european corporate governance institute

ecgi

The Dividend policy of German firms

A panel data analysis of partial adjustment models

Christian Andres
University of Bonn

André Betzer
University of Bonn

Marc Goergen
Sheffield University Management School and ECGI

Luc Renneboog
Tilburg University and ECGI

european corporate governance institute

ECGI Working Paper Series in Finance

The Dividend policy of German firms
A panel data analysis of partial adjustment models

Working Paper N°. 216/2008

August 2008

Christian Andres
André Betzer
Marc Goergen
Luc Renneboog

Abstract

German firms pay out a lower proportion of their cash flows, but a higher proportion of their published profits than UK and US firms. We estimate partial adjustment models and report two major findings. First, German firms base their dividend decisions on cash flows rather than published earnings as (i) published earnings do not correctly reflect performance because German firms retain parts of their earnings to build up legal reserves, (ii) German accounting is conservative, (iii) published earnings are subject to more smoothing than cash flows. Second, to the opposite of UK and US firms, German firms have more flexible dividend policies as they are willing to cut the dividend when profitability is only temporarily down.

1. Introduction

Lintner's (1956) empirical observation that firms gradually adjust dividends in response to changes in earnings, has acquired the status of a stylized fact on corporate dividend policy.[1] His seminal work suggests that managers change dividends primarily in response to unanticipated and non-transitory changes in their firm's earnings, and they have reasonably well-defined policies in terms of the speed with which they adjust dividends towards a long run target payout ratio. Empirical studies, such as Fama and Babiak (1968), have confirmed Lintner's original findings.

As most of the empirical evidence is on UK and US data, little is known about the dividend policy and the explanatory power of dividend models for the case of continental European firms. In this paper we estimate the empirical relation between dividends and earnings in Germany by applying Lintner's 'partial adjustment model' and by using the Generalized Method of Moments (GMM-in-systems). We examine whether German firms have a long-term target payout ratio. In addition, we investigate whether the target payout ratio is based on published earnings or on cash flow. We also study how the dividend adjustment process takes place.

An earlier study by Behm and Zimmermann (1993) on German dividend policy is based on a sample of the 32 largest German firms only. Their study estimates the Lintner model for the period 1962-88 and concludes that it reasonably fits both aggregate and individual firm data. The present paper improves on earlier research by using a longer sample period, a larger, more representative and more consistent sample, more advanced econometric techniques, and two substantially different proxies for profitability. Specifically, we improve the methodology along the following lines. First, we use panel data on 220 industrial and commercial quoted firms for the twenty-two-year period from 1984 to 2005. The reason why it is important to consider a long period is that some US studies have documented substantial changes to dividend patterns over briefer periods. For example, Fama and French (2001), and Amihud and Li (2006) document that US dividends were disappearing during the late 1990s whereas Ikenberry and Julio (2004) find that dividends have been reappearing since 2000.[2] Second, this sample covers more than 50 per cent of the German industrial and commercial

---

[1] See Marsh and Merton (1986) and Brealey et al. (2005).

[2] See also DeAngelo et al. (2004).

quoted companies. Unlike earlier studies, we exclude financial companies as these firms have different accounting policies. Third, earlier studies on German dividend policy did not control for unobserved firm-specific effects which might be correlated with the observed explanatory variables causing Ordinary Least Squares (OLS) and Within-Groups estimators to be biased and inconsistent. We use the Generalized Method of Moments technique developed by Arellano and Bond (1991), Blundell and Bond (1998) and Arellano and Bover (1995). Finally, we do not only use published bottom line earnings as an explanatory variable, but also cash flows which have the advantage that they are less subject to conservatism in German accounting methods (e.g., the legal requirement to add earnings to reserves).

Our main findings can be summarized as follows. (i) German firms pay out a lower proportion of their cash flows than UK firms. However, on a published profits basis, the pattern is reversed, with German firms showing significantly higher payout ratios. (ii) Dividends of German firms are more volatile than those of Anglo-American firms, and dividend omissions and zero dividend payout policies occur more frequently in the former. (iii) As none of the published-earnings specifications of our partial adjustment models yield a long run target payout ratio and speed of adjustment in line with the average ratio and speed of adjustment, German firms do not seem to base their dividend decisions on published earnings. Given that the published earnings figures may not correctly reflect corporate performance as German firms tend to retain a significant part of their earnings to build up legal reserves and given the conservative nature of published earnings figures, the long term payout ratio may be based on cash flows. This is confirmed by our partial adjustment model based on cash flows. (iv) Our estimation results improve when we employ unbiased estimation techniques such as GMM-in-systems. (v) Whereas Anglo-American firms only slowly adjust their dividend policy, German companies tend to be more willing to cut the dividend in the wake of a consistent decrease in profitability. The German data suggests that there is a high degree of 'discreteness' in the dividends-per-share time series as opposed to the 'smoothness' (i.e., frequent small annual adjustments in the dividend per share) observed in the US and the UK. The paper is structured as follows. In the next section, we discuss some institutional aspects such as profit transfers from a subsidiary to its parent company, dividends on preference shares, and German accounting policies. We then describe our data set and provide descriptive statistics in Section 3. In Section 4, we first discuss the relevant

econometric issues. We then report the econometric results and present some tests to ascertain the robustness of these results. Section 5 concludes.

2. The Institutional Setting in Germany

The purpose of this section is to provide a brief overview of some important issues concerning German dividend policy. The issues are: (i) 'control agreements' which may apply to firms with a large shareholder, (ii) preference shares which earn a guaranteed dividend, (iii) share repurchases, and (iv) accounting rules.

Some quoted German companies have 'control agreements' with their parent company. There are two possible types of control agreements: a Profit and Loss Agreement (which we call PLA) and a Subordination of Management Agreement (SMA).[3] An SMA requires the controlling company to absorb any losses but the transfer of profit is optional. A PLA implies a transfer of both profits and losses to the controlling company. Hence, the pertinent question is whether companies with such agreements should be included in this study.

We decide to exclude these firms from our analysis for two reasons. First, the rationale of these control contracts is to benefit from possible tax losses carried forward at the level of the subordinate company. The controlling company can then absorb these losses and offset them against its profits so as to reduce its tax bill, because in Germany, like the UK but unlike the US, the taxable profit is based on the accounts of the individual companies in the group. Hence, the amount transferred to the parent company is not a dividend, but is the direct result from the effort to reduce the tax liability of the parent company. Second, financial reports are very difficult to interpret in these cases. Often the profit is not disclosed, but the amount (which may be positive or negative) that is transferred to the parent company as well as the dividend per share paid to the 'free' shareholders (the minority shareholders of the controlled company) is shown. One way to deal with this sample exclusion bias is to use consolidated accounts. If the parent firm is publicly quoted, the transfers from the subordinate firm to its parent company will be reflected in the parent firm's financial report, and therefore these subordinate firms will be recorded (indirectly) in our sample. This is one reason why

---

[3] Both agreements require the approval of at least 75 per cent of the voting capital represented at general meetings of both the controlling and subordinate companies. Note that the existence of a controlling shareholder does not necessarily imply the existence of either PLA or SMA type of agreements.

consolidated accounts have been used in this study. The other reason relates to provisions concerning the profit distribution which we now turn to.

