



Determinants and trends of dividend distribution in the US

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Abstract:

In the US, larger, more profitable companies are more likely to pay dividends, as are firms whose retained earnings account for a significant portion of total equity. Levered firms are less likely to pay dividends due to their financial constraint. Conversely, firms with strong cash balances, thus less financially constrained, are prone to pay dividends. Moreover, risk exposure and cash-flow uncertainty negatively impact the propensity to distribute dividends, while the effects of investment opportunities and liquidity are rather weak in the 1972-2020 period. There are two crucial patterns, the downward trend from 1983 to 2001 and the subsequent recovery (2001-2014). In 1983 the fraction of dividend payers observed was 49%, before it decreases to only 26% by 2001 and finally bounces back to 39% by 2014. Concerning the dividend disappearance phenomenon, the change in firm characteristics explain 46% of the decreasing pattern observed while the remaining 54% is driven by the change in propensity to pay. In contrast, 80% of the increase in the total fraction of payers is attributable to the variation in firm characteristics, whereas the increasing propensity to pay dividends drive the remaining 20%.

Keywords: dividend, determinants, propensity to distribute

Determinantes e padrões na distribuição de dividendos nos EUA

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Sumário:

Nos EUA, as empresas maiores e mais lucrativas têm maior propensão em pagar dividendos, assim como as empresas cujos lucros retidos dos anos anteriores representam uma parcela significativa do património líquido total. As empresas mais alavancadas são menos prováveis de pagar dividendos devido às restrições financeiras associadas. Em contrapartida, as empresas com elevada disponibilidade em caixa e bancos, encontram-se menos limitadas financeiramente, e são, por isso, mais suscetíveis a pagarem dividendos. Além do mais, a exposição ao risco e a incerteza dos fluxos de caixa tem um impacto negativo no que toca à distribuição de dividendos enquanto, os efeitos das oportunidades de investimento e liquidez são significativamente reduzidos no período de 1972-2020. Durante este período, existem dois padrões fundamentais a considerar, a tendência descendente de 1983 a 2001 e a subsequente recuperação (2001-2014). Em 1983, a fração de empresas que pagavam dividendos correspondia a 49% tendo decrescido para 26% em 2001 e aumentado de novo para 39% em 2014. Quanto ao fenómeno do desaparecimento dos dividendos, as mudanças nas características das empresas explicam 46% da tendência decrescente observada enquanto os restantes 54% correspondem a variações na propensão das empresas distribuírem dividendos. Contrariamente, 80% do aumento da percentagem de empresas que pagam dividendos é atribuível a alterações nas características das empresas, enquanto, a crescente propensão a pagar dividendos impulsiona os 20% restantes.

Palavras-chave: dividendo, determinantes, propensão para distribuir

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1. Introduction

From the beginning, dividend policy has been one of the most puzzling phenomena in corporate finance. Even today, it is unclear why investors demand cash dividends or why certain firms distribute large fractions of their earnings every year.

Early on, almost every public firm paid cash dividends to its shareholders, but companies have been changing their attitude towards the payment of dividends for the last decades. Fama and French (2001) observe a decreasing trend in the fraction of dividend payers from 66% in 1978 to 21% in 2000. After 2000, Michaely and Moin (2022) identify a recovery pattern until 2018, with the fraction of payers increasing from 23% to 36%.

Starting with Miller and Modigliani, the number of studies on dividend policy has escalated throughout the years, but the fundamental determinants are still to be discovered. Although some factors like the Fama and French firm characteristics or the earned-to-contributed capital mix proposed by DeAngelo, DeAngelo, and Stulz (2006) are broadly discussed, there are still some others little examined that could add valuable insights.

This dissertation focus on two research questions. Firstly, it aims to examine the determinants of dividend policy for US firms. Secondly, the study observes the evolution of the proportions of payers and non-payers between 1972 and 2020 and attempts to decompose the changes in the total percentage of dividend payers into changes in firm characteristics and changes in the propensity to pay dividends of those firms.

The fraction of firms paying dividends is, in the beginning, 53% of total firms but rapidly rises until 65% in 1978. From 1979 onwards, the percentage of payers decreases to 35% in 1990 and 26% in 2001. After 2001, the reappearing dividend phenomenon is observed since payers account for 35% of the total number of firms represented in the sample by 2011 and then the fraction increases to 39% in 2014.

Then, there are estimated regressions to acknowledge what are the firm characteristics that predict the payment of dividends from 1972 to 2020. Starting with some of the most discussed predictors, size and profitability, this paper estimates that larger and more profitable firms are more likely to pay dividends. In contrast, investment opportunities, proxied by the asset growth rate and the market-to-book ratio, present mixed results regarding the effect on the distribution of dividends. If firms accumulate a large portion of their profits on retained earnings, they are expected to pay dividends. In contrast, highly levered firms tend to pay less to avoid the risk of defaulting on their debt obligations. Contrarily, firms with substantial cash balances are prone

to distribute dividends to mitigate the potential conflict of interests between managers and shareholders. Moreover, risk exposure, either from idiosyncratic or systematic risk, negatively affects the propensity of dividend payments while liquidity exhibit almost no effect on the proclivity of payment. Finally, managers facing high cash-flow uncertainty are less willing to distribute dividends because the firm might not be capable of funding future dividend payments if the cash-flows decrease suddenly.

After answering to the first research question, the objective is to understand how the total change in the fraction of payers is explained by the change in firm characteristics or by the variation in the propensity to pay dividends. The first-factor variation is solely caused by the change in firm characteristics from one year to the other, assuming that the proclivity to pay dividends is constant. The second factor captures the effect of the changes in the propensity to distribute dividends. For the sake of this analysis, the disappearing dividend period lasts from 1983 to 2001 whereas between 2001 and 2014, the fraction of payers shows an upward trend. 46% of the former's decreasing pattern is explained by the change in firm characteristics while the decreasing proclivity to pay dividends drives the remaining 54%. Conversely, 80% of the latter's increasing pattern is attributable to the variation in firm characteristics, whereas the rising propensity to distribute dividends induces the remaining 20%.

This paper gives an excellent contribution to the dividend policy literature. Firstly, it provides current and updated results for each of the determinants studied and incorporates many macroeconomic events such as previous recession periods, the 2009 financial crisis, and the initial effect of the Covid-19 pandemic. Secondly, it incorporates some of the most widely known and discussed variables plus those other variables that seem to be important but end up being little tested. To do so, these models add lesser-known determinants to those commonly discussed. Thirdly, it presents a larger and more representative period than most past literature, which enables the interpretation of the disappearing and reappearing dividend phenomena for the same sample.

The rest of this study is structured in the following way. Section 2 reviews past literature on dividend policy. Section 3 describes the dataset used in this analysis. Section 4 explores the time trends of dividends. Section 5 examines the univariate effects of the determinants. Section 6 explains the multivariate analysis and presents the main findings and conclusions. Section 7 analyzes the impact of changes in firm characteristics and changes in the firm's propensity to

pay. Section 8 provides a conclusion of the study. Section 9 presents the reference list and Section 10 the appendices.

2. Literature Review

The payment of dividends has been a puzzle in the researcher's mind for a long time. They do not understand why some firms payout dividends to their shareholders but others do not. From the traditional Miller and Modigliani (1961) theory, investors should be indifferent between receiving capital gains or dividends, meaning that payout decisions should be irrelevant. A very specific set of conditions must be verified: no taxes, symmetric information among all players in the market, no transaction costs, and rational managers and investors. Suppose personal taxes (Black 1976) are included in the analysis and assuming share repurchases have higher flexibility and other benefits (Guay and Harford, 2000 and Skinner, 2008). In that case, it is even more puzzling that firms pay dividends.

Assuming that the market is inefficient and that the Miller and Modigliani (1961) do not hold, Fama and French (2001) find there is a decreasing pattern of the percentage of dividend payers until 2000, commonly called the disappearing dividend phenomenon. The study starts by testing size, profitability, and investment opportunities as potential determinants of the decision to pay or not dividends. The authors test the significance of those determinants in a cross-section and then examine if the changes in these firm characteristics explain the disappearing dividend phenomenon. The study argues that dividend payers are larger and more profitable while presenting lower investment opportunities. Fama and French (2001) is the first study to explore the trade-off between retaining or distributing the earnings accumulated throughout time depending on the investment opportunities available. The changing firm characteristics constitute an important factor in explaining the variation of the fraction of payers, but it does not solely drive the observed decreasing pattern. As such, a decreasing propensity to pay dividends justifies the rest of the declining pattern of dividends.

DeAngelo and DeAngelo (2006) also aim to deal with the issue of free cash flows. These authors consider the agency theory proposed by Jensen (1986) enhanced by the inclusion in the model of the firm's investment opportunities presented by Fama and French (2001) and Grullon, Michaely, and Swaminathan (2002). The theory foresees that firms pay small dividends for the first years of existence since their investment opportunities are higher than their earnings. On the other hand, mature firms generate internal funds that exceed their investment opportunities, so they payout excess free cash flows to avoid the risk of being

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wasted. Lastly, DeAngelo, DeAngelo, and Stulz (2006) came up with the mix of earned to contributed capital which shows that a higher ratio of retained earnings to total equity is associated with a higher propensity of a firm to pay dividends. Denis and Osobov (2008) build on the findings of the previously referred literature and examine the conclusions from regressing the Fama and French (2001) firm characteristics and the mix of earned to contributed capital mix proposed by DeAngelo, DeAngelo, and Stulz (2006). The determinants of the proclivity to pay dividends are identical across countries (US, Canada, UK, Germany, France, and Japan). Besides larger and more profitable firms, those with high retained earnings to total equity are more likely to pay dividends. In contrast, the effect of investment opportunities does not hold for all countries. For the US, the determinants are significant for the 1989-2002 period.

