed more light on how the model works we next present numerical simulations of the firm's adjustment following a productivity shock. The simulation procedure requires a specification of the firm's production function, which takes the form $F(K_t) = K_t^\varepsilon$, where ε is the share of capital and the pre-shock productivity level is normalized to unity, i.e. $\theta = 1$. Since we are solving the model forward and are not interested in the magnitude of the productivity shock (which leads to $\theta > 1$), we only have to set the marginal value of capital exogenously.

The marginal value of capital equals $\lambda_t^K = 1 - \tau_{pd}$ in a long-run equilibrium and, hence, with a personal dividend tax rate of 30 percent ($\tau_{pd} = .3$), the marginal value equals $\lambda_t^K = .7$. When initiating the simulations, the marginal value of capital is set exogenously at a higher level than the long-run value. This causes the firm to raise its capital stock by retaining earnings and borrowing. Increasing the capital stock, in turn, reduces λ_t^K . The simulation procedure is repeated until the marginal valuation of capital is eventually reduced to its long-run level, i.e.

⁵ It may be the case that the firm faces costs associated with perk consumption due to inefficient production. This would then be captured in the production function $F(K)$. What we explicitly model is the cost associated with free cash flow, i.e. retained earnings.

$\lambda_t^K = 1 - \tau_{pd} = .7$, but now with a larger capital stock. The dynamics of the marginal product of capital follows from the first-order condition for capital in (7)⁶

$$\lambda_{t+1}^K = \lambda_t^K (1 + \beta) - (1 - \tau_{pd})(1 - \tau)\theta F_{K_{t+1}}. \quad (12)$$

With $K_t = 1$ and $B_t = .6$ (sample mean, see table 1 below), and arbitrarily setting the marginal value of capital equal to $\lambda_t^K = .85$ immediately following upon the productivity shock, we obtain the results presented in figures 1 and 2. The outcome depends crucially on the cost of perk consumption, i.e. parameter α .⁷ In the figures, α takes on the relatively low value of $\alpha = 3$ in order to clearly illustrate the sources of finance and the relation between dividends and investments in accordance with the new view.

Following the productivity shock in period t , investments will increase in order to expand the capital stock, see figure 1. Due to the cost of deviating from the target dividend level, the firm will not retain all earnings but will instead also make use of debt. If dividends were costless to adjust, the firm would rely totally on retained earnings and the stock of debt would remain unchanged. Hence, the simulations clearly illustrate the use of debt as an instrument for dividend smoothing (cf. the budget constraint in (5)). Note also that the initial borrowing is refunded (negative change) from period $t+1$ and onwards until the stock of debt reaches its initial level.⁸ This follows from the fact that the cost of free cash flow will fall as the amount of retained earnings decreases over time, making debt more expensive as compared to retained earnings. Hence, retained earnings are used both as a source of finance for investments and for debt amortization. The firm reaches the new long-run equilibrium in period $t+6$, where retained earnings equal zero, i.e. the entire income is distributed. As a consequence, investments and new borrowing also equal zero.

⁶ Combining (8) and (10) gives $\lambda_t^{D^*} + \lambda_t^D = 1 - \tau_{pd}$, which is used when simplifying (7) into (12).

⁷ The magnitude of other included parameters does not affect the main outcome of the simulations, but only affects the length of the adjustment path, the size of the stocks, etc.

⁸ By using the first order conditions (7) and (9) we obtain the long-run solution $\beta = (1 - \tau)(i + \rho B_{t+1})$, which implies that the stock of debt must be the same in two different long-run equilibriums, since β , τ , i and ρ are constant.

Figure 1. The adjustment of investments, debt and retained earnings.