Paragraph 150 of the German Stock Corporation Act (AktG §150) regulates the profit distribution. The company has to build up a legal reserve from its profits in the balance sheet. The annual profit, net of the transfer to the legal profit reserve, is then the basis for distribution according to the provisions of AktG §58, which basically state that the management board and the supervisory board, *without* consulting the shareholders,[4] can retain part, but no more than half, of the annual profits. In other words, this provision requires companies to pay out at least 50 per cent of their current profits as dividends. However, this is not the case for all companies as other requirements such as legal reserves and special provisions in the articles of association of companies mitigate the impact of AktG §58 (such that the management board may be authorized to transfer up to 100 per cent of the year's profit to profit reserves). Further, in practice, AktG §58 does not impose a binding lower bound on dividend payouts as the managers can put forward a proposal at the AGM for a lower dividend payout. As long as they obtain shareholder approval, lower dividend payouts are possible.[5] Legally, when deciding on the dividend policy of the firm, the (parent's) management only has to take into consideration the profit of the parent (unconsolidated) company. However, in practice, group accounts play a fundamental role in the dividend payout decision. If the holding company's results were substantially lower than the group's accounts, shareholders could demand either an explanation or a higher dividend. Thus, for the purposes of this study, we opted for the group's profit as the profit measure.[6]

Preference shares are frequently issued by German corporations (see chapter 5 of Correia et al. (2004)). In almost all cases, they carry no voting rights,[7] but are entitled to a minimum cumulative preferential dividend. In general, if this dividend is not paid during two consecutive years then the preference shares become voting shares. Preference shares are not only given priority in terms of the dividend they receive, but also receive an excess dividend

---

[4] This is the case as long as there is no control agreement between the controlling company and the subordinate company.

[5] We are grateful to one of the two anonymous referees for pointing this out.

[6] Harris *et al.* (1994) confirm the validity of our choice as they document that consolidation increases the value relevance of accounting measures for German companies.

[7] Except in a few cases where the term *preference share* refers to shares with multiple-voting rights rather than to a preferential dividend.

of usually between DM1 to DM2 (€ 0.50 to € 1) per share.[8] These stock corporation provisions basically ensure that firms, which are fully controlled by one or a few shareholders and which have issued quoted preference shares, do not adopt dividend policies that favour the large shareholders at the expense of the minority non-voting shareholders.

In Germany, until 1998, public corporations were allowed to buy their shares back (AktG §§ 71-71e) only under special circumstances. For example, a company could acquire its own shares up to a total of 10 per cent of its share capital if this repurchase was necessary to avoid serious damage to the company (i.e., loss of property or assets), or with the intention to offer them to the employees of the company. Since 1998, companies have been able to repurchase up to 10 per cent of their equity with the approval of the AGM.

Finally, German accounting is often considered to be particularly deficient in the information disclosed to investors. The German system has traditionally encouraged a certain degree of conservatism (see Harris *et al.* (1994) for an overview of the system). In particular, the three following factors contribute to a conservative bias in the profit figure disclosed. First, there is some degree of prudence in terms of asset valuation, as the imparity principle requires unrealized losses to be recognized but not unrealized gains. Second, as a consequence of the link established by AktG §58 (see above) between dividends and earnings, managers have incentives not to report earnings that attain a desired dividend policy because higher reported earnings may create shareholder pressure for higher dividends.[9] Third, the existence of pension provisions may also account for a certain downward bias in the published profit figure. We will shortly come back to this point.

In the light of conservative accounting information, we provide an alternative measure of corporate profitability. We define cash flows as zero distribution profits, gross of depreciation and changes in long term provisions. As this definition merits an explanation,

---

[8] In other words, where there are dual-class shares of this type, distributed profits are first accorded to preference shares and in case there is still profit left, ordinary shares receive a dividend. Once the amount paid to ordinary shares reaches the amount accorded to preference shares and if there is further profit left, the marginal increase in dividends paid is the same for both types of shares although the preference shares generally receive a small premium in excess of the dividend paid to ordinary shares.

[9] Although one should bear in mind all these difficulties when interpreting German accounts, there is no empirical evidence that reported earnings in Germany have less value relevance than those in other countries. For example, Harris *et al.* (1994) argue that German reported earnings have informational content similar to those of the US.

we briefly discuss (i) zero distribution profits and dividend related taxation, (ii) depreciation and (iii) pension and other provisions.

(i) The German tax system affects measured profits and dividend payout ratios.[10] Until 2001, dividends were taxed differently than retained earnings. This implies that corporate tax liabilities were sensitive to dividend distributions. The convention that has been used in this case is to measure profits by zero dividend distribution profits and these are defined as:

$$\frac{D(1-t_c)}{(1-t_d)} + R \tag{1}$$

where t_d accounts for the tax rate on dividends distributed, t_c for the tax rate on retained profits, $D(1-t_c)$ are the dividends after corporate tax, $D/(1-t_d)$ are the dividends gross of tax on distributions and R are earnings retentions. To understand how dividends in Germany affect tax liabilities, assume that a firm makes a loss. If it omits its dividend, then there will be no tax liability. However, if it decides to pay out a dividend despite its loss, then there will be a tax liability (equal to t_d times the dividend distribution). In 2001, Germany underwent a major tax reform.[11] Under the new taxation laws, distributed and retained earnings are no longer taxed at different rates. (ii) Depreciation is included as it is merely a bookkeeping transaction that does not involve cash inflows or outflows. (iii) Long term provisions are defined as the sum of provisions for pensions, and other provisions. The inclusion of pension provisions in the calculation of the cash flow deserves a comment because, e.g., in the UK this item is not significant. In one respect, the pension provisions should be regarded as a liability (of the company towards the employees) and therefore it should not be part of retentions. However, in our view, there is a strong case for considering it as a form of cash flow. Edwards and Fischer (1994, Table 3.4, p.66) report that, between 1970 and 1989, this amount accounted for approximately 6 per cent of the internally generated funds of the non-financial sector. The authors also argue that firms frequently have a high degree of discretion over how pension provisions are invested. This is another reason why the bottom line profit figure may be so conservative in Germany. Therefore, we opt for the inclusion this item in the cash flow figure. The item 'other provisions' is net of tax provisions, such as deferred taxation.

---

[10] See Mayer and Alexander (1990) for a more detailed discussion of the issue.

[11] See the appendix for a short summary of the 2001 tax reform.

3. Sample and Data Description

3.1 Sample

Our sample includes all of the 220 industrial and commercial firms that are quoted in at least one of the eight German Stock Exchanges (GSE), and for which there are at least five years of accounting data available over the eighteen-year period from 1984 to 2005. Thirty-six firms obtain a listing in a year after 1984, but all sample firms are quoted in 1989. Overall, the sample consists of an unbalanced panel data of 3,932 firm-year observations (see Table 1).

[INSERT TABLE 1 ABOUT HERE]

Accounting data are collected from *Saling/Hoppenstedt Aktienführer[12]*, an annual publication which provides information on balance sheet and profit and loss account items, historical data on equity raised on the stock exchanges, shareholdings, share prices, date of first quotation, etc. The following data are gathered from this source for the twenty-two-year period 1984-2005: published after-tax earnings, depreciation, changes in pension provisions and other provisions, dividends per share for both preference and ordinary shares, and the number of ordinary and preference shares at the end of the accounting year to which the dividend per share refers. The dividend per share figures are adjusted for stock splits.

3.2 Definitions and data issues

We use gross dividends, defined as cash dividends gross of corporation tax levied on dividend distributions. Preference shares are often issued on the German Stock Exchanges: in about 25 per cent of our sample (58 cases out of a total of 220), preferred stock was listed in at least one year during the period 1984-2005. To account for dividends on preferred stock, we calculate a weighted average of the dividend paid on ordinary and preference shares. The weights consist of the ratios of the share capital issued as preference shares and ordinary shares, respectively, divided by the total market value of the total equity capital outstanding.[13]

---

[12] The name *Salinger Aktienführer* was changed to *Hoppenstedt Aktienführer* in 1997 with the publication of the 90th edition of the guide.