Another layer of complexity to the cross-section analysis so far is added by Kuo, Philip, and Zhang (2013). This study incorporates leverage, liquidity, and risk variables as well as the ones used by Denis and Osobov (2008). For US firms, liquidity and risk are important determinants of dividend policy while the leverage ratio does not show the significance for most of the models presented. Banerjee, Gatchev, and Spindt (2007) is consistent with the previous article mentioned since it shows that firms with more liquid stocks have less incentives to pay dividends.

In contrast, cash-flow uncertainty has received less attention in the past literature. Chay and Suh (2009) advocate that it is an important determinant of US firm's payout policy for the 1994-2005 period. In addition, the earned/contributed capital mix is a valuable determinant while agency conflicts and investment opportunities show a weak impact over dividend decisions. More recently, Michaely and Moin (2022) found significance for the earnings volatility measure, a proxy for cash-flow uncertainty.

Past literature also focuses much on time series impacts, apart from the cross-sectional determinants. In fact, this paper aims to understand how dividend payments have changed over time, especially on specific events like the 2009 financial crisis.

Fama and French (2001) observed that the proportion of U.S. industrial firms paying cash dividends has decreased from 66.5% of public firms in 1978 to 20.8% in 1999. The authors argue that the disappearing dividend phenomenon was primarily driven by the decreasing propensity to pay dividends during this period. For the following years, many authors tried to explain this decreasing pattern.

DeAngelo, DeAngelo, and Stulz (2006) do not solve the disappearing puzzle. Still, it estimates that among firms with RE/TE ratios high enough to enable dividend payments, the magnitude of the decreasing propensity to pay is approximate twice the one reported by Fama and French (2001).

For liquidity, Banerjee, Gatchev, and Spindt (2007) show that the declining propensity of firms to pay dividends is mainly driven by changes in the liquidity of the U.S. market.

Lastly, Hoberg and Prabhala (2009) argue that the idiosyncratic and systematic risk successfully explains the disappearing dividend puzzle.

Then focusing on the financial crisis, Floyd, Li, and Skinner (2015) show that dividends of U.S. industrial firms have become highly concentrated over a small number of large firms. Dividends have increased steadily after 2002 and reached the peak in 2007 when industrial firms as a group paid 90% of their earnings. Immediately after the crisis (2010), dividends reached higher amounts than the 2007 peak. This event might be related to dividends' implied commitment, which is commonly discussed in the literature. According to Lintner (1956) and Brav et al. (2005), managers are reluctant to cut dividends or to initiate them. Moreover, many managers would not initiate dividend payments if they could decide to start all again and are even willing to raise external capital or forego positive NPV projects to avoid cutting dividends (Brav et al. 2005).

Floyd, Li, and Skinner (2015) stated that there has been an upward trend on the fraction of dividend payers starting in 2000 right after the end of the disappearing dividend puzzle. Michaely and Moin (2022) document a consistent increasing trend between 2000 and 2018 which the authors call as the reappearing dividend phenomenon.

3. Data

The sample used in this study is composed of US industrial firms from 1972 until 2020. Accounting data was retrieved from CRSP/Compustat Merged, and returns were taken from CRSP database, both available through Wharton Research Data Service (WRDS). The PERMNO code was used to merge the two datasets.

Annual information on total assets, total liabilities, total equity, cash and short-term investments, earnings before interest and tax, net income, retained earnings, interest expense, number of shares outstanding, number of shares traded, close price, dividends to common stockholders and dividends per share are obtained to conduct the analysis. Moreover, monthly

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returns are taken from CRSP database to compute SRVOL annually, which proxies for cash-flow uncertainty. Lastly, the monthly 3 Fama and French factors are taken from these author's websites and then regressed to the monthly returns, resulting in the IDIOS measure representing the idiosyncratic risk. All the figures presented above are required to have non-missing values. Following Fama and French (2001) and Denis and Osobov (2008) there are only considered publicly traded stocks with CRSP share codes of 10 or 11, utilities [Standard industrial classification (SIC) codes between 4900 and 4949], financial firms (SIC codes between 6000 and 6999) and negative book equity companies are excluded from the dataset. After filtering, the dataset is composed of 165,212 firm-year observations and 16,775 unique companies between 1972 and 2020. Additionally, the data includes both active and dead companies to avoid the existence of survivorship bias.

Even though CRSP/Compustat Merged data starts in 1950 and CRSP database in 1925, the observations included in this study begin in 1972 because before that the information regarding dividends is almost inexistent.

To avoid extreme observations that may misrepresent the distribution, it is necessary to winsorize some of the independent variables (V/A, E/A, dA/A, RE/BE, D/E, CASH and TOR) at the bottom and top percentile like Skinner (2008).

4. Time trends

This paper is focused on understanding the evolution of the fraction of payers and non-payers as well as its main determinants. To accomplish this purpose, it is crucial first to analyze dividend payment trends and how they were impacted by the most important events in the US.

As shown in Figure 1, at the beginning of the sample (1972), there were roughly 50% of payers and non-payers. Between 1973 and 1975, the US economy was in recession, showing negative GDP growth which might be related to the lower fractions of firms paying dividends. After 1975 the percentage of payers started rising until it peaked at approximately 67% in 1979. This period was defined by strong GDP growth rates and decreasing unemployment. Then, it is represented a steep decrease over the fraction of payers that stabilized in 1988 with only 35% of payers. Due to the extremely high levels of inflation in late 1979 and the monetary policies which were not unanchored to the inflation expectations, the economy dived into a severe recession that was the worst after the Second World War. It is reasonable to assume that this event might have hastened the decrease of dividend payers between 1979 and 1988 but should not be the only cause. In fact, after the recession, the US economy was improving, but no effect

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was felt regarding the distribution of dividends. If the recession were the only explanation for the percentage of payers decrease, then it would be expected that the fraction of payers would rebound to pre-recession amounts. From 1988 until 1992, the proportion is approximately constant (around 35%). According to NBER's, the business activity peak occurred in March of 2001 which signals the end of the expansion period, which lasted for 10 years. In contrast, it is registered a downward trend for the fraction of payers, from 35% in 1992 to 25% in 2001, which allows to conclude that the macroeconomic environment does not explain the decreasing pattern of dividend payers in this period. From 2001 until 2006, it is recorded an upward tendency, and for 2007 and 2008 the proportions of payers and non-payers are roughly constant. Regarding the global financial crisis, Figure 1 presents a slight decline of 5pp from 2008 to 2009. Still, the proportions rebound again in 2010 to nearly the same amount recorded for 2008 meaning 33% of payers and 77% of non-payers. Dividends show high resilience in the 2009 crisis, which is consistent with expectations of past literature. After 2010, the share of dividend payers fluctuated between 33% and 40%, reaching its peak in 2012 (40.1%). Lastly, from 2019 to 2020, there is a decline of 7 pp in the percentage of payers associated with the Covid-19 pandemic, causing massive uncertainty regarding firms' operations.

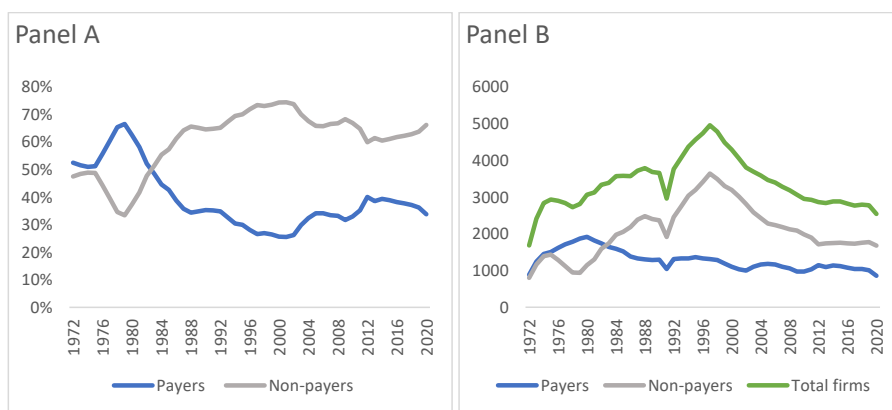
Apart from the macroeconomic conditions, many other factors can impact the evolution of the proportion of the 2 dividend groups across time. A big portion of past literature focuses on the substitution effect of dividends and share repurchases which might explain the decreasing overall pattern presented in Figure 1.

As seen from past literature there is no consensus regarding the substitution effect. Modigliani and Miller (1961) argue that rational investors would not have any preference between the two types of cash distribution under the assumption of market efficiency. In contrast, Grullon and Michaely (2002) support the existence of a substitution effect between dividends and share repurchases while Bernheim (1990) do not. Moreover, DeAngelo, DeAngelo, and Skinner (2000) find no evidence of the substitution between share repurchase programs and special dividends. The substitution effect if existent could partly explain the decreasing trend represented in Figure 1. Though it is important to bear in mind that the implied commitment for dividends is much more important than for share repurchases.

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Figure 1: Fraction of US firms by dividend payment group for each year

Figure 1 represents the fraction (panel A) and the number of firms (panel B) in the US in each group, meaning payers and non-payers from 1972 until 2020. The sample incorporates non-financial and non-utility firms that fulfil the data availability requirements of Section 2. The payers group is composed by firms with positive EPS.