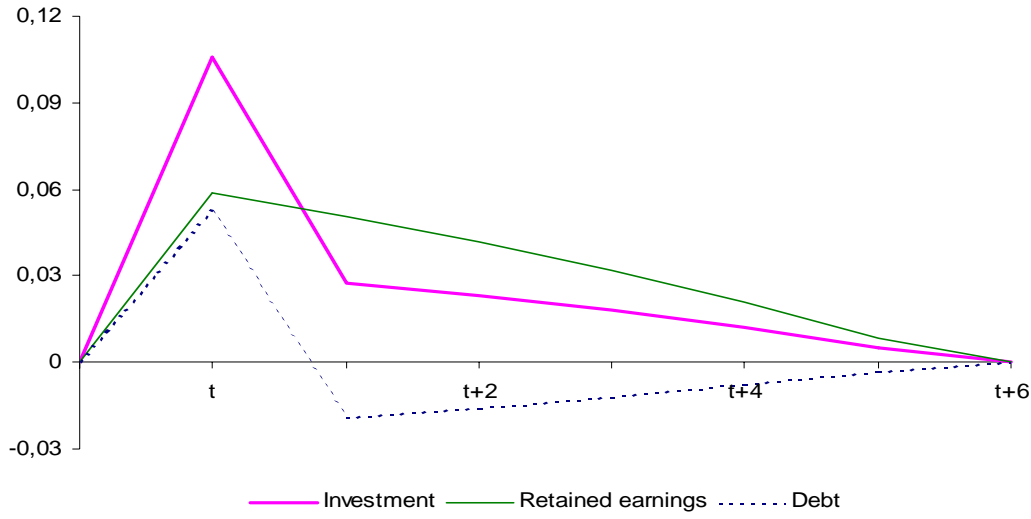


Figure 2. The adjustment of investments, target dividend and actual dividend.

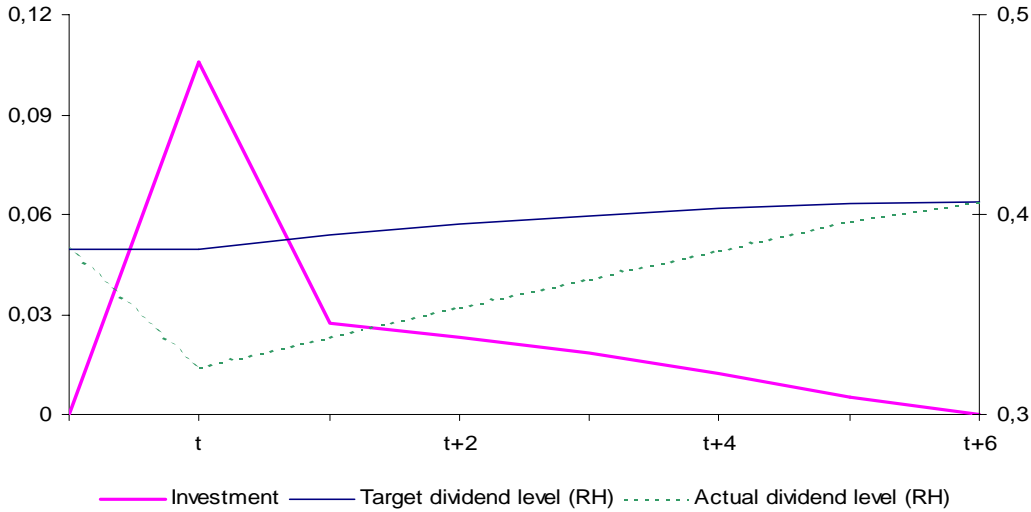


Figure 2 illustrates the key implication of the new view, namely that dividends and investments are negatively related. Following the productivity shock in period t , the amount of actual dividends drops as compared to the target dividend level. The difference between actual and target dividend levels represents the amount of retained earnings used for investments (as shown in figure 1).

We also emphasize that the magnitude of α does not affect the meaning of the simulations, i.e. the included variable will follow the pattern shown in figures 1 and 2, but it will merely affect the time length of the growth path to the new long-run capital stock. Hence, the firms will always make use of retained earnings as the marginal source of finance. This holds as long as α does not become infinitely high and the productivity shock does not push the

valuation of capital over unity. A valuation over unity implies that the firm makes use of new equity that immediately suppresses the valuation of capital to unity (from which the valuation of capital is further suppressed to its long-run value, as the stock of capital increases through retained earnings). In summary, it seems that the traditional view (i.e. new equity as the marginal source of finance) only appears as a special and temporal case of the extended new view (i.e. retained earnings as a marginal source of finance).

We next turn to an empirical evaluation of the scenarios illustrated in figures 1 and 2 above. The empirical analysis is extended to also incorporate other explanatory variables not captured in the theoretical model. The aim of the empirical part is to find out whether a *change* in investment needs is financed through a *change* in cash dividends, i.e. whether firms make use of internally generated funds for their marginal investments. It should be noted that it is not possible to derive an analytical expression to be estimated in the model presented above. The theoretical part should instead be taken as an attempt to intuitively illustrate the mechanisms.