[13] Hence, the weighted average dividend per share is calculated as follows. Let N_T be the total number of shares outstanding, N_o the number of ordinary shares, and N_p the number of preference shares. Thus, $N_T = N_o + N_p$. Moreover, let DPS_o be the dividend per share paid on ordinary shares, and DPS_p the

UK studies typically consider only dividends on ordinary shares (see, e.g., Bond *et al.* (1996), Edwards *et al.* (1986)). Even for Germany, the issue of dividends on preferred equity may be less empirically relevant in the context of panel data estimations because the movements in dividends per share are equal for the two classes of shares in virtually all our sample firms. In other words, when dividends per ordinary share increase, the dividend per preference share increases by a similar amount. For only 13 German firms (out of the 58 with preference shares), the change in dividends per ordinary share was different from the change per preference share. Furthermore, the change is only different in situations of dividend omissions or dividend initiations, which is consistent with the fact that there is generally a dividend premium paid on preference shares. To conclude, our data suggests that the degree of flexibility in choosing the level of dividends on preference shares is similar to the one on ordinary shares.

A striking fact is the high incidence of 'specially designated dividends' paid by German corporations. We find that such payments occurred in 343 of the 3,932 firm-year observations, i.e., 9 per cent of the whole sample. These special dividends predominantly reflect one-off pay-outs of excess cash. Brickley (1983), who studies the dividend payouts and earnings of a sample of US firms in the year following the announcement of special dividends, also subscribes to this view. In 44 firm-years, we observe large one-off payments associated with either 'special anniversaries', or with sales of subsidiaries, or with distributions of reserves previously accumulated at a different rate of taxation. The fundamental problem with these large payments is one of timing, i.e., which accounting years should these payments be allocated to? As we do not have enough information allowing us to allocate these payments to specific accounting years, we exclude these payments.

Two earnings figures are employed: (a) after-tax earnings as published in the annual reports, and (b) cash flows defined as zero distribution earnings gross of depreciation and changes in provisions.[14] Both measures of earnings were divided by the number of shares outstanding at the end of each accounting year to obtain a per-share figure.

---

dividend per share paid on preference shares. The weighted average dividend per share (*WDPS*) then equals: $WDPS = (DPS_0 x N_0 + DPS_p x N_p)/N_T$

[14] Behm and Zimmermann (1993) use 'net profits', a figure that is suggested by the German Financial Analysts Association. However, data on net earnings are not available for all firms in our sample and negative 'net profits' are not reported.

We use consolidated data for the following reasons. First, the use of consolidated data ensures that the fact that we exclude firms under 'control agreements' does not create a sample exclusion bias. These firms are indirectly included in our data via the accounts of the quoted parent company if the latter is in our sample, i.e. has at least five years of accounting data available over the twenty-two-year period from 1984 to 2005. Second, the dividend policy of the parent company is, in practice, determined after consideration of the annual consolidated accounts. However, a problem arises from working with consolidated accounts. We have 14 sample firms that are owned by other corporations which, in turn, are also in our sample. Such a double-counting issue may create a bias in our estimations. A typical example is Renk AG, which was owned by MAN AG over our sample period. The size of these 14 firms is usually very small compared to their parent companies. The average market capitalization of Renk AG is 8 per cent of the market capitalization of the average sample firm, and only 3 per cent of the market capitalization of MAN AG (which is 3 times as large as the average listed firm). We will investigate whether the double-counting problem biases our results by performing a re-estimation excluding these 14 firms.

3.3 Some descriptive statistics

Some descriptive statistics of the dividends, earnings and cash flow series for the whole period are given in Table 2. A first striking result is that published earnings account for only 23.3 per cent of the cash flow. Hence, the mean dividend payout ratio on a published earnings basis is significantly higher than the equivalent ratio on a cash flow basis: 67.2 and 15.7 per cent, respectively. This also suggests that the published earnings figure is rather conservative. Table 2 also reveals that the dividend per share figure has a coefficient of variation (defined as the standard deviation of the series over the mean) of 0.99, which is lower than the coefficient of variation of published earnings (2.62) and cash flows (1.33). The variance ratio of dividends over published earnings equals 0.06 (=$11.9^2/47.0^2$) and the one of dividends over cash flows equals approximately 0.01. This provides a rough estimate of the degree of 'dividend smoothing'. Cash flows have a slightly lower coefficient of variation than published earnings but the variance ratio of published earnings over cash flows equals 0.21 providing some evidence of what we can call 'published earnings smoothing'. As these figures per share may be influenced by firm size, we also show the correlation coefficient between firm size, on the one hand, and dividends, published earnings, and cash flows per share, on the other hand. We observe that cash flows per share are positively correlated with

firm size (coefficient of 19.4 per cent). The correlation coefficients of size with dividends per share and with published earnings are smaller, but are also positive (19.1 and 16.7 per cent, respectively).

An important stylized fact on German dividends is the high incidence of unchanged dividends every year, which is confirmed by Goergen et al. (2005). As Table 3 reports, more than 46 per cent of the firm-year observations in our sample correspond to cases of maintained dividends. The frequency distribution of dividend changes during 1984-2005 indicates that the average firm changes its dividend per share every two years.

[INSERT TABLE 2 ABOUT HERE]

Table 3 shows that approximately 16 per cent of the firm-years correspond to cases where there are zero dividend payouts in at least two consecutive years. The table also reveals that in 34 per cent of observations (i.e., 581/1706), the zero dividend payout is maintained. The proportion of dividend cuts (including omissions) is almost 20 per cent of the total sample. Twenty-eight per cent of the dividend cuts are dividend omissions, suggesting that German dividend policy is not very rigid. Only one firm did not pay any dividends throughout the whole sample period, whereas 41 firms always pay a strictly positive dividend (not reported in the table).

[INSERT TABLE 3 ABOUT HERE]

In Table 4 we show the characteristics of the distribution of changes in the dividends per share. The mean increase and cut (excluding dividend initiations and omissions, respectively) are 36 per cent and –30 per cent, respectively. The median for dividend cuts amounts to 24 per cent whereas the median of increases is lower at 16 per cent. To summarize, we observe: (i) a high frequency of changes in dividends per share; (ii) the frequent occurrence of dividend omissions and zero dividend payout policies; (iii) some evidence of dividend smoothing; and (iv) the median of dividend cuts being higher than the median of dividend increases.

[INSERT TABLE 4 ABOUT HERE]

4. Estimation and results

Lintner (1956) conducted interviews with 28 carefully selected US companies to investigate the rationale behind their dividend policy. His fieldwork revealed considerable differences in dividend policies across companies but also unveiled some common patterns. Marsh and Merton (1987) summarize these patterns as follows:

(1) managers believe that firms should have some long term target payout ratio;

(2) in the dividend decision, managers focus on the change in current payouts and not on the dividend level;

(3) a change in dividends is usually triggered by a major unexpected and persistent change in earnings;

(4) most managers try to avoid changing the dividend if there is a high probability that this dividend change may be reversed within one year or so.