5. Univariate analysis

Fama and French (2001) found that certain firm characteristics have a relationship with the firm's payout policy, meaning the payment of dividends. Those characteristics are profitability, investments opportunities, and size.

5.1. Profitability

Profitability measured by the earnings to asset ratio is computed by the sum of net income to the interest expense divided by the total assets of the firm.

According to Fama and French (2001), payers present higher profitability over the 1963-1998 period than non-payers and the same happens if the proxy used is the aggregate common stock earnings over aggregate book equity (Y/BE). In this sample, the earnings to asset ratio is higher for payers than for non-payers for all the subperiods. The ratio averages 7.7% per year for payers and -5.1% for non-payers for the entire sample. Table A2 (displayed in the appendix) shows that the ratio decreases throughout time for the 2 dividend groups. For the 1972-1980 period payers have on average 9.1% while non-payers only 6.2%. In contrast, payers account for 6.4% and non-payers -10.7% for the most recent period of the sample (from 2011 to 2020). Thereby firms have become less profitable throughout time. The decrease of the earnings to

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asset ratio for all firms from 7.9% to -0.3% is mainly explained by the decreasing profitability of the non-payers. Therefore, it is predicted that profitable firms are more likely to pay dividends, meaning that profitability should positively affect the dependent variable.

5.2. Investment opportunities

To measure the firm's investment opportunities, prior studies use the market-to-book ratio and the asset growth rates. However, not all of them compute the first ratio the same way. Chay and Suh (2009) and Kuo, Philip, and Zhang (2013) chose the most common which is defined by the market value of equity over book value of equity. In contrast, Fama and French (2001(Vermaelen 1981)) and Denis and Osobov (2008) computed the ratio of the aggregate market value to the aggregate book value of assets, but they use different designations. Following the latter articles mentioned, the investment opportunities are measured as the asset growth rates and as the ratio of the market value of total capital (book value of liabilities plus the market value of equity) to the book value of total assets (V/A). In this case, it is reasonable to assume that the book value of liabilities is a good proxy for the market value of liabilities. To mitigate the lack of information regarding market capitalization, the market value of equity is calculated by multiplying the number of shares outstanding by the share price at the end of the year.

Denis and Osobov (2008) cannot find any relation between the investment opportunities and the dividend payments that hold across countries. Regarding Fama and French (2001) non-payers have higher asset growth rates for the 1963-1998 period but for the subperiods, it is not always the case. Additionally, payers present a higher V/A , for the subperiods between 1963 and 1977 but lower than non-payers for the entire period and all the subperiods after 1977. In this dataset, non-payers have higher asset growth rates for the entire sample (1972-2020) and for all the subperiods except from the period between 1972 and 1980. Moreover, the group of payers seems to suffer a decline in their asset growth while non-payers show increasing growth rates until the 1991-2000 period (24.8%), then it decreases to roughly 14% and goes up again during the 2011-2020 period. Regarding V/A , non-payers show consistently higher ratios for the entire sample and all the subperiods within. Thus, firms with more investment opportunities pay fewer dividends to their shareholders, meaning a negative relation between investment opportunities and the payment of dividends is expected.

5.3. Size

Following Chay and Suh (2009), size is measured as the logarithm of total assets. Size can be a measure of information asymmetry because small firms have less coverage from analysts and

media. They face lighter provisions from regulators, and the accounting standards are less strict than for larger firms. Hence investors of small firms have access to less information, thus representing higher information asymmetry than larger companies, consistent with Vermaelen (1981) findings. Moreover, Aivazian, Booth, and Cleary (2003) argue that size measures the firm's access to the financial market. Since larger firms have easier access to the financial markets, they are expected to raise higher funds. Thus, they should be able to distribute higher dividends. Size is the firm characteristic that all past literature tests and gets to the same conclusion, paying firms are much larger than non-payers. From table A2, it is possible to confirm that payers are larger for the entire sample and for every subperiod. Throughout time, dividend payers, on average, tend to be even larger while non-payers decrease from the first to the second subperiod and then start increasing on average until the latest year. Consequently, it is expected a positive relation between the size of the firm and its likelihood of paying dividends.

5.4. Life-cycle variable

DeAngelo, DeAngelo, and Skinner (2004) state that dividends payments are concentrated over a small number of large companies. According to DeAngelo, DeAngelo, and Stulz (2006), this concentration is explained by the life-cycle theory which advocates that firms determine their optimal dividend policy according to their investment opportunities. In the first years of existence, firms avoid paying dividends because their investment opportunities surpass their internally generated funds. In contrast when firms become more mature, they start paying more dividends to avoid free cash flows being wasted in negative NPV projects. This is the case where the investment opportunities available are lower than internally generated capital. Moreover, they state that firms with a lower earned-to-contributed capital mix are in the phase of receiving external capital to fund their operations meaning they cannot afford to pay out dividends whereas companies with a high mix are mature firms and possess large cumulative profits which might be subject to be paid to shareholders. According to DeAngelo, DeAngelo, and Stulz (2006) the earned-to-contributed equity mix is used to proxy for the firm's life-cycle stage. The proxy compares the internally generated, to the contributed capital of the firm and it is computed as the ratio of retained earnings to the book value of equity (RE/BE). The authors prove that RE/BE has a greater impact on the likelihood of paying dividends compared to other variables of earned-to-contributed equity capital mix such as retained earnings over total assets. Additionally, the life-cycle theory is supported by Denis and Osobov (2008), Ferris, Jayaraman, and Sabherwal (2009), Kuo, Philip, and Zhang (2013) and Chay and Suh (2009). Regarding this sample, described in table A2, payers present higher ratios for the entire sample as well as

for every subperiod defined. For both dividend groups, the RE/BE is decreasing throughout time. For payers, it remains positive (from 69% for the 1972-1980 period to 46.6% for 2011-2020) while for non-payers starts as positive (15.4%) but ends up being largely negative. Hence it is expected a positive relation between the earned-to-contributed capital mix and the probability of dividend payment.

5.5. Leverage

The leverage ratio is also an important measure to be analyzed regarding payout policy. Kuo, Philip, and Zhang (2013) find that the level of debt impacts dividend payment decisions. Moreover, von Eije and Megginson (2008) observe that firms with higher proportions of debt are less likely to pay. By intuition it is reasonable to state that firms high-leverage firms are more constrained due to their debt obligations, thus they prefer to be more conservative on their payout policy. In certain situations, the decision to omit dividends can work as a financing decision instead of borrowing more debt or issuing new equity. Aivazian, Booth, and Cleary (2003) show that high-leverage firms end up making lower dividend payments. According to Jensen (1986) and von Eije and Megginson (2008), leverage can help to control the issue of agency costs by reducing the need of distributing excess cash to shareholders. Leverage and cash payments, in this perspective, will be substitutes for limiting managerial incentives to spend capital that is not needed for current operations or to invest in new growth opportunities, thus suggesting a negative relation between dividends and leverage. Alternatively, high-leverage firms might simply represent older, more stable, and profitable firms that can afford to distribute dividends. Hence leverage and dividend payments would be complements implying a positive relationship between the distribution of dividends and leverage.

In line with Kuo, Philip, and Zhang (2013), leverage is measured with the debt-to-equity ratio (D/E) computed as the book value of total liabilities over the book value of equity. The leverage variable is summarized in Table A2. Non-payers turn to be more levered than payers for the overall sample as well as for every subperiod. The highest ratio (2.1) appears in the 1981-1990 period, but the second-largest peak (D/E equal to 2) happens in the 2011-2020 period which may be associated with the huge financial crisis of 2009. Interestingly for non-payers, the period of 2001-2010 presents the lowest debt-to-equity ratio compared to all the other periods defined. Although payers present lower D/E ratios compared to non-payers, throughout the period their D/E ratios have been increasing. This changing characteristic could be a potential explanation for a decreasing propensity to distribute capital from dividend payers. All the preceding

considerations lead to the conclusion that leverage and the likelihood of dividend payments should be expected to be negatively correlated.

5.6. Cash holdings

Cash relevance for dividend payment is linked to the free cash flow hypothesis supported by Jensen (1986), just like leverage. Positive free cash flows will generate cash that could be distributed or used on negative net present value projects which will generate a decline of firm value. To avoid the evident conflict of interest managers might be induced to distribute dividends using excess cash. In contrast, von Eije and Megginson (2008) state that the higher the cash holdings the lower the probability of paying dividends whereas for payers the amount distributed is higher. Following Chay and Suh (2009), the ratio of cash and short term investments over book value of total assets is used as a proxy for the variable CASH. In this sample, non-payers present higher cash ratios for the entire period and for all the subperiods except from the period between 1972 and 1980. Payers started with a cash ratio of 8.5% and non-payers equal to 8.1%, then payers' ratios fluctuated between 9% and 13% while non-payers increased their cash holdings across time reaching their highest amount on the last subperiod (28.1%). For the latter, between the first and the last subperiods, the cash ratio increased by almost 250%. Regarding the former, the variation was only 53%. Non-payers have a roughly two-fold higher percentage than payers from 1991 to 2000. Considering the conclusions taken above, it is expected a negative relationship between cash holdings and the probability of distributing dividends.

5.7. Liquidity

After analyzing measures focused on accounting features of the firm, it would be interesting to study the impact of the firm's stock liquidity. Stock liquidity is a very important factor for investors because it defines how easily they can sell a specific security. Theoretically, rational investors favor stocks with high liquidity. Conversely, they will demand high discount rates when facing firms with low liquidity, thus decreasing their valuation of those firms. As a response, firms with low liquidity would be more likely to pay dividends to raise their valuations.