4 Data and empirical specifications

The empirical analysis reported in the next two sections draws on Auerbach and Hassett (2000), but we modify the analysis to capture circumstances specific for Swedish data. For instance, Swedish firms distribute dividends only once a year, as compared to once a quarter in the U.S. We expect a negative relation between cash dividends and investments if the new view holds, and we argue that the firms could make use of debt to reduce the gap between actual dividends and the target dividend level. The use of debt to smooth dividends is determined as a trade-off between the cost associated with free cash flow and that of a higher debt level. Hence, we expect the coefficient of debt to be negative when included as an explanatory variable for dividends.

Cash flow should also be incorporated as an explanatory variable for dividends. Cash flow represents, in principle, the firm's after-tax income and is, conditional on the investment needs, an important source of dividends (expected positive sign of the coefficient). Finally, the firm's market value is used as an overall control variable, thereby capturing investors' expectations about the firm's prospects. The market value is assumed to have a positive effect on dividends.

In defining the variables, it should first be noted that total assets are used to scale each variable. *Dividend* (D) equals the payout from the firm's stock of shares and *Value* (V) equals the market value of the firm. *Cash flow* (C) equals the sum of after-tax income and the value of balance-sheet allocations. *Investment* (I) represents real investments, while short- and long-run interest bearing loans sum up to *Debt* (B).⁹

The data are obtained from the TRUST¹⁰ database, where income statements and balance sheets for firms traded on the Swedish stock market are recorded. Swedish firms are traded on different lists depending on their size (market value, history, etc.) and trading volume. To be included in the sample, firms are required to be relatively stable over time and belong to the manufacturing industry (branches like bank, real estate, insurance, trust, consultancy and shipping are ignored).¹¹ Firms are categorized into one of the following industries: cyclical (forestry, primary, etc.), heavy manufacturing (steel, cars, etc.), ordinary manufacturing (construction, consumer goods, etc.), trading (clothes, food, etc.), and other (transportation, power, etc.).

However, the TRUST database does not include the firms' market value of equity, which has been obtained from the less comprehensive database FINLIS. After merging the two databases, the sample consists an unbalanced panel of 145 firms (1462 observations) during the period 1980 to 1998. Since the market values are measured as of December 31 each year, firms with non-calendar accounting periods were excluded (10 firms). Further, 24 observations have been excluded due to missing information in the variable *depreciation according to plan* and 13 observations due to unrealistic observations.¹² Finally, since the theory is best suited for mature firms and since we will make use of lagged variables in the

⁹ Further, even though new equity is neither incorporated in the theoretical model nor in the econometric specifications, we will still use it below as an indicator (0/1) of accessibility to the capital market. The variable *New share issue* (N) represents the amount of contributed new equity.

¹⁰ TRUST, as well as the below mentioned FINLIS, are administered by SIX (Stockholm Information Exchange).

¹¹ The collected data used in the analysis follow, in principle, that of Hamberg (2000). Although the selection criterion is somewhat subjective, we find the data collected by Hamberg to be reliable and representative, since Hamberg reports an extensive verification of the data. The reason for focusing on the manufacturing industry is that those firms are best suited for the theory.

¹² $C < -1$ (1 observation), $B > 1$ (2 observations), $V > 20$ (1 observation) and $N < 0$ (9 observations).

specifications, the firms are required to have records of at least five consecutive years and they must have positive dividends in at least one of these years (24 firms and 79 observations are dropped due to those requirements).¹³ This leaves a sample of 111 firms and 1205 observations. The sample statistics are found in table 1.¹⁴

Table A.1. Sample statistics, aggregated over the period 1980-1998.

Variable		Mean	Standard Deviation	Min	Max	Expected sign
Dividend	D	.0148	.0164	0	.2820	
Investment	I	.1053	.0870	0	.7901	negative
Cash Flow	C	.0807	.0596	-.3450	.5061	positive
Value	V	.6583	.6699	.0223	8.7652	positive
Debt	B	.5960	.1420	.0208	.9374	negative

Note: All variables scaled by total assets. Number of observations: 1205

It is worth emphasizing the timing of the firms' decisions and dividend payments. Swedish firms pay dividends once a year. Dividends for period t are paid to the shareholders at the beginning of period $t+1$. Consequently, according to the accounts, the firms' investment and debt policies in period t , with the resulting consequences on their cash flow and market value affect dividends distributed in period $t+1$, i.e. $D_{t+1} = f(I_t, C_t, B_t, V_t)$.