Based upon these facts, Lintner (1956) formalizes corporate dividend behaviour as a *partial adjustment model*. For any year *t*, the target level of dividends, D^*_{it} for firm *i*, is related to current earnings, E_{it}, by a desired payout ratio r_i:

$$D^*_{it} = r_i E_{it} \qquad (2)$$

In any given year the firm will only *partially* adjust towards the target dividend level. Hence, we have:

$$D_{it} - D_{i,t-1} = a_i + c_i (D^*_{it} - D_{i,t-1}) + u_{it} \qquad (3)$$

where a_i is a constant; c_i is the speed-of-adjustment coefficient, with $0 \leq c_i \leq 1$; $D_{it} - D_{i,t-1} = \Delta D_{it}$ is the actual change in the dividend and $(D^*_{it} - D_{i,t-1})$ is the desired change in the dividend.

If $a_i = 0$ and $c_i = 1$, the actual changes in dividends coincide with the desired changes. Conversely, if $c_i = 0$, then changes in dividends towards the desired level are not undertaken. The hypothesis that firms gradually adjust dividends in response to changes in earnings and thus apply dividend smoothing implies that the speed-of-adjustment coefficient c_i is within the range $0 < c_i < 1$. Furthermore, a positive a_i represents the management's resistance to reduce dividends.

The adjustment process (3) can be written as

$$D_{it} = a_i + c_i D_{it}^* + (1 - c_i) D_{i,t-1} + u_{it} \qquad (4)$$

Now substitution of (2) into (4) gives

$$D_{it} = a_i + c_i r_i E_{it} + (1 - c_i) D_{i,t-1} + u_{it} \qquad (5)$$

One obtains the following empirically testable equation:

$$D_{it} = a_i + b_i E_{it} + (1 - c_i) D_{i,t-1} + u_{it} \qquad (6)$$

with $r_i = b_i / c_i$ being the payout ratio and c_i the speed of adjustment coefficient.

Fama and Babiak (1968) extend the partial adjustment model by including a lagged earnings variable. They assume that the process generating the annual earnings of firm i is as follows

$$E_{it} = (1 + \lambda_i) E_{i,t-1} + v_{it} \qquad (7)$$

where v_{it} is a serially uncorrelated error term. A further assumption is that there is full adjustment of dividends to the expected earnings change $\lambda_i E_{i,t-1}$, and partial adjustment to the remainder:

$$D_{it} - D_{i,t-1} = a_i + c_i \left[r_i (E_{it} - \lambda_i E_{i,t-1}) - D_{i,t-1} \right] + r_i \lambda_i E_{i,t-1} + u_{it} \qquad (8)$$

which rearranged, gives

$$D_{it} = a_i + (1 - c_i) D_{i,t-1} + c_i r_i E_{it} + r_i \lambda_i (1 - c_i) E_{i,t-1} + u_{it} \qquad (9)$$

yielding the following empirically testable equation

$$D_{it} = a_i + (1 - c_i) D_{i,t-1} + b_i E_{it} + d_i E_{i,t-1} + u_{it} \qquad (10)$$

where $b_i = c_i r_i$, and $d_i = r_i \lambda_i (1 - c_i)$.

Our basic, empirically testable, model is based on equation (10):

$$D_{it} = a + (1 - c) D_{i,t-1} + b E_{it} + d E_{i,t-1} + YEAR_t + \eta_i + V_{it} \qquad (11)$$

where D_{it}, $D_{i,t-1}$ are the dividend per share at time t and $t-1$, respectively, for firm i; E_{it} is published profits (PP_{it}) or cash flow (CF_{it}) per share at time t for firm i; $YEAR_t$ (with $t=1, \ldots,$ T) are time dummies that control for the impact of time on the dividend behaviour of all

13

sample firms; η_i is a firm-specific effect to allow for unobserved influences on the dividend behaviour of each firm and is assumed to remain constant over time. $V_{it.}$ is a disturbance term.

4.1 Econometric issues

In this subsection we briefly describe the relevant econometric issues as well as the estimation techniques used. In dynamic panel data models such as (11) with a large cross-section of firms and a small number of time-series observations, there is a potential estimation problem because the earnings variable, E_{it}, is likely to be correlated across firms with the firm-specific effect, η_i. In addition, the lagged dependent variable is most likely to be correlated with these firm-specific effects. Thus, if we estimate (11) using OLS, the estimators are inconsistent and biased because $cov(D_{i,t-1}, \eta_i) \neq 0$ and $cov(E_{it}, \eta_i) \neq 0$ (Hsiao 1986). The Within-Groups estimator (WG), i.e. the estimator obtained from applying OLS on the equation with each observation expressed as the deviation from the time mean, will eliminate the firm-specific effect. However, the estimators will still be inconsistent and biased since $cov(D_{i,t-1}, V_{i.}) \neq 0$, where $V_{i.}$ is the deviation from the time mean of the disturbance term V_{it} (Nickell 1981).

To obtain consistent estimators, the model (equation (11)) is first-differenced to eliminate the fixed-effect, η_i:

$$D_{it} - D_{i,t-1} = (1-c)(D_{i,t-1} - D_{i,t-2}) + b(E_{it} - E_{i,t-1}) + (YEAR_t - YEAR_{t-1}) + (V_{it} - V_{i,t-1}) \qquad (12)$$

As suggested by Arellano and Bond (1991), we then use an instrumental variable approach (see Anderson and Hsiao 1981) to estimate (12).

Provided there is no serial correlation in the disturbance V_{it}, we can use all lagged values of the dependent variable, i.e., $D_{i,t-2}$, $D_{i,t-3}$, ..., D_{i1} as valid instruments in the first-differenced equation. Similarly, allowing for a possible correlation between E_{it} and V_{it}, only lagged values dated $t-2$ and earlier will be used as instruments (Arellano and Bond 1991). In other words, we allow for the endogeneity of the regressors as it is likely that shocks affecting dividend choices may also affect measured earnings and cash flows. Arellano and Bond (1991) develop a Generalized Method of Moments technique in-first-differences to obtain such an estimator.

A further refinement is developed by Arellano and Bover (1995) and Blundell and Bond (1998). Their Monte Carlo analysis shows that in dynamic panel data models where the autoregressive parameter (i.e. $1-c$ in (11)) is moderately large and the number of time series observations is moderately small, the GMM-first-differences-IV estimator is poorly behaved.[15] In this case, lagged levels of the series provide weak instruments for the first-differenced equation. The authors propose a linear GMM estimator in a system of first-differenced and levels equations that offers significant efficiency gains in situations where the GMM-first-differences estimator performs poorly. The resulting linear estimator uses lagged differences of the series as instruments for the equations in levels, in addition to lagged levels of the series as instruments for equations in first differences. Specifically, it uses $(D_{i,t-1} - D_{i,t-2})$ and $(E_{i,t-1} - E_{i,t-2})$ as additional instruments in the levels equations (11), under the assumption that these differences are uncorrelated with the firm-specific effect, η_i, even though the levels of the series are correlated with η_i. We call this technique GMM-in-systems.

We proceed as follows. We report the results of each of the four estimation techniques described above: OLS in levels, Within-Groups (WG), GMM-in-first-differences (GMM(DIF)) and GMM-in-systems (GMM(SYS)). This procedure shows us how much the size of the speed of adjustment coefficient (i.e., c) and the one of the estimated target payout ratio (i.e., b/c) vary across the different estimation techniques. We will also compare our results with those of previous studies which have mainly used basic OLS estimation.

4.2 Results

We discuss three sets of results: (i) those corresponding to the published earnings model; (ii) those obtained from the cash flow model; and (iii) those derived from a model which includes earnings and cash flows simultaneously.