In addition, for low liquidity markets, investors prefer to receive dividends rather than getting the same payout in form of homemade dividends due to the existence of high transactions costs. As a result, and in line with the preceding two considerations, companies with low liquidity are more likely to pay dividends. Banerjee, Gatchev, and Spindt (2007) evidence supports those

conclusions for US firms over the period 1963-2003 and Bulan, Subramanian, and Tanlu (2007) show that dividend initiations are more frequent in illiquid markets.

Following Kuo, Philip, and Zhang (2013), turnover ratio (TOR) is used as a proxy for liquidity. It is commonly used in many studies, and it is defined as the volume of shares traded over the number of shares outstanding for each year of the 1972-2020 period.

Commented [DB6]: This comes from Compustat or CRSP?

Evidence from Table 1 seems to be consistent with previous literature and main theories and intuitions. Indeed, non-payers present higher TOR than payers for the entire period and all subperiods. The former present, on average, TOR equal to 140% for the 1972-2020 period while the latter is less liquid (89%). The dividend groups have initially quite similar ratios (30% for payers and 38% for non-payers) but with the effect of time, their liquidity measure does not increase at the same pace and for the 2011-2020 period their ratios are completely different. According to previous literature and evidence from this sample, the hypothesis is that stock liquidity is negatively related to the likelihood of paying dividends.

5.8. Cash-flow uncertainty

The uncertainty around the evolution of future cash-flows is a factor that might impact managers' decisions regarding payout policy. If firms face cash-flow uncertainty they are expected to pay fewer dividends or to avoid paying at all because they fear future cash shortfalls and they opt to prevent that occasion by keeping earnings inside the firm. Generally, the cost of external funding is higher than the cost of internal financing. The cost of funding is even larger for firms with unpredictable cash-flows because they might be financially constrained. Moreover, dividends are considered to be sticky and a potential decision to cut payouts could result in a significant drop in the firm's value. As a result, when cash flows are unpredictable, managers are hesitant to pay high dividends because they are unsure of their capacity to maintain them.

According to Lintner (1956), managers look at earnings stability as one of the key factors of dividend policy. Similarly, Brav et al. (2005) state that more than 66% of the CFOs of dividend-paying firms acknowledge their decisions are impacted by cash-flow uncertainty.

To measure cash-flow uncertainty, there were used two variables. SRVOL is replicated from Chay and Suh (2009) and Earnings volatility is replicated from Michaely and Moin (2022).

Firstly, SRVOL (used in the third regression) is measured as the standard deviation of monthly stock returns taken from CRSP database over the 2 most recent years. Firms without data for any of the 24 months composing the 2 years should be neglected. The SRVOL works as a proxy

for cash-flow uncertainty because stock prices oscillate more when cash-flows are unpredictable.

Secondly, earnings volatility (EVOL) is computed by the ratio of the change in earnings before interest ($E_t - E_{t-1}$) to the average of total assets $[(A_t + A_{t-1})/2]$, squared. This last variable will only be used for tests of robustness.

Table A2 presents the average SRVOL and EVOL for all firms in the sample, payers, and non-payers. As expected, the averages presented in the table corroborate the previous argument. For SRVOL, non-payers present consistently higher standard deviations than payers which means they show higher cash-flow uncertainty. For EVOL the conclusions are the same. SRVOL stay roughly constant while EVOL increases until the 2001-2010 period and decreases for the last subperiod.

For all these reasons stated above, cash-flow uncertainty and the probability of dividend payments are expected to be negatively related.

5.9. Risk

Risk is present everywhere and every time. For companies there is no exception, they are always exposed to many potential risks. The firm's exposure to idiosyncratic and systematic risk might impact its managerial decisions namely its payout policy. Building on the maturity theory proposed Venkatesh (1989), where mature firms are associated with less risk, it is possible to infer that those firms will be prompted to pay dividends. Grullon, Michaely, and Swaminathan (2002) also find evidence of this theory. Furthermore, Fama and French (2001) argue that part of the disappearing dividends puzzle could be explained by the changing firm characteristics namely the decreasing profitability of newly listed small firms. Hence, it could be deduced that since newly list firms carry more risk, then there would be a lower occurrence of dividend payments.

From another perspective, Pástor and Pietro (2003) link the rising idiosyncratic risk in the 1990s to the increasing cash flow risk, which is expected to restrict the payout of dividends. Lastly, Xu and Malkiel (2003) suggest that higher idiosyncratic risk is associated with future growth potential for the firm. Hence firms with higher firm-specific risk might decrease the payment of dividends to save some capital useful for the future growth opportunity.

Following Hoberg and Prabhala (2009), this study uses 2 different proxies for risk. Firstly, idiosyncratic risk (IDIOS) is measured as the standard deviation of residuals from a regression of the stock excess return on the 3 Fama and French factors, which are HML, SMB and MKT.

The systematic risk (SYS) is computed as the standard deviation of the predicted values for the regression used for the firm-specific risk. The stock excess returns are computed by deducting the risk-free rate from the stock return and the monthly 3 Fama and French factors are taken from the authors' website.

Consistent with the articles stated above, non-payers present always higher standard deviations than payers for idiosyncratic risk (IDIOS) meaning that the high non-payers exposure to risk prevents them from paying out dividends. Except from the 1972-1980 period, non-payers show roughly 2 times higher standard deviations than payers which might reflect the importance of risk on payout decisions. Lastly, non-payers register their higher exposure to idiosyncratic risk on the 1991-2000 period with a 14% of standard deviation. Before that period, it increases from 10.6% in 1972-1980 to the 1991-2000 peak and then decreased to 11.6% in the last subperiod (2011-2020). Regarding payers, their exposure is approximately constant. Moreover, non-payers present consistently higher SYS than payers and both groups exhibit a stable pattern across time.

Thereby, firms with higher risk are expected to avoid paying dividends meaning risk and likelihood of dividend payments are predicted to be negatively correlated.

6. Multivariate analysis

6.1. Methodology

After analyzing individually each of the dependent variables used in this study and giving some intuition to support the predicted impacts (positive or negative) over the explanatory variable, regressions are estimated to examine the simultaneous impact of the variables on dividend policy.

In regard to methodology, there are multiple types of regressions analysis and there is no consensus regarding which one is, in fact, the most representative of the distributions. According to Hellevik (2009), in many situations, the linear model represents the distributions as well as the logistic model even with a small sample, thus producing identical significance results. In contrast, past literature on dividend policy commonly uses logit regression to find the best fit for the distribution of the binary dependent variable. Then, the results of the logit regressions are tested for robustness using the linear probability model which has the advantage of being less computational demanding.

Below there are presented the models that are estimated on the next section:

Logit Regression Analysis

- 1) $\log\left(\frac{P_{it}}{1-P_{it}}\right) = \beta_0 + \beta_1 \text{Size}_{it} + \beta_2 \text{Asset Growth}_{it} + \beta_3 \text{Market-to-book}_{it} + \beta_4 \text{Earnings to asset}_{it} + \beta_5 \text{Earned equity}_{it} + \beta_6 \text{Leverage}_{it} + \alpha_i + \delta_t$
- 2) $\log\left(\frac{P_{it}}{1-P_{it}}\right) = \beta_0 + \beta_1 \text{Size}_{it} + \beta_2 \text{Asset Growth}_{it} + \beta_3 \text{Market-to-book}_{it} + \beta_4 \text{Earnings to asset}_{it} + \beta_5 \text{Earned equity}_{it} + \beta_6 \text{Leverage}_{it} + \beta_7 \text{Liquidity}_{it} + \beta_8 \text{Idiosyncratic risk}_{it} + \beta_9 \text{Systematic risk}_{it} + \alpha_i + \delta_t$
- 3) $\log\left(\frac{P_{it}}{1-P_{it}}\right) = \beta_0 + \beta_1 \text{Size}_{it} + \beta_2 \text{Asset Growth}_{it} + \beta_3 \text{Market-to-book}_{it} + \beta_4 \text{Earnings to asset}_{it} + \beta_5 \text{Earned equity}_{it} + \beta_6 \text{Leverage}_{it} + \beta_7 \text{Liquidity}_{it} + \beta_8 \text{Idiosyncratic risk}_{it} + \beta_9 \text{Systematic risk}_{it} + \beta_{10} \text{Cash}_{it} + \beta_{11} \text{Cash-flow uncertainty}_{it} + \alpha_i + \delta_t$

Linear probability model

- 4) Dummy variable for dividend payment_{it} = $\beta_0 + \beta_1 \text{Size}_{it} + \beta_2 \text{Asset Growth}_{it} + \beta_3 \text{Market-to-book}_{it} + \beta_4 \text{Earnings to asset}_{it} + \beta_5 \text{Earned equity}_{it} + \beta_6 \text{Leverage}_{it} + \alpha_i + \delta_t$
- 5) Dummy variable for dividend payment_{it} = $\beta_0 + \beta_1 \text{Size}_{it} + \beta_2 \text{Asset Growth}_{it} + \beta_3 \text{Market-to-book}_{it} + \beta_4 \text{Earnings to asset}_{it} + \beta_5 \text{Earned equity}_{it} + \beta_6 \text{Leverage}_{it} + \beta_7 \text{Liquidity}_{it} + \beta_8 \text{Idiosyncratic risk}_{it} + \beta_9 \text{Systematic risk}_{it} + \alpha_i + \delta_t$
- 6) Dummy variable for dividend payment_{it} = $\beta_0 + \beta_1 \text{Size}_{it} + \beta_2 \text{Asset Growth}_{it} + \beta_3 \text{Market-to-book}_{it} + \beta_4 \text{Earnings to asset}_{it} + \beta_5 \text{Earned equity}_{it} + \beta_6 \text{Leverage}_{it} + \beta_7 \text{Liquidity}_{it} + \beta_8 \text{Idiosyncratic risk}_{it} + \beta_9 \text{Systematic risk}_{it} + \beta_{10} \text{Cash}_{it} + \beta_{11} \text{Cash-flow uncertainty}_{it} + \alpha_i + \delta_t$

The logit regression (LR) and the linear probability model (LPM) are estimated with panel data observations from 1972 to 2020. The dependent variable is a binary, taking one when the firm pays dividends in the current year and zero otherwise. For both procedures α_i and δ_t represent the inclusion of firm and year fixed effects, respectively. The panel data allows controlling for omitted variables which are those that are not included in the model but might impact the results obtained because they are correlated to the explanatory variables. In the two models, time and firm fixed effects are included which enables the assessment of what is happening to a specific company but not measuring changes from different samples inside the population. In other words, this way it is possible to understand how each of the factors studied impact the dividend payout decisions of each specific firm.