As a consequence of distributing dividends once a year, the frequency of variations in dividend between two consecutive years is very high (93.4 percent). The dividend level was increased in 57.0 percent, decreased in 36.4 percent and remained unchanged in 6.6 percent of the periods. Further, the variable *Dividend* is equal to zero in 9.5 percent of the observations, to be compared with the 18 percent of zero observations in the U.S. data reported by Auerbach and Hassett (2000). One potential explanation for the difference is the possibility for U.S. firms to transfer income through repurchases of their own shares, which effectively reduces the need for dividends. Repurchases of own shares were not allowed in Sweden during the sample period.

Since the number of observations with zero dividends was as high as 18 percent for the U.S. data, Auerbach and Hassett (2000) chose to run non-linear tobit specifications. To capture

¹³ We will also calculate firm-specific autocorrelation coefficients, which become more accurate with several time periods.

¹⁴ Figure A.1. in the appendix illustrates the sample statistics as a year-by-year aggregate.

differences between firms, they include a large number of dummy variables, such as industry and size dummies, in the base specifications, as well as dummies for bond rating and analysts' forecasts in the more detailed specifications. Further, Auerbach and Hassett run the specifications in levels. For comparison we will run the same tobit specifications for the Swedish data. However, the theoretical set-up offers support for performing the analysis in first differences. In addition, for Swedish data it seems more appropriate to run the analysis in differences, since we have a large variation in the dependent variable between two consecutive periods. As a result, the number of zero observations in the dependent variable is considerably lower for the Swedish data, so we will make use of the properties of the panel and run simple linear specifications in first differences.

5 Results

We first replicate the basic tobit specifications presented in Auerbach and Hassett (2000) on Swedish data and then present the linear specification in first differences. Column I in table 2 gives a first hint of the result. Running dividends on lagged explanatory variables (in levels) and time dummies, it is clear that the coefficient of investment has a negative sign. As expected, cash flow has a positive effect on dividends and the stock of debt has the predicted negative impact. However, the market value does not show a significant positive effect. The initial result seems to support the new view, and follows the result reported in Auerbach and Hassett.¹⁵

However, the initial result may just be a result of long-run differences among firms. Since we are mainly interested in explaining short-run fluctuations in dividends, following a productivity shock for instance, we must eliminate any long-run permanent cross-section variation. We therefore include a set of dummy variables for classification of the firms. First, the firms are classified into one of the five industries reported in section 4. Second, size dummies (total assets) are used where the intervals are based on the percentiles of the sample, below the 50th, 50th-75th, 75th-90th and above the 90th. Finally, to capture any dynamics in the process, Auerbach and Hassett (2000) also include an additional lag of the explanatory variables. The result of this specification on Swedish data is found in column II of table 2. The first lag of the market value now has a significant positive effect on dividends, but the

¹⁵ The U.S. data show a significant positive effect of the market value.

second lag has the opposite effect. Investments and cash flow have a negative and positive effect, respectively, on dividends in both lags. Hence, it seems that dividends do respond to short-run fluctuations in investment needs and, especially, the positive impact of the market value does not eliminate the impact of either investments or cash flow. The initial result supporting the new view is thus strengthened. Once more, the result is well in line with that presented by Auerbach and Hassett.¹⁶

Table 2. Tobit specifications (in levels). Dependent D(t).

	I	II	III	IV	V	VI
Sample	All	All	A-list	Not A-list	High probability	Low probability
I(t-1)	-.0172** (.0061)	-.0188* (.0075)	-.0086 (.0067)	-.0250* (.0123)	-.0083 (.0044)	-.0222 (.0147)
I(t-2)		-.0090* (.0042)	-.0074 (.0064)	-.0073 (.0058)	.0004 (.0042)	-.0361 (.0198)
C(t-1)	.1136** (.0233)	.1113** (.0258)	.0761** (.0226)	.1384** (.0402)	.0590** (.0123)	.2072** (.0624)
C(t-2)		.0440** (.0119)	.0177 (.0160)	.0613** (.0165)	.0250** (.0092)	.0297 (.0257)
V(t-1)	.0013 (.0009)	.0044* (.0018)	.0036 (.0028)	.0071** (.0022)	.0008 (.0014)	.0030 (.0044)
V(t-2)		-.0043** (.0017)	-.0025 (.0030)	-.0049** (.0019)	.0007 (.0015)	-.0076 (.0048)
B(t-1)	-.0361** (.0049)	-.0181* (.0087)	-.0299** (.0092)	-.0106 (.0128)	-.0137* (.0069)	-.0345 (.0215)
B(t-2)		-.0239** (.0075)	-.0221* (.0086)	-.0186 (.0109)	-.0106 (.0068)	-.0410* (.0190)
Dummies:						
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	No	Yes	Yes	Yes	Yes	Yes
Size	No	Yes	Yes	Yes	Yes	Yes
Obs.	1205	1094	556	538	393	394