The parameter estimates obtained from the published earnings model (based on equation (12)) are reported in Table 5. The coefficient on the lagged dividend, $(1-c)$, varies from 0.51, obtained in the GMM(DIF) estimation, to 0.79 when OLS in levels is used. Thus, the speed of adjustment (c) lies within a broad range, namely [0.21, 0.49]. As on average 46 per cent of our firm-year observations correspond to a maintained dividend and, for firm-year

---

[15] Both one step and two step versions of GMM first-difference showed a downward finite sample bias.

observations with a dividend change, the average percentage increases and decreases are modest (see Tables 3 and 4), we expect a speed of adjustment which is low. As the coefficient on the lagged dividend is equal to one minus the speed of adjustment, the coefficient is then expected to be close to one. This is precisely the kind of situation (see section 4.1) where GMM(SYS) performs better than GMM(DIF). Table 5 confirms that the GMM(SYS) estimation procedure yields realistic speed of adjustment estimates of about 0.27.

[INSERT TABLE 5 ABOUT HERE]

Another useful statistic is the estimated (or implicit) target payout ratio (b/c), which can be calculated from Table 5. The target payout ratio varies from 12.8 per cent (specification (f)) to 27.3 per cent (specification (a)) and is significantly lower than the average payout ratio (the average payout ratio of the sample) which amounts to 67 per cent[16]. This is true irrespective of the technique used. In other terms, biases due to fixed-effects cannot solely account for the discrepancy between estimated and average dividend payout ratios. Using GMM(SYS), which ought to give a parameter estimate closer to the true average value for the ratio, we obtain an estimated ratio of 23 per cent (specifications (g)) and 21.5 per cent (specification (h)). Thus, it seems that for German firms the dividend decisions are not based on long term target dividend payout ratios.

How do our estimates of the speed of adjustment and the estimated dividend payout ratio perform in comparison to the dividend literature? Table 6 shows that our estimated speed of adjustment of 0.21 (from OLS) and 0.49 (from GMM(DIF)) are at the top end of the values obtained by previous studies on France, Germany, Portugal, the UK and the US. However, similar to our results, other studies (apart from Aivazian et al. (2006) and Khan (2006)), have also found an estimated payout ratio which is well below the average payout ratio.

To summarize, the estimations of the published earnings model for German firms suggest that dividend decisions are not based on long term target payouts, as originally hypothesized by Lintner (1956). This view is supported by estimated payout ratios that deviate substantially from average payout ratios. An alternative explanation is that target payout ratios are expressed in another profitability measure, for example, cash flows. This would be consistent

---

[16] Table 2 shows that the target payout ratio is 67%; dividends per share are DM 12.1 and earnings per share amount to DM 18.0.

with the fact that the published earnings figure is likely to be conservative as German firms withhold part of their earnings to build up (legal) reserves. Moreover, it would also be consistent with the hypothesis that firms adjust slowly to cash flows rather than earnings. We investigate this alternative view by re-estimating our model using a cash flow basis.

[INSERT TABLE 6 ABOUT HERE]

Table 7 shows that a cash flow model yields parameter estimates which are much closer to reality. Specifications (g) and (h) based on the GMM(SYS) estimation technique give a speed of adjustment of 0.24 and 0.23, respectively, similar to the speed of adjustment obtained in the published earnings model. Furthermore, unlike the earnings model, the cash flow model yields an estimated target payout ratio which is much closer to the average target payout. This estimated target payout is 10.1 per cent (specifications (g) and (h)), which is significantly closer to the mean payout ratio of 15.7 per cent.[17]

[INSERT TABLE 7 ABOUT HERE]

When inspecting the results obtained by simultaneously including published earnings and cash flows (see Table 8), we find that the explanatory power of both the cash flow variables and the published earnings remains.[18] This result is true irrespective of the estimation technique. This suggests that published earnings have explanatory power over and above cash flows and vice-versa.

Regarding the speed of adjustment of dividends towards the long term target payout ratio, Germany is somewhat in between two extremes. On the one hand, companies from Anglo-American countries move only slowly towards their target payout ratio. In addition, the partial adjustment models by Short *et al.* (2002) and Renneboog and Trojanowski (2007) show that UK firms have a long term target payout ratio, which is positively correlated to institutional ownership and negatively to managerial ownership. On the other hand, 'emerging markets firms often have a target payout ratio but they are generally less concerned with volatility in dividends over time and, consequently, dividend smoothing over

---

[17] In Table 2, the dividends per share are DM 12.1 and the cash flow per share amounts to DM 77.3, giving a cash flow payout ratio of 15.7 per cent.

[18] Although the cash flow and earnings variables are correlated to a certain extent, variance inflation factors and the related tolerance levels suggest that multicollinearity is not a problem in our analysis.

time is less important' (Glen *et al.* 1995: 24). For instance, Adaoglu (2000) shows that the companies listed on the Istanbul Stock Exchange continued to follow unstable dividend policies even after the regulation that required that half of the earnings had to be distributed as cash dividends was abandoned.

[INSERT TABLE 8 ABOUT HERE]

During the 1990s, there have been several tax changes in Germany.[19] These changes may have influenced the propensity to pay dividends for our sample firms and hence, may have introduced a bias in our results. Prior to 1990, the tax rate on retained earnings was similar to the marginal tax rate on personal income. Starting with 1990, both tax rates were gradually lowered. However, as the tax rate on retained earnings was lowered faster, this created a preference of capital gains over dividend income for individual investors (in high tax brackets). For corporate shareholders, these changes were insignificant since they were not subject to personal income taxation and received dividends tax-free. During the period of 1984 to 2000, corporate investors therefore preferred dividends over capital gains.

As shown by Franks and Mayer (2001) and Correia da Silva et al. (2004) about 85% of listed German firms have a large blockholder who holds more than 25% of the voting stock. Even though families and individuals figure among these large blockholders, it is important to note that they hold their shares via corporate entities and not in their personal brokerage accounts. Consequently, all large investors (with the exception of foreign investors) preferred dividends throughout the whole period of 1984 to 2000, irrespective of the tax changes mentioned above. This implies that we do not expect changes in the propensity to pay dividends until 2001.

Conversely, 2001 saw a major tax reform which may have caused a regime change. As can be seen from the more detailed account on the tax changes in the appendix, individual investors now prefer capital gains over dividends while corporate shareholders are now indifferent between capital gains and dividends. As a result, companies may have lowered their dividend payments after 2001. We conducted several robustness tests to test whether the partial adjustment model with data until 2001 performed differently from the model with data up to 2005. However, we found no material changes with respect to the target payout ratio and the

---

[19] A summary of the main tax changes in Germany can be found in the appendix.

speed of adjustment.[20] This leads us to the conclusion that our results are robust to changes in taxation.

5. Conclusions

The extensive literature on dividend policy of Anglo-American companies, which builds on Lintner (1956), shows that managers tend to set long term target payout ratios. Further, managers focus on dividend changes rather than dividend levels. These changes in dividends are triggered by major persistent changes in earnings, and dividend changes are avoided if a reversal to the previous dividend level is likely in the short run. We examine whether these stylized facts also hold for German firms which operate in a substantially different corporate governance regime which is characterized by concentrated control, ownership pyramids, and the representation of banks on the board. We proceed by fitting Lintner's model of dividend behaviour to a data set of German industrial and commercial quoted firms.