As explained in subsection 5.6, there are computed two different proxies for cash-flow uncertainty, SRVOL and EVOL. These two proxies are used in models III and VI one at a time meaning that, instead of having three models for each procedure, there are four. For the logit approach, model III is split into two, IIIa and IIIb using SRVOL and EVOL, respectively. Likewise, the linear model divides the approach VI into VIa and VIb incorporating either SRVOL or EVOL, respectively.

6.2. Logit regressions

In this subsection, the effects of explanatory variables over dividend policy are estimated using the logit regression approach. Table 1 shows the slope coefficients and t-statistics for the logit regression (LR) estimated for panel data observations from 1972 to 2020 controlling for firm and year fixed effects. As discussed above the dependent variable is one if the firm pays dividends in year t and zero otherwise.

In column 1 (Table 1), it is represented model I which is composed of the firm characteristics proposed by Fama and French (2001), the life-cycle measure (RE/BE) proposed by DeAngelo et al. (2006), and the debt-to-equity ratio (D/E). The main objective of this first model is to test whether some of the most discussed variables over past literature continue to show high impact for the US sample used in this sample.

For model I, the variables are statistically significant at the 1% significance level. Size, earnings-to-asset ratio and RE/BE show positive coefficients consistent with univariate and past literature predictions. Whereas the asset growth (a proxy of investment opportunities) and the debt-to-equity ratio, exhibit negative impact on dividend payment, consonant with previously predicted signs. Lastly, V/A (the other proxy for investment opportunities) show a positive

coefficient which is in contradiction with the asset growth impact and the predicted in the univariate analysis. Hence it is not possible to infer what is the real impact of investment opportunities on dividend policy.

In column 2, it is studied the effect of firm characteristics, life cycle, leverage, stock liquidity, and risk simultaneously (model II), thus replicating model 6 by Kuo, Philip, and Zhang (2013). Liquidity is proxied by the turnover ratio (TOR) and risk by idiosyncratic (IDIOS) and systematic (SYS) risk. All the variables show significance at any significance level considered in table Z, except for liquidity that is insignificant. In regard to firm characteristics, life cycle and leverage factors, they continue to show significance at the 1% level and their coefficient signs remain unchanged. For risk, both idiosyncratic and systematic exhibit a negative correlation to the payment of dividends as expected.

For the model represented in column 3 of Table 1, all the variables from column 2 are incorporated plus the variable representing the firm's cash and short-term investment balance and SRVOL which is a proxy for cash-flow uncertainty (model IIIa). All the coefficients are significant at the 1% significance level apart from risk measures since both show insignificant coefficients. Liquidity becomes significant at the 5% level while risk exhibit no impact on the dependent variable.

Lastly, in column 4, it is estimated a new regression on the same explanatory variables as column 3 but instead of having SRVOL, it incorporates the earnings volatility (EVOL) as a proxy for cash-flow uncertainty (model IIIb). Its main objective is to test the column 3 model for robustness. All the variables exhibit unchanged coefficient signs and significance apart from liquidity that becomes irrelevant for dividend policy decisions and both risk measures turn to be significant again at the 1% significance level like in column 2.

Table 1: Logit regressions to study potential determinants of dividend policy

Table 1 summarizes the coefficients of the logit regressions estimated for the 1972-2020 period. The dependent variable is equal to one if the company distributes dividends in year t and zero otherwise. Columns (1), (2), (3) and (4) correspond to models I, II, IIIa and IIIb, respectively. The explanatory variables used are: Size [$\log(A)$]; Investment Opportunities have two proxies, the market-to-book ratio (V/A) and the asset growth (dA/A); Profitability (E/A); Life-cycle (RE/BE); Leverage (D/E); Cash Holdings (CASH); Liquidity (TOR); Cash-flow Uncertainty have 2 proxies, SRVOL and EVOL; Risk have 2 proxies, IDIOS and SYS. For brevity and due to high number of determinants, they further explained in Table A1 in the Appendix. In parenthesis there are presented the t-statistics. The asterisks correspond to the significance levels for the coefficients presented in the table (* $\alpha < 0.1$, ** $\alpha < 0.05$, *** $\alpha < 0.01$).

VARIABLES	(1)	(2)	(3)	(4)
log(A)	2.618*** (48.53)	2.532*** (37.95)	2.463*** (36.36)	2.575*** (38.32)
V/A	0.151*** (9.451)	0.178*** (8.889)	0.166*** (8.109)	0.166*** (8.265)
E/A	2.729*** (17.16)	2.446*** (12.20)	2.378*** (11.78)	2.321*** (11.56)
dA/A	-0.438*** (-11.36)	-0.460*** (-8.901)	-0.475*** (-9.121)	-0.469*** (-9.084)
RE/BE	0.208*** (10.66)	0.277*** (10.42)	0.252*** (9.720)	0.286*** (10.76)
D/E	-0.126*** (-16.13)	-0.0793*** (-8.477)	-0.0685*** (-7.272)	-0.0729*** (-7.794)
Cash			1.064*** (6.795)	1.111*** (7.163)
TOR		0.00445 (0.255)	0.0349** (1.971)	-0.00273 (-0.156)
SRVOL			-15.02*** (-21.40)	
IDIOS		-8.263*** (-18.16)	-0.159 (-0.273)	-8.103*** (-17.78)
SYS		-6.961*** (-14.88)	1.065* (1.790)	-6.907*** (-14.77)
EVOL				-0.281*** (-4.432)
Observations	58,714	43,297	43,297	43,297
Number of PERMNO	3,248	2,450	2,450	2,450
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

6.3. Robustness test: Linear probability model

After estimating the logit regressions, the same explanatory variables are regressed to the binary dependent variable to confirm if the conclusions are similar.

Table 2 shows the slope coefficients and t-statistics for the linear probability model (LPM) estimated for panel data observations from 1972 to 2020 controlling for firm and year fixed effects.

In column 1, it is represented model IV which is composed of the firm characteristics' variables, life cycle and leverage measures. All the coefficients in column 1 are highly significant. Size measure, earnings-to-asset ratio, asset growth (one of the proxies for investment opportunities) and the debt-to-equity ratio are consistent with the previous univariate analysis and consequently present the expected sign. On the other hand, the market-to-book ratio presents a positive coefficient which is against the prediction of a negative effect of investment opportunities over dividend payments. Moreover, although the life-cycle variable presents a negative coefficient which is not in accordance with its prediction, the effect is not that negative meaning that, on average, a one percentage point increase in the RE/BE ratio translates into an approximately 0.4 pp decrease of the probability of paying dividends, holding all the other explanatory variables constant. Lastly, Table 3 presents the standardized coefficients which enable the comparison of the impact of the different factors studied. In column 1, size, leverage and life cycle seem to have the biggest impact on dividend policy. Size has a ten times larger impact on dividend payment decisions than life cycle, for example.

Table 2: Linear probability model to test for robustness

Table 2 summarizes the coefficients and t-statistics (in parenthesis) for the linear probability model for the 1972-2020 period. The dependent variable is equal to one if the company distributes dividends in year t and zero otherwise. Columns (1), (2), (3) and (4) correspond to models IV, V, VIa and VIb, respectively. The explanatory variables used are: Size [$\log(A)$]; Investment Opportunities have two proxies, the market-to-book ratio (V/A) and the asset growth (dA/A); Profitability (E/A); Life-cycle (RE/BE); Leverage (D/E); Cash Holdings (CASH); Liquidity (TOR); Cash-flow Uncertainty have 2 proxies, SRVOL and EVOL; Risk have 2 proxies, IDIOS and SYS. For brevity and due to high number of determinants, they further explained in Table A1 in the Appendix. The asterisks correspond to the significance levels for the coefficients presented in the table (* $\alpha < 0.1$, ** $\alpha < 0.05$, *** $\alpha < 0.01$).