Note: ** and * denote significance at the 1% and 5% levels. Robust standard errors are in parenthesis. All variables are in levels. The *A-list* is defined as those firms traded on the A-list (the main list) and the *Not A-list* capture firms traded on all other lists. *Low probability* is defined as those firms with an estimate (probit) in the percentile 0-40 of the sample and *High probability* is defined as those firms with an estimate (probit) in the percentile 60-100 of the sample.

Since the explanatory variable debt (*B*) is directly affected by the possibility to borrow funds from the capital market, and since the alternative source of finance to retained earnings and debt is new share issues (explicitly not in the model), it is motivated to incorporate accessibility to the capital market in the empirical specification to capture if the firms are

¹⁶ With the difference that the second lag of the market value is insignificant in Swedish data.

financially constrained. Auerbach and Hassett (2000) utilize two measures; bond rating and whether the firms have analysts' forecasts. Such measures are not available in Swedish data. Instead we split the sample according to the firms' stock market listings. Firms on the so-called *A-list* have a high trading volume, stable market value, etc., which should contribute to good access to the capital market. Several minor lists exist, but they are aggregated into a *Not A-list* in the empirical work. Firms traded on those lists are assumed to have weaker access to the capital market. Several interesting results are displayed in columns III and IV of table 2.

For both sub-samples, we find that cash flow has a positive impact on dividends, where the estimate is lowest for the firms traded on the *A-list*. This is an expected result, since firms traded on the *Not A-list* do not have the same access to the capital market, thereby making dividends more dependent on internally generated funds. Further, the negative impact of investments on dividends is insignificant for firms on the *A-list*, as well as the positive effect of the firms' market value. Fluctuations in dividends are instead solely explained by cash flow and debt, which is in sharp contrast with the firms on the *Not A-list*, where investments and market value do have a significant effect on dividends. On the other hand, debt is insignificant for those firms.

Hence, the firms on the *A-list* can make use of debt to the extent that dividends can always be smoothed over time, and thereby make them unaffected by both investments and market value. In terms of the theoretical model of section 2, parameter α seems to be high, which is explained by the high level of asymmetric information between managers and owners in the firms traded on the *A-list*. In contrast, dividends do respond to investments in the firms on the *Not A-list* (these firms do not have the same access to the debt market). These results are in line with the extended new view.¹⁷ Although Auerbach and Hassett (2000) make use of other dummies for splitting the sample, it is interesting to compare the results for the U.S. and Sweden. Both investments and cash flow show an insignificant effect for firms with high access to the capital market, and a higher coefficient of cash flow for firms with less accessibility.

¹⁷ An alternative explanation is that, due to a high accessibility to the capital market, firms on the *A-list* can make use of new equity as their source of finance. If this is the case, the cost of perk consumption is infinitely high, leading the firm to distribute its entire income, which rejects the implication of the new view.

In order to shed more light on how the accessibility to new equity affects the result, Auerbach and Hassett (2000) split the sample according to the probability of issuing new equity. The fixed costs of issuing equity probably encourage firms to issue larger amounts than needed for the current period. Hence, there are strong reasons to believe that the variable *New share issue* does not reflect year-specific changes. But, for the classification of firms and their access to the external capital market this is no problem. With the same explanatory variables and dummies as above, but with the amount of new share issues as the dependent variable, we run a probit model, where the estimates, interpreted as the probabilities of issuing new equity, are used for splitting the sample. It turns out that only *Investment* has a significant effect on the decision whether to issue equity.¹⁸