German firms pay out a lower proportion of their cash flows than UK firms. However, on a published profits basis, the pattern is reversed, with German firms showing significantly higher payout ratios. The company law provisions described above partly account for these two conflicting results. In addition, compared to the UK and US, German dividends are more volatile, and dividend omissions and dividend cuts occur more frequently. When we use a partial adjustment model based on published earnings to estimate the target payout ratio, we find that the estimated value is not in line with the average payout ratio. Our results do not improve when we abandon the basic estimation techniques such as OLS or Within-Groups in favour of more advanced methods such as GMM-in-differences or GMM-in-systems. Therefore, German firms do not seem to base their dividend decisions on long term target dividend payout ratios based on public earnings.

In fact, the published bottom line earnings figure may not correctly reflect corporate performance as German firms tend to retain a significant part of their earnings to build up legal reserves. Given the conservative nature of published earnings figures, the long term payout ratio may be based on cash flows. We do indeed find that the Lintner partial adjustment model yields more realistic estimation results when cash flows are used instead of published earnings. The estimated payout ratio is much closer to our observed (average)

---

[20] These results are available upon request.

19

payout. We conclude that dividend payout ratios of German firms are based upon cash flows rather than published earnings. The reason why cash flows are economically more meaningful than published earnings may be the higher degree of smoothing of the latter. Our view is confirmed by the substantially higher autocorrelation of published earnings.

Regarding the speed of adjustment of dividends towards the long term target payout ratio, UK and US companies only slowly adjust their dividend policy whereas German companies tend to be more willing to cut the dividend in the wake of a consistent decrease in profitability. The German data suggests that there is a high degree of 'discreteness' in the dividends-per-share time series as opposed to the 'smoothness' (i.e., frequent annual small adjustments in the dividend per share) observed in the US and the UK.

References

Adaoglu, C. (2000), 'Instability in the dividend policy of the Istanbul Stock Exchange (ISE) corporations: evidence from an emerging market', Emerging Markets Review 1, 252-70.

Amihud, Y. and Li, K. (2006), 'The declining information content of dividend announcements and the effect of institutional holdings', Journal of Financial and Quantitative Analysis 42, 637-60.

Anderson, T. and Hsiao, C. (1981), 'Estimation of dynamic models with error components', Journal of the American Statistical Association 76, 598-606.

Arellano, M. and Bond, S. (1988), 'Dynamic panel data estimation using DPD – A guide for users', Working paper, Institute of Fiscal Studies.

Arellano, M. and Bond, S. (1991), 'Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations', Review of Economic Studies 58, 277-297.

Arellano, M. and Bover, O. (1995), 'Another look at the instrumental-variable estimation of error-component models', Journal of Econometrics 68, 29-52.

Aivazian, V., Booth, L. and Cleary, S. (2006), 'Dividend smoothing and debt ratings', Journal of Financial and Quantitative Analysis 41, 439-453.

Behm, U., and Zimmermann, H. (1993), 'The empirical relationship between dividends and earnings in Germany', Zeitschrift für Wirtschafts- und Sozialwissenschaften 113, 225-254.

Benzinho, J. (2004), 'The dividend policy of the Portuguese corporations. Evidence from Euronext Lisbon', available at SSRN: http://ssrn.com/abstract=609461.

Blundell, R. and Bond, S. (1998), 'Initial conditions and moment restrictions in dynamic panel data models', Journal of Econometrics 87, 115-143.

Bond, S., Chennells, L., and Windmeijer, E. F. (1996), 'Shareholder status and company dividend behaviour', mimeo, Institute of Fiscal Studies.

Brealey R., Myers S. and F. Allen (2005), Corporate Finance (8th edition), McGraw-Hill.

Brickley, J. (1983), 'Shareholder wealth, information signalling and the specially designated dividend: an empirical study', Journal of Financial Economics 12, 187-209.

Correia da Silva, L., Goergen, M. and Renneboog, L. (2004), Dividend policy and corporate governance, Oxford University Press.

DeAngelo, H., DeAngelo, L. and D. Skinner (2004). 'Are dividends disappearing? Dividend concentration and the consolidation of earnings', *Journal of Financial Economics* 72, 425-456.

Edwards, J. and Fischer, K. (1994), Banks, finance and investment in Germany, London and Cambridge: CEPR and Cambridge University Press.

Edwards, J., Mayer, C., Pashardes, B. and Poterba, J. (1986), 'The effects of taxation on corporate dividend policy in the UK', Working Paper No. 96, Institute of Fiscal Studies.

Fama, E., and Babiak, H. (1968), 'Dividend policy: an empirical analysis', American Statistical Association Journal 63, 1132-1161.

Fama, E. and French, K. (2001), 'Disappearing dividends: changing firm characteristics or lower propensity to pay?', Journal of Financial Economics 60, 3-43.

Franks, J. and Mayer, C. (2001), 'Ownership and control of German corporations', Review of Financial Studies 14, 943-977.

Glen, J., Karmokolias, Y., Miller, R. and Shah, S. (1995), 'Dividend policy and behavior in emerging markets: to pay or not to pay', IFC Discussion Paper 26.

Goergen, M., Renneboog, L. and L. Correia da Silva (2005), 'When do German firms change their dividends?', Journal of Corporate Finance 11, 375-399.

Harris, T. S., Lang, M., and Möller, H. P. (1994), 'The value relevance of German accounting measures: an empirical analysis.' Journal of Accounting Research 32, 187-209.

Hsiao, C. (1986), Analysis of Panel Data, Cambridge: Cambridge University Press.

Ikenberry, D. and Julio, B. (2004), 'Reappearing dividends', Journal of Applied Corporate Finance 16, 89-100.

Khan, T. (2006), 'Company dividends and ownership structure', Economic Journal 116, 172-189.

Kaserer, C., Roos, S. and Wenger. E (2002), 'Tax driven one-time dividends and the managerial discretion hypothesis – new evidence from Germany', Working paper EFMA meetings Helsinki 2003 (available on SSRN).

Lintner, J. (1956), 'Distribution of incomes of corporations among dividends, retained earnings and taxes', American Economic Review 46, 97-113.

Marsh, T. and Merton, R. (1987), 'Dividend behaviour for the aggregate stock market', Journal of Business 60, 1-40.

Mayer, C., and Alexander, I. (1990), 'Banks and securities markets: corporate finance in Germany and the United Kingdom', Journal of the Japanese and International Economies 4, 450-475.

McDonald, J., Jacquillat, B. and Nussenbaum, M. (1975), 'Dividend, investment and financing decisions: empirical evidence on French firms', Journal of Financial and Quantitative Analysis 10, 741-755.

Mueller, D. (1967), 'The firm decisions process: An econometric investigation', Quarterly Journal of Economics 81, 58-87.

Nickell, S. (1981), 'Biases in dynamic models with fixed effects', Econometrica 49, 1417-1426.

Renneboog, L. and Szilagyi, P. (2006), 'How relevant is payout policy under low shareholder protection?', Discussion paper European Corporate Governance Institute and CentER, Tilburg University.

Renneboog, L. and Trojanowski, G. (2007), 'Control structures and payout policy', Managerial Finance 33 (1), 43-64.

Short, H., Zhang, H., and Keasey, K. (2002), 'The link between dividend policy and institutional ownership', Journal of Corporate Finance 8, 105-122.