Variables	(1)	(2)	(3)	(4)
log(A)	0.168 (21.23)***	0.171 (17.85)***	0.170 (17.71)***	0.175 (18.19)***
V/A	0.00994 (9.216)***	0.0113 (8.342)***	0.0106 (7.842)***	0.0104 (7.742)***
E/A	0.0344 (6.143)***	0.0263 (3.651)***	0.0245 (3.424)***	0.0250 (3.491)***
dA/A	-0.0222 (-11.78)***	-0.0194 (-7.953)***	-0.0204 (-8.225)***	-0.0212 (-8.521)***
RE/BE	-0.00361 (-9.654)***	-0.00331 (-7.249)***	-0.00346 (-7.534)***	-0.00341 (-7.438)***
D/E	-0.0108 (-15.61)***	-0.0100 (-11.80)***	-0.00960 (-11.35)***	-0.00978 (-11.51)***
Cash			0.0764 (5.305)***	0.0771 (5.341)***
TOR		-0.00225 (-1.407)	-0.00179 (-1.116)	-0.00280 (-1.757)*
SRVOL			-0.396 (-12.58)***	
IDIOS		-0.181 (-7.987)***	0.0277 (1.319)	-0.175 (-7.763)***
SYS		-0.212 (-8.395)***	0.00632 (0.267)	-0.214 (-8.545)***
EVOL				-0.000225 (-7.636)***
Constant	0.0901 (6.152)***	0.146 (8.476)***	0.154 (8.603)***	0.130 (7.368)***
Observations	165,212	123,348	123,348	123,348
R-squared	0.056	0.067	0.070	0.068
Number of				
PERMNO	16,775	13,125	13,125	13,125
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Robust t-statistics in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: Standardized coefficients from the linear probability model

Table 3 presents the standardized coefficients for the linear probability model for the 1972-2020 period estimated in Table 2. The dependent variable is equal to one if the company distributes dividends in year t and zero otherwise. Columns (1), (2), (3) and (4) correspond to models IV, V, VIa and VIb, respectively. The explanatory variables used are the same as Tables 1 and 2.

Variables	(1)	(2)	(3)	(4)
log(A)	0.319	0.325	0.323	0.332
V/A	0.028	0.032	0.030	0.029
E/A	0.014	0.011	0.010	0.010
dA/A	-0.017	-0.015	-0.016	-0.017
RE/BE	-0.030	-0.028	-0.029	-0.029
D/E	-0.060	-0.056	-0.054	-0.055
Cash			0.030	0.030
TOR		-0.007	-0.005	-0.009
SRVOL			-0.073	
IDIOS		-0.029	0.004	-0.028
SYS		-0.028	0.001	-0.028
EVOL				-0.003
Observations	165,212	123,348	123,348	123,348
Number of PERMNO	16,775	13,125	13,125	13,125

In column 2 it is represented the model V which incorporate all the variables from column 1 plus the liquidity (TOR) and risk (IDIOS and SYS) measures. In this model, all the coefficients are highly significant at the 1% significance level except from TOR that is not significant for any of the 3 levels used. Regarding the variables that are also included in column 1, the sign of the coefficients remains the same and the coefficients themselves stay roughly constant. As stated above, all the latter are significant, but they present smaller t-statistics than column 1. Regarding risk measures, they are consistent with the predicted negative sign of the univariate analysis. Regarding Table 3, size remains the most impactful variable for this second model, followed by leverage. In the third tier of importance, appear the market-to-book ratio which has a bit larger effect than risk measures.

Concerning column 3, it illustrates model VIa by adding the cash balance and cash-flow uncertainty (SRVOL) variables to the ones incorporated in column 2. All the coefficients are statistically significant according to any value of significance except for liquidity and risk. For all the variables incorporated in the models presented above, their coefficient signs remain the same apart from the risk measures that became insignificant. The cash holding measure presents

positive coefficients whereas SRVOL shows a negative sign, thus both in line with the previous predictions. Size remains the most important factor in dividend policy followed by the existence of cash-flow uncertainty and leverage effect. The cash measure has a similar effect to the market-to-book ratio and RE/BE.

As a robustness test, column 4 incorporates the same variables as column 3 except for SRVOL that is switched by EVOL, also a proxy of cash-flow uncertainty. All the coefficients are statistically significant for any confidence level defined except for liquidity that is only significant for a significance level of 5% or higher. For the variables included in column 3, their impact over the dependent variable is identical (coefficients with the same sign), apart from risk variables that show negative effects on dividend payment, hence consistent with column 2 and to this study's predictions. Moreover, IDIOS and SYS coefficients could not be interpreted because they were not significant for column 3 but now, they are highly significant. Furthermore, it is important to highlight that the liquidity measure becomes significant at the 5% confidence level and EVOL shows significance at any confidence level presented. As to standardized coefficients for column 4, they are identical to column 2 in regard to their relative importance since the size, leverage, market-to-book ratio and risk factors are the most impactful. Lastly, EVOL shows a low impact on the dividend policy decision compared to the other proxy of cash-flow uncertainty (SRVOL) incorporated in column 3.

The coefficients shown by Table 1 concerning the logit regression (LR) are difficult to be interpreted. As such the marginal effects are computed for each of the 4 models previously estimated with the logit. By having the marginal effects for both approaches (LR and LPM), it is possible to compare the effect on the probability of paying dividends of a 1% change in some explanatory variable while keeping the rest constant.

Table A3 (in the appendix) shows the average marginal effects of each explanatory variable in the model and the t-statistics associated. Although, the table facilitates the interpretation of the effect of the independent variables on the payment of dividends, for ratios like the debt-to-equity or the earnings-to-asset it is not easy to do so. For example, looking at column 3 of Table A3, a coefficient of 0.0635 for Cash means that for a one percentage point increase of the ratio of cash and short-term investments to total assets, the probability of paying dividends rises by 6.35 percentage points, holding the other variables constant.

In a similar way, the slope coefficients from the linear probability model (LPM) represented in Table 2, inform on what is the impact on the probability of paying dividends if one independent

Commented [DB7]: These are not panels, are columns.

variable changes by 1 unit with all the rest constant. As such, there are some possible comparisons between the two approaches. For size, the LPM shows higher coefficients than the LR approach for columns 1, 2 and 4. V/A exhibit a similar pattern apart from column 3, on which the impact is similar (around 1 pp rise in the probability of dividend payment). The profitability factor is always higher for logit regression than LPM ranging from 2 times larger in column 1 to almost 6 times (from 0.025 to 0.14). Asset growth, cash, and systematic risk measures tend to be similar across the two approaches. In contrast, the LR estimates higher life cycle and leverage ratios than LPM, between 2 and 5 times larger. Following the larger impact of the LR approach, for idiosyncratic risk and SRVOL, the model presents twice the effect of LPM on dividend policy. As such, LR exhibits, on average, a coefficient of 0.36 for IDIOS while the LPM is approximately 0.18. A final note to earnings volatility which denotes a huge gap from 0.01 to 0.00025 for LR and LPM, respectively

To summarize, the linear probability model exhibits similar conclusions to the logit regression approach with some exceptions. The Fama and French firm characteristics are all significant for both approaches and the signals are consistent between each other. The impacts of size, profitability and asset growth are in line with the predicted effects described in the univariate analysis (Section 5) while the market-to-book ratio show a positive impact which is against the expected negative impact of investment opportunities. The life-cycle measure (RE/BE) is always significant at the 1% level for both approaches but present positive and negative impacts for LR and LPM, respectively. Leverage is negatively correlated to the payment of dividends and has a relatively high importance compared to the other determinants while cash is a valuable factor to increase the likelihood of dividend payments. There is not much support to the importance of the liquidity measure (TOR) except when incorporated with the SRVOL in LR approach. In this case it has a positive impact over dividends although it is expected to be negative. The risk measures show strong negative impacts like expected for both approaches except for models IIIa and VIa due to the incorporation of SRVOL. Lastly, cash-flow uncertainty exhibits negative impacts in both procedures using either SRVOL or EVOL, meaning it is consistent with expectations from subsection 5.6. SRVOL seems to be quite important on both approaches.

7. Analysis on changes in the fraction of dividend payers

This section seeks to quantify the impact of firm characteristics and propensity to pay dividends on the evolution of the fraction of dividends payers discussed in Section 4 especially for the disappearing and reappearing dividend period found by Michaely and Moin (2022).

7.1. Methodology

First, pooled logit regressions are estimated by applying the models I, II and III for a base period between 1972 and 1982, controlling for year fixed effects. Then, the slope coefficients for the base period are computed and multiplied by each firm characteristic in the subsequent year (1983 onwards). For each one of the observations, it is obtained a log odd which is further simplified to get the individual probability of each firm in a specific year to pay dividends. Lastly, to get the expected overall probability of a firm being a dividend payer for a certain year, it is computed the average of all individual firm probabilities.

7.2. Differential between actual and expected proportions

The coefficients used to compute the probabilities from 1983 onwards are estimated based on the firms' characteristics during the 1972-1982 period which means that they intrinsically reflect the propensity to pay dividends shown by companies included on the dataset during the same timeframe. When these coefficients are applied to the firms- characteristics of a certain year (1983 or after), the expected percentage of payers computed represent the fraction of firms forecasted to pay dividends if their propensity to pay dividends remains the same compared to the 1972-1982 period. Thereby the expected proportion of payers varies uniquely according to the change of firm characteristics across the years because the propensity of paying dividends is kept constant (the same as for the 1972-1982 period). The actual percentage of payers, on the other hand, is the proportion of companies that have paid dividends for each year. The difference between the expected and the actual percentages of payers (Expected minus Actual) is called residual and measures the change of propensity to pay dividends. Moreover, the residual can be seen as the fraction of firms that are expected to pay dividends between 1972 and 1982 but do not pay in a specific year. If, for example, the expected percentage is higher than the actual fraction of payers, the difference is explained by a lower propensity to pay in the year in question compared to the propensity to distribute dividends during the base period.