The two last columns of table 2, i.e. columns V and VI, display the result according to this new split. Starting out with the cash flow variable, the magnitude of the estimate is considerably higher for firms with a low probability of issuing new equity. This is in accordance with the list dependent split above. The high impact for those firms is explained by a weaker access to the capital market, i.e. borrowing for smoothing dividends or new equity for financing investments. Both investment and market value have the expected signs, but are insignificant. For firms with good access to the capital market, the result follows that of column III, and may once again be explained by the use of debt for smoothing dividends. However, we would expect that the investment needs of the firms in the low probability sample, i.e. with weaker access to the capital market, should respond to fluctuations in dividends if the new view best describes the firms' financial decision. But this is not the case (even though the coefficients show the expected signs), and the conclusion is that the new view hypothesis of a negative response in dividends to investment needs does not hold in this particular specification for the Swedish data.

Cash flow and debt in the Swedish data follows the same pattern as in the U.S. data reported by Auerbach and Hassett (2000). The market value is insignificant for high probability firms

¹⁸ The parameter values are as follows (with robust standard errors in parenthesis): $I(t-1)$: 1.9742 (.5644); $I(t-2)$: 1.8307 (.5763); $C(t-1)$: .1045 (1.0381); $C(t-2)$: .7660 (.9484); $V(t-1)$: .1098 (.1702); $V(t-2)$: .0753 (.1643); $B(t-1)$: .4327 (.8160); $B(t-2)$: .5994 (.8042). With an estimate in the percentile 0-40 of the sample, the firm is categorized as having a low probability of obtaining funds from the external market. On the other hand, high probability firms are those with an estimate in the percentile 60-100 of the sample. The middle observations are excluded in order to have two distinct different samples.

in both Sweden and the U.S., but significant for low probability firms in the U.S. Further, in the U.S. data, investments are negatively related to dividends in both sub-samples, confirming the implication of the new view in the U.S.

To sum up the first part of the empirical analysis, the implication of the new view that dividends should respond negatively to investments is partly found in the Swedish data. The effect of investments is not as robust for different specifications based on the sub-samples as cash flow. The positive effect of cash flow is strong, robust for different specifications and acts as predicted in the different sub-samples. The other explanatory variables show the expected sign, but are not always significant. The result on Swedish data is comparable to that derived in Auerbach and Hassett (2000), but is not as strong and convincing.

In the second part of the analysis, we will adjust the empirical specifications to better fit the theoretical model and the Swedish data. However, we will make use of the same set-up in the use of sample splits as in the first part of the analysis. As is clear from the theoretical model and the result of the simulations presented in figures 1 and 2, we are interested in how a change in the investment pattern changes the amount of cash dividends. For that reason, we will define the variables in differences.¹⁹ Further, since there is a high variation in the dividend level between two subsequent time periods (because Swedish firms only distribute dividends once a year) and relatively few zero observations, we will run ordinary least squares specifications in first differences as presented in table 3.^{20 21}

¹⁹ Since we are using a first-difference estimator, the size and industry dummies used in the level specifications in table 2 will be dealt with by the differentiation and are therefore omitted. Including these, although having a different interpretation compared to the level specifications reported in table 2, do not change the results.

²⁰ We did also run ordinary least squares in levels on the specifications as in table 2. The conclusions follow that of the tobit specifications. As an alternative to a first-difference estimator, we could have used fixed or random effect specifications in levels. A Hausman test rejects the random effect specification due to correlation between the explanatory variables and the disturbance term. The within estimator (fixed effect model) gives the predicted signs of the explanatory variables (at the same significance level, basically).

²¹ As a consequence of using a first-difference estimation procedure, the disturbances will be correlated. We will control for autocorrelation and heteroskedasticity by employing the method put forward by Prais and Winsten (cf. Green (1997)). The errors follow a first order firm-specific autocorrelation process (AR(1)) and we control for heteroskedasticity within but assume no correlation between firms. The conclusions remain the same, even when the firms face the same AR(1) process.

Table 3. Ordinary least square specifications (in first differences). Dependent $\Delta D(t)$.