Table 1	
Overall Sample Composition	
Panel A	
Sample Period	1984-2005
Number of Firms	220
Number of Firm-Year Observations	3932
Panel B	
Number of Records per Firm	*Number of Firms*
22	74
21	14
20	15
19	12
18	16
17	22
16	12
15	14
14	5
13	3
12	1
11	12
10	7
9	1
8	7
7	1
6	3
5	1

Table 2

Descriptive Statistics on Dividends, Published Earnings, and Cash Flows

Sample period: 1984-2005. Sample: 220 German industrial and commercial quoted firms. Dividends are gross dividends per share. The cash flows are defined as zero distribution earnings gross of depreciation and changes in provisions. The par value of all shares is standardized to DM 50 (approximately € 25). The coefficient of variation is defined as the standard deviation of the series over its mean.

	Dividends per Share	Published Earnings per Share	Cash Flow per Share
Mean	12.1	18.0	77.3
Standard Deviation	11.9	47.0	103.1
Coefficient of Variation	0.99	2.62	1.33
Median	11.4	12.8	56.2
Maximum	275	873.5	1559.1
Minimum	0	-474.1	-902.7
Correlation coefficient of firm size and ...	19.1%	16.7%	19.4%

Table 3
Number of Increases, Decreases and Maintained Dividends

Sample period: 1984 - 2005. Sample: 220 German industrial and commercial quoted firms.

	Nr of Firm-Year Observations	*% of Total*
Dividends *Maintained*	1706	46.4%
Thereof, cases of zero dividends in at least two consecutive years	581	15.8%
Dividends *Increased*	1239	33.7%
Thereof, Dividend *Initiations*	135	3.7%
Dividend *Cuts*	731	19.9%
Thereof, Dividend *Omissions*	202	5.5%
TOTAL	3676	100%

Table 4
Distribution Measures of Percentage Changes

Sample period: 1984 - 2005. Sample: 220 German industrial and commercial quoted firms.
[*] Excluding dividend initiations. [**] Excluding dividend omissions

	Increases	*Cuts*
Mean Percentage of Dividend Increases [*] / Cuts [**]	36.4%	-29.9%
Median Percentage of Dividend Increases [*] / Cuts [**]	15.9%	-24.2%
Standard Deviation of Percentage of Dividend Increases [*] / Cuts [**]	82.3%	22.0%
Number of Dividend Increases [*] / Cuts [**]	1104	529
Nr of Dividend *Initiations*	135	
Nr of Dividend *Omissions*		202
Distribution of Size of Dividend Increase [*] / Cut [**] [0%; 10%] dividend increase / cut]10%; 25%]]25%; 50%]]50%;75%]]75%;90%] >90%	 355 (32.2%) 399 (36.1%) 164 (14.9%) 73 (6.6%) 22 (2.0%) 91 (8.2%)	 135 (25.5%) 133 (25.1%) 172 (32.5%) 60 (11.4%) 24 (4.6%) 5 (0.9%)

Table 5
Dividend Model with Published Earnings

D_{it} is the dependent variable and stands for dividends per share. *PP* are published earnings per share. Time dummies are included in all specifications. m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Sargan statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with degrees of freedom (k) reported in parentheses. OLS stands for Ordinary Least Squares. WG stands for Within-Group estimation: specifications (c) and (d) have variables expressed as deviations from the time mean. Variables in specifications (e) and (f) are expressed in first-differences. Specifications (g) and (h) are linear systems of first-differenced and levels equations. GMM(DIF) and GMM(SYS) are one-step estimators. Instruments: Specifications (e) and (f): $D_{t-2}... D_1$ and $PP_{t-2} ... PP_1$. Specifications (g) and (h) $D_{t-2}... D_1$ and ΔD_{t-1}, and $PP_{t-2} ... PP_1$ and ΔPP_{t-1}. Standard-errors, asymptotically robust to heteroskedasticity, are reported in parentheses. ***, ** and * stand for statistical significance at the 1%, 5% and 10% level, respectively.

	OLS in Levels		WG		GMM (DIF)		GMM (SYS)	
Variables	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**
Constant	1.745	3.280***	-	-	-	-	-	-
	(1.002)	(0.957)						
$D_{i,t-1}$	0.791***	0.790***	0.640***	0.631***	0.529***	0.509***	0.727***	0.725***
	(0.059)	(0.064)	(0.080)	(0.085)	(0.136)	(0.130)	(0.084)	(0.084)
PP_{it}	0.057***	0.057***	0.059***	0.057***	0.063**	0.063***	0.063***	0.059***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.016)	(0.016)	(0.013)	(0.011)
$PP_{i,t-1}$	-	0.001	-	0.007	-	0.010		0.006
		(0.008)		(0.007)		(0.007)		(0.007)
Time dummies	yes	yes	yes	yes	yes	yes	yes	yes
m_1	-3.20	-3.16	-4.56	-4.49	-4.50	-4.68	-4.84	-4.90
m_2	0.13	0.14	0.11	0.08	-0.36	-0.21	-0.61	-0.58
Sargan (d.f.)	-	-	-	-	206	200	199	199
					(438)	(437)	(479)	(493)
Observations	3676	3676	3676	3676	3432	3432	3676	3676

Table 6
Estimated Speed of Adjustment and Payout Ratios

[a] Parameter from the model including lagged earnings. [b] Excludes the years 1936 and 1937. [c] The coefficient on earnings is not significantly different from zero in 1957 and 1959. [d] For firms with managerial shareholders owning in excess of 5%. [e] For firms with institutional shareholders owning in excess of 5%. [f] For firms with neither managerial nor institutional shareholders. [g] For firms with both managerial and institutional shareholders.

Study	Sample	Period	Speed of adjustment	Target payout ratio	
				Estimated	Arithmetic average
Behm and Zimmermann (1993)	32 major quoted German firms	1962-88	0.26; 0.13[a]	0.48	0.58
Lintner (1956)	All American corporations	1918-41[b]	0.30	0.50	–
Mueller (1967)	67 US firms	1957-60 [c]	0.16; 0.27	0.26; 0.39	–
Fama and Babiak (1968)	392 major industrial US firms	1946-64	0.32–0.37	0.40[a] –0.82	–
McDonald et al. (1975)	75 French firms randomly selected from 400 largest firms in 9 industries	1962-68	0.12–0.33	0.41–1.01	–
Aivazian et al. (2006)	All US firms in Compustat database	1981-99	0.24	0.50	0.26
Short et al. (2002)	211 UK firms	1988-92	0.38	0.16[d]; 0.19[e,g]; 0.17[f];	0.26
Khan (2006)	350 large UK firms	1985-97	0.20–0.45	0.33–0.83	0.38–0.46
Benzinho (2004)	All 34 firms listed on Euronext Lisbon	1990-2002	0.35	0.22	0.42

Table 7

Dividend Model with Cash Flows

D_{it} is the dependent variable and stands for dividends per share. *CF* are cash flows per share. Time dummies are included in all specifications. m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Sargan statistic is a test of the over-identifying restrictions, asymptotically distributed as $\chi^2(k)$ under the null of valid instruments, with degrees of freedom (k) reported in parentheses. OLS stands for Ordinary Least Squares. WG stands for Within-Group estimation: specifications (c) and (d) have variables expressed as deviations from time mean. Variables in specifications (e) and (f) are expressed in first-differences. Specifications (g) and (h) are linear systems of first-differenced and levels equations. GMM(DIF) and GMM(SYS) are one-step estimators. Instruments: Specifications (e) and (f): D_{t-2}... D_1 and CF_{t-2} ... CF_1. Specifications (g) and (h) D_{t-2}... D_1, ΔD_{t-1} and CF_{t-2} ... CF_1, ΔCF_{t-1}. Standard-errors, asymptotically robust to heteroskedasticity, are reported in parentheses. ***, ** and * stand for statistical significance at the 1%, 5% and 10% level, respectively.