Another possible view is to analyze the changes in total percentage of payers as the sum of the change in firm characteristics and the change in propensity to pay dividends. This view is very

helpful to explore the potential effects of the two factors in the disappearing and reappearing phenomena.

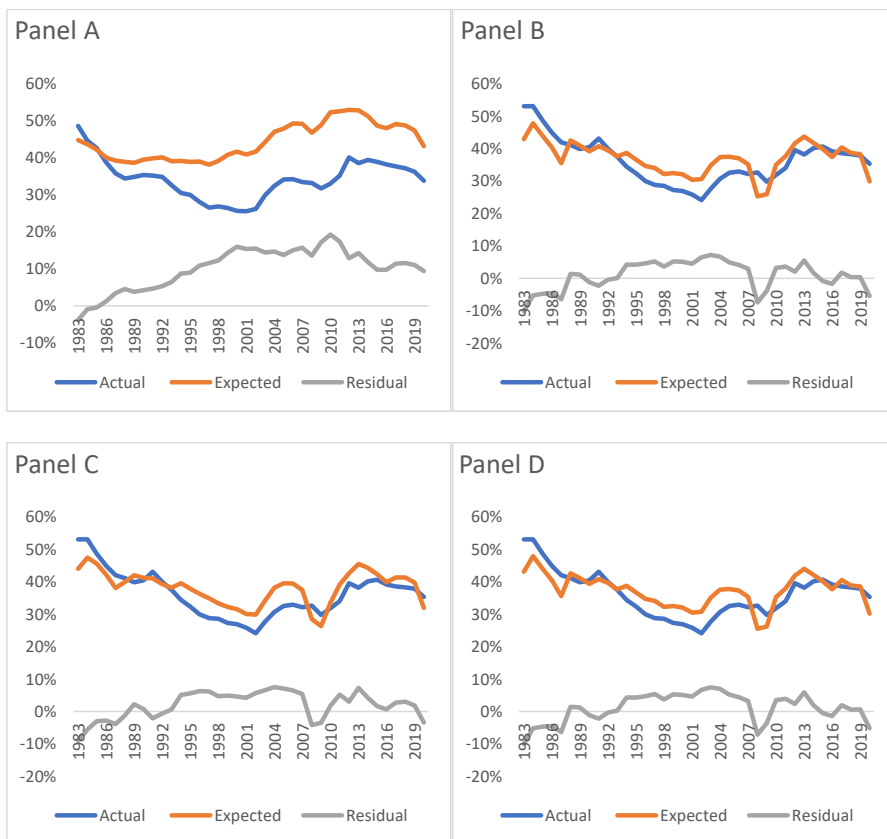
In this first part of the dissertation, the approach described is conducted using the four models described at the beginning of Section 6.

7.3. Evolution of the actual, expected and residual curves for FW

As represented in Figure 2, until 2001, the actual proportions show a decreasing trend that is not consistent with the roughly constant expected fractions of payers in model 1 for the same period. In other words, if the changing firm characteristics over time was the only factor impacting the percentage of dividend payers, it would be expected to have a stable evolution of that proportion until 2001. In reality, the fraction of dividend payers decreases implying the existence of another factor that is commonly called propensity to pay dividends. For this small subperiod, a declining decrease of the percentage of payers. The same conclusion is inferred when analyzing the increasing pattern of the residual computed (Expected-Actual proportions). From 2001 until 2008 the expected and actual fractions follow similar patterns meaning that the change of firm characteristics explains well the evolution of the actual percentages implying a roughly constant residual (impact of changing propensity to pay). Interestingly, from 2008 to 2009, the residual goes up because the expected proportion increases while the actual decreases, i.e. firm characteristics forecast higher ability for dividend payments but managers show lower willingness to distribute cash due to the uncertainty brought by the 2009 global financial crisis. The decrease of the actual percentage of payers exhibited for 2009 quickly bounces back in 2010 to the same 33% of 2008. Lastly, from 2011 onwards, Figure 2 shows consistent patterns for expected and actual proportions of payers.

Figure 2: Evolution of the expected, actual, and residual curves for the fixed base period (1972-1982)

Figure 2 shows the estimated expected, actual, and residual amounts for each year between 1983 and 2020 using the fixed window approach, which means the base period is 1972 to 1982 regardless of the year in question. The expected curve reflects the fraction of dividend payers forecasted uniquely by the changing firms characteristics. The actual percentage of payers, on the other hand, is the proportion of companies that have paid dividends for each year. The residual (Expected minus Actual) measures the change in proclivity to pay. In other words, if $\text{Expected} > \text{Actual}$, the difference is explained by a lower propensity to pay in that year compared to the base period. Panel A,B,C and D represent models I,II, IIIa and IIIb, respectively.



For model II, until 1987 there are expected lower proportions of payers than the actual amounts meaning that firms with those characteristics would not be expected to pay dividends for the base period thus implying an increasing propensity to pay dividends during those years. From 1988 to 1993, firm characteristics forecast almost perfectly the actual percentage of payers. Just

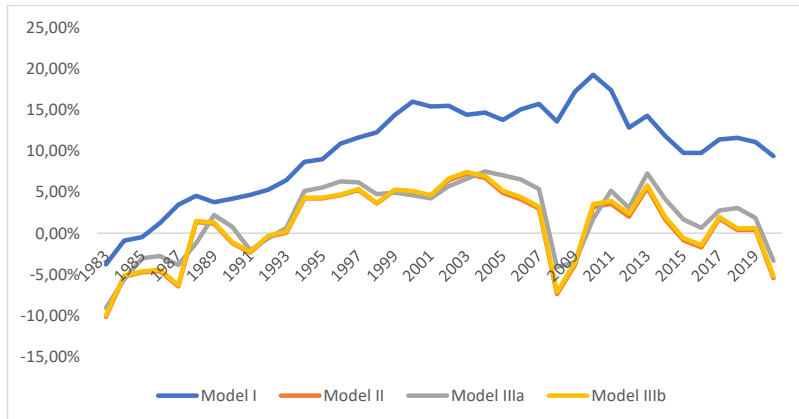
as seen in model I, from 1994 until 2002, the expected and actual rates are consistent in terms of their decreasing pattern. In contrast, from 2002 to 2007, they both present increasing patterns while keeping a residual of around 4 and 5 percent. Thereby, residuals are stable for those two periods which means that the change in propensity has a low explanation power over the change in total percentage of payers. For 2008 and 2009, expected fractions become lower than the actual ones which means that if only the change of firm characteristics is considered the drop in the percentage of payers would be much higher. Ultimately, from 2010 onwards the expected and actual curves show consistent fluctuations except for 2013 and 2020 when the residual curve exhibit steep increases (in absolute value) because the firm characteristics for those years cannot solely explain the actual fraction of payers observed.

Regarding model III, it is used in two different approaches, the first with SRVOL and the second with EVOL as proxies for cash-flow uncertainty, as shown for the multivariate analysis. They are both represented in Figure 2 and Figure 3. Moreover, they are both identical to model II as shown in Figure 3.

Overall model I in Figure 4 shows higher residuals compared to the other 3 alternatives except for the period between 1983 and 1988. The expected fraction of payers computed from firm characteristics predict consistently better the actual proportions for model II, IIIa and IIIb compared to model I. Conversely, the higher residuals estimated for model I throughout time prove that the existence of the propensity to distribute factor is needed so that the expected proportion plus the residual match the actual percentage observed. Furthermore, it is interesting to note how different is the reaction in the period of the 2009 financial crisis. Model I estimates higher expected rates than actual ones while for the other 3, it is the other way around. The former estimates an increasing propensity to pay while the latter exhibit a decreasing propensity to distribute dividends. Lastly, the inclusion of the risk and liquidity measures may explain the difference in the residual curves between models I and II and although the models II and IIIa seem to have no meaningful differences, the incorporation of the SRVOL variable in model IIIa) differentiates slightly its curves from models II and IIIb which also includes the CASH variable and the EVOL variables instead of SRVOL.

Figure 3: Comparison of the residual curves for the fixed base period (1972-1982)

Figure 3 compares the estimated residual curves from 1983 to 2020 using the fixed window approach (1972-1982 base period) for the 4 different models. Remember that the residual explains the difference between actual and expected fractions that can't be predicted by company characteristics for that year.



7.4. Robustness test using the rolling window approach

An alternative way of computing the actual and expected fractions of payers is to define a rolling window for the base period, starting with the 1972-1982 period. The coefficients estimated for that window are used to compute the expected proportions in 1983 taking into account the firm characteristics of that year. Then, to compute the expected percentages of payers for 1984, it is used the 1973-1983 period coefficients (bottom and top limits of the period increase by 1 year) and so on for each year until 2020.

In contrast to the first approach, the rolling window procedure computes expected percentages of dividend payers assuming the propensity to distribute does not change relative to the one verified for the previous 11 years. For example, the expected fraction of payers estimated for 1990, represents the percentage of firms predicted to pay dividends if the propensity of payment does not change relative to the 1979-1989 period. Moreover, for the first approach with the fixed window from 1972 to 1982 (FW) the expected percentage of payers is estimated based on the firm characteristics of the previously referred timeframe which may not be the most realistic assumption for later period years. Conversely, the second approach using the rolling window (RW) allows the introduction of different sets of coefficients based on the 11 years before the year being considered. The probabilities take into consideration the specific aspects

of each period thus decreasing the potential exposure to bad estimations in the late years of the sample period.

Figure 4 present the evolution of the 3 types of curves for the rolling window approach. Figure 5 plots the residuals of the 4 models using the same approach. Lastly, Figure 6 measure the effect of using the rolling window instead of the fixed, for model I or II, panel A or B, respectively.