	I	II	III	IV	V
Sample	All	A-list	Not A-list	High probability	Low probability
$\Delta I(t-1)$	-.0088* (.0041)	-.0044 (.0061)	-.0112* (.0051)	-.0052* (.0025)	-.0247 (.0140)
$\Delta C(t-1)$	.0370** (.0216)	.0180 (.0108)	.0452** (.0165)	.0053 (.0070)	.0799** (.0219)
$\Delta V(t-1)$	.0053** (.0012)	.0069** (.0020)	.0046** (.0015)	.0008 (.0008)	.0134** (.0042)
$\Delta B(t-1)$	-.0199** (.0072)	-.0205 (.0112)	-.0194* (.0085)	-.0271** (.0052)	-.0100 (.0213)
const.	-.0004 (.0018)	-.0007 (.0019)	.0012 (.0048)	-.0082 (.0050)	-.0003 (.0049)
Dummy: Year	Yes	Yes	Yes	Yes	Yes
R ²	0.1695	0.1472	0.2261	0.4461	0.1466
Obs.	1094	556	538	393	394

Note: ** and * denote significance at the 1% and 5% levels. The results are corrected for both autocorrelated (first order firm-specific autocorrelation) and heteroskedastic disturbances. All variables are in first differences. The *A-list* is defined as those firms traded on the A-list (the main list) and the *Not A-list* captures firms traded on all other lists. *Low probability* is defined as those firms with an estimate (probit) in the percentile 0-40 of the sample and *High probability* is defined as those firms with an estimate (probit) in the percentile 60-100 of the sample.

The first column of table 3 shows the result from the basic specification. The first difference in investment is significantly negative in explaining changes in dividends, which is in line with the simulations presented in figures 1 and 2. The other explanatory variables have the predicted signs and are highly significant. Thus, the result clearly supports the new view.

Following the first part of the analysis, we next control for any financial constraints and examine how these affect the initial result. We will first split the sample according to trading lists, and, second, also make use of the split according to the probabilities of issuing new equity. When splitting the sample according the trading lists, do remember that firms on the main list (*A-list*) are supposed to have a high accessibility to the external market as compared to other firms (*Not A-list*). The result of the split is presented in columns II and III of table 3.

For firms traded on the *A-list*, the negative impact of a change in investments on the first difference in dividends is insignificant, as is the effects of the changes in the firm's cash flow and stock of debt (the estimates have the predicted signs, however). Fluctuations in dividends are instead explained solely by changes in market value. This is in sharp contrast to firms traded on the *Not A-list* where, besides investments, cash flow and market value, the first

difference in debt also have a significant effect on dividend changes. These results are difficult to interpret because the significant result between debt and dividends only for firms traded on the *Not A-list* shows that we have probably not obtained the desired split into firms with good and weak accessibility to the capital market.

Since the split according to the probability of issuing new equity draws on actual behavior, it constitutes a better base for capturing whether the firm is financially constrained. The last two columns of table 3 display the result of this split. Note that debt does not explain dividend changes for firms with a low probability of issuing new shares (column V), which is interpreted as weak access to the capital market. Hence, this split seems to be more relevant. The variable cash flow is significant in explaining changes in dividend for firms with weak access to the capital market (column V), but insignificant for firms with good access (column IV). The first difference in investment is significant for firms that are not financially constrained (column IV) and shows the predicted sign for firms with a low accessibility to the capital market (column V). This result gives strong support for the implication of the new view since a change in investment still affects dividends, even though the firms have a good accessibility to new equity. And since this seems to be the most accurate specification in table 3, the conclusion from the second part of the analysis is that Swedish data support the new view of equity.

6 Summary

In the theoretical part, we set up a simple neoclassical model of firm behavior where the firm faces a cost of adjusting the dividend level because of an aggravated free cash flow problem. The existence of such a cost - which has been an argument for the traditional view of equity - does not invalidate the core of the new view, namely that the marginal investment may be financed with retained earnings. As suggested by Auerbach and Hassett (2000), the combination of costly changes in dividends and retained earnings as the marginal source of funds actually defines an *extended new view* of equity. The traditional view then appears as a special and temporal case of this extended new view, where the firm faces infinitely high costs of adjusting dividends to finance investments.

In the empirical part of the paper, we test the implication of the new view that dividends and investments are negatively related. For comparison we first run the same tobit specifications

as in Auerbach and Hassett for the Swedish data. However, the theoretical set-up, as well as the Swedish data, offers support for performing the analysis in first differences, so, secondly, we extend the analysis and make use of a first-difference estimator. The overall conclusion is that the implication of the new view is supported for traded Swedish firms during 1980-98.

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Appendix: Sample Statistics

Figure A.1. Sample statistics, year-by-year aggregate.