Variables	OLS in Levels		WG		GMM (DIF)		GMM (SYS)	
	(a)	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**
Constant	1.619	1.703*	-	-	-	-	-	-
	(1.047)	(1.006)						
$D_{i,t-1}$	0.828***	0.835***	0.668***	0.661***	0.576***	0.549***	0.763***	0.772***
	(0.065)	(0.070)	(0.085)	(0.091)	(0.160)	(0.162)	(0.104)	(0.102)
CF_{it}	0.019***	0.020***	0.024***	0.023***	0.025***	0.026***	0.024***	0.023***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.004)	(0.004)
$CF_{i,t-1}$	-	-0.003	-	0.003	-	0.007***	-	0.000
		(0.003)		(0.003)		(0.002)		(0.003)
Time dummies	yes	yes	yes	yes	yes	yes	yes	yes
m_1	-1.86	-2.36	-2.91	-2.84	-4.44	-4.32	-4.97	-4.94
m_2	0.55	0.18	0.23	0.29	0.32	0.21	0.60	0.61
Sargan (d.f.)	-	-	-	-	198	192	203	196
					(438)	(437)	(479)	(493)
Observations	3676	3676	3676	3676	3432	3432	3676	3676

Table 8
Dividend Model with Published Earnings and Cash Flows Simultaneously

D_{it} is the dependent variable in all specifications. It represents dividends per share, *PP* are published earnings per share and *CF* are cash flows per share. Time dummies are included in all specifications. m_1 and m_2 are tests for the absence of first-order and second-order serial correlation in the residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Sargan statistic is a test of the over-identifying restrictions, asymptotically distributed as χ^2(k) under the null of valid instruments, with degrees of freedom (k) reported in parentheses. Specification (b) has variables expressed as deviations from time mean. OLS stands for Ordinary Least Squares. WG stands for Within-Group estimation: variables in specification (c) are expressed in first-differences. Specification (d) is a linear system of first-differenced and levels equations. GMM(DIF) and GMM(SYS) are one-step estimators. Instruments: Specifications (c): $D_{t-2}... D_1$, $PP_{t-2}...PP_1$ and $CF_{t-2}...CF_1$. Specification (d) $D_{t-2}...D_1$, ΔD_{t-1}, $PP_{t-2}... PP_1$, ΔPP_{t-1} and $CF_{t-2}...CF_1$, ΔCF_{t-1}. Standard-errors, asymptotically robust to heteroskedasticity, are reported in parentheses. ***, ** and * stand for statistical significance at the 1%, 5% and 10% level, respectively.

	OLS in Levels	WG	GMM (DIF)	GMM (SYS)
Variables	(a)	(b)	(c)	(d)
Constant	3.262***	-	-	-
	(0.993)			
$D_{i,t-1}$	0.790***	0.626***	0.509***	0.737***
	(0.066)	(0.087)	(0.135)	(0.083)
PP_{it}	0.049***	0.048***	0.049***	0.049***
	(0.009)	(0.009)	(0.014)	(0.012)
$PP_{i,t-1}$	0.005	0.007	0.005	0.005
	(0.008)	(0.007)	(0.007)	(0.008)
CF_{it}	0.007***	0.009***	0.011***	0.008***
	(0.003)	(0.003)	(0.003)	(0.003)
$CF_{i,t-1}$	-0.006	-0.002	0.001	-0.004
	(0.003)	(0.004)	(0.004)	(0.004)
Time dummies	yes	yes	yes	yes
m_1	-3.06	-3.51	-4.57	-4.88
m_2	0.37	0.62	0.14	0.50
Sargan (d.f.)	-	-	202 (665)	199 (757)
Observations	3676	3676	3432	3676

Appendix

The German tax reform of 2001 is the first major regime shift since the 1977 reform. Indeed, the 2001 reform replaced the imputation system by a so-called "half-income system". Under the German imputation system ("Anrechnungsverfahren"), corporate earnings were taxed on a dual rate basis whereby retained earnings were taxed at a higher rate[21] than earnings distributed as dividends.[22] If earnings that had been initially retained were distributed at a later time, the firm would receive a tax credit for the higher tax rate it had paid on retained earnings. In the following, we describe the tax treatment applying to individual investors, corporate investors, and foreign investors.

For domestic investors other than corporations (i.e. individuals and partnerships), the gross dividend (distributed dividend plus corporate tax payment) was taxed at the investor's personal marginal tax rate.[23] However, the investor could use the corporate tax payment as a credit to offset his tax liability on this amount. The distributed earnings were effectively taxed at the personal marginal tax rate of the individual investor. Corporate investors received the distributed dividend plus a credit which amounted to the corporate tax payment. Consequently, they did not pay any tax on their received dividends. Foreign investors received the distributed dividend and were taxed in their respective home countries. In contrast to domestic investors, foreign investors may not have been able to claim parts or all of the tax paid by the German company as the size of the tax credit depended on the tax treaty between Germany and their country (Amihud and Murgia 1997).

In contrast to dividends, capital gains were tax exempt for stock held for at least six months. However, as retained earnings incurred tax at a higher rate, individuals with a personal marginal tax rate below the corporate tax rate on retained earnings still preferred dividends over capital gains. Corporations also preferred dividends, and individuals with a marginal tax rate equal to the corporate tax rate on retained earnings were indifferent between dividends and capital gains. Foreign investors preferred capital gains over dividends because at best they would only receive a partial tax credit for any dividends received.

---

[21] The rate was 56% until 1990, 50% during 1990-1993, 45% during 1994-1998 and 40% during 1999-2000.
[22] The rate was 36% until 1994 and 30% during 1995-2000.
[23] The top marginal tax rate was 36% until 1994 and 30% during 1995-2000.

The 2001 tax reform replaced the imputation system by the so-called "half-income system" ("Halbeinkünfteverfahren"). Retained profits and distributed dividends are no longer taxed at different rates and incur now the same rate of 26.4% (25% plus a "solidarity surcharge"[24] of 5.5%, increasing the rate to 26.4%) at the corporate level. Under the new system, individuals have to pay tax on 50% of the dividends they receive. This implies that 50% of the dividend is taxed at 26.4%, and the other half is taxed twice, at the personal and corporate level. Therefore, for individuals the effective tax rate is larger than the tax rate of 26.4% incurred on retained earnings. Since capital gains are still tax-exempt (on stock held for more than 12 months), individuals will now prefer capital gains over dividends even if they are in the lowest tax bracket.

Under the new system, dividend payments are virtually tax-free for corporations (since 2004, 5% of the received dividend has had to be declared as revenue and has therefore been subject to the corporate tax rate). Since capital gains from the sale of shares held in another company are also tax-exempt, corporations are indifferent between retained and distributed earnings.

---

[24] The "solidarity surcharge" ("Solidaritätszuschlag") is a surcharge affecting corporate and personal taxes and was introduced in order to meet the cost of the German reunification. The surcharge is currently 5.5 percent.

european corporate governance institute

about ECGI

The European Corporate Governance Institute has been established to improve *corporate governance through fostering independent scientific research and related activities.*

The ECGI will produce and disseminate high quality research while remaining close to the concerns and interests of corporate, financial and public policy makers. It will draw on the expertise of scholars from numerous countries and bring together a critical mass of expertise and interest to bear on this important subject.

The views expressed in this working paper are those of the authors, not those of the ECGI or its members.

www.ecgi.org

european corporate governance institute