For brevity and since the different possible relationships between actual, expected, and residual curves were already explored for the fixed window approach, the graphs are displayed below but no extensive analysis is conducted.

Figure 4: Evolution of the expected, actual, and residual curves for the rolling base period

Figure 4 presents the estimated expected, actual, and residual amounts for each year between 1983 and 2020 using the rolling window approach, which means the base period is composed by the 11 years before the year being studied. The expected curve reflects the fraction of dividend payers forecasted uniquely by the changing firm characteristics. The actual percentage of payers, on the other hand, is the proportion of companies that have paid dividends for each year. The residual (Expected minus Actual) measures the change in proclivity to pay. In other words, if $Expected > Actual$, the difference is explained by a lower propensity to pay in that year compared to the base period. Panel A and B represent models I and II, respectively. Model III present similar conclusions to model II.

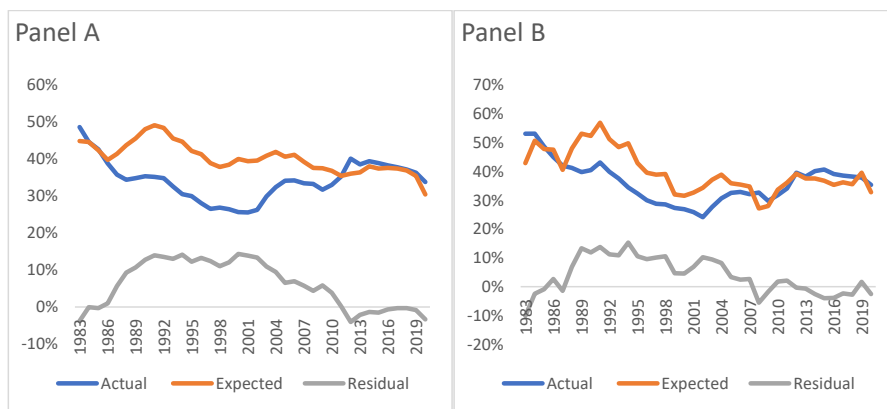


Figure 5: Comparison of the residual curves for the rolling base period

Figure 5 shows the comparison of the estimated residual curves from 1983 to 2020 using the rolling window approach (base period is composed by the previous 11 years) for the 4 different models. Remember that the residual explains the difference between actual and expected fractions that can't be predicted by company characteristics for that year.

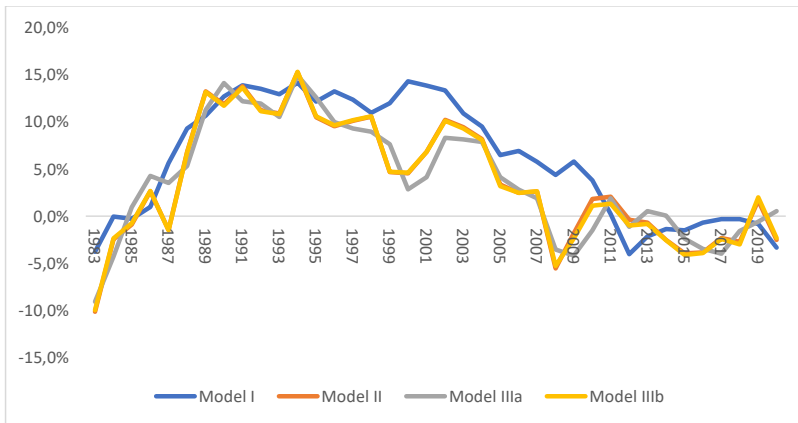
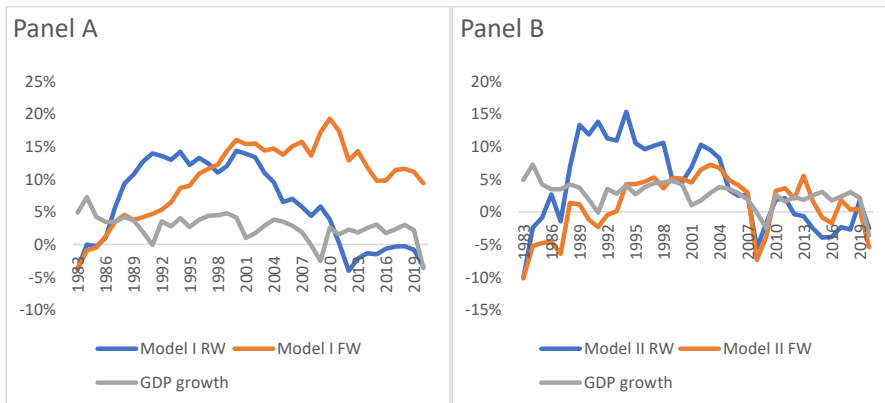


Figure 6: Comparison of the residuals for the fixed and rolling window approaches plus GDP growth

Figure 6 exhibits the comparison between the residual curves estimated using the fixed window or the rolling window from 1983 to 2020. Moreover, it is plotted the GDP growth evolution. Remember that the residual explains the difference between actual and expected fractions that can't be predicted by company characteristics for that year. Panel A represents the contrast of model I estimations across the two approaches while panel B does the same for model II.



The objective of the inclusion of the GDP growth on Figure 6, is to test if the propensity to pay either estimated with a fixed window or using a rolling window, follows the pattern observed in the GDP. This issue links to the discussion on Section 4 because it could be the case that GDP growth drives the firms' propensity to pay dividends. By analyzing both panels, it seems that GDP is kind of consistent with the residual of model I (RW) after 2004 but with some exceptions. For panel B, model II (FW) presents an overall similar tendency. Although there may be room for further research on this relationship, the more or less consistent pattern observed can be a mere coincidence.

To conclude, it is expected that the residual curves for the fixed and rolling window approaches are quite different because they are computed for periods with distinct propensities to pay dividends. By estimating the rolling window approach, it is possible to observe that model d) shows quite different residuals especially after 2004 because in the rolling window they start to decrease approaching zero while for the fixed window they are stable around 10%. Before 2004, both residual curves increase but not at the same pace. On the other hand, the patterns of the residuals of the two approaches are more similar between each other especially from 2000 onwards. Based on this comparison, it is plausible to anticipate some contradictory results in the next subsection.

7.5. Decomposition of the change in percentage of payers

After analyzing the fluctuations of the actual and expected curves for the different models, it is possible to compute how much of the disappearing and reappearing phenomena are attributable to changing firm characteristics and changing propensity to pay dividends. As explained above, the changes in the expected fraction of payers are attributable to changes in the firm characteristics from one year to the other. However, the total effect on the actual percentage of dividend payers is larger than the change on the expected rates, inferring that the unexpected variation should be attributed to changes in the propensity to distribute dividends. For example, decreases in the propensity to pay represent the behavior of firms that had similar characteristics from the 1972-1982 period but omitted dividend payments. The following equations are used to break down the different components that drive the changes in dividend payers:

$$\text{Total Change} = \text{Change from firm characteristics} + \text{Changes from propensity} \quad (\text{a})$$

$$\text{Change from firm characteristics} = \text{Expected Change} \quad (\text{b})$$

$$\text{Change from propensity} = \text{Residual of the model} \quad (\text{c})$$

$$\frac{\text{Change from firm characteristics}}{\text{Total Change}} = \frac{\text{Expected Change}}{\text{Total Change}} \quad (\text{d})$$

$$\frac{\text{Change from propensity}}{\text{Total Change}} = 1 - \frac{\text{Expected Change}}{\text{Total Change}} \quad (\text{e})$$

Equations (a), (b) and (c) are already explained at the beginning of this section. Then, dividing equations (b) and (c) by the actual (total) change in the proportion of payers, it is obtained equations (d) and (e). They represent the fraction of total actual change attributable to the change in firm characteristics and change in the propensity to distribute, respectively. The total change in percentage of dividend payers is decomposed to study two different patterns, the disappearance (1983-2001) and the reappearance (2001-2014) of dividends, using as baseline the expected and actual fractions for 1983 and 2001, respectively. For example, from 1983 to 2001, the fraction of dividend payers decreases by 23.1 pp (Table A4, Panel A, column 1) for model d). This decline estimated the change in the actual percentage of payers and incorporates the changes in firm characteristics and propensity. For the same period, the expected change declined by 3.9 pp (Table A4, Panel A, column 2). This means that 3.9/23.1 or 16.9% of the dividend disappearing phenomenon is explained by changes in firm characteristics between 1983 and 2001 (Table A4, Panel A, column 4). Conversely, the change in propensity explains the remaining 83.1% of the decreasing pattern. For model e), 46.1% of the disappearing dividend pattern is attributable to the change in firm characteristics while the remaining 53.9% are explained by the change in the propensity to pay dividends (Table A4, Panel B, columns 4 and 5). The impact of the change in characteristics becomes almost 3 times higher which may be explained by the inclusion of risk and liquidity factors in model e), although the liquidity measure (TOR) is not significant in the multivariate analysis.

For 2001-2014, model d) estimates that 74.3% of the change in total percentages of payers is attributable to changes in firm characteristics and the remaining 25.7% to changes in the propensity to distribute dividends (Table A4, Panel E, columns 4 and 5). Model e) estimates that changes in company characteristics account for 80.1 percent of the change in overall percentages of payers between 2001 and 2014, while changes in the propensity to pay dividends account for the remaining 19.9 percent (Table A4, Panel F, columns 4 and 5). In contrast to the 1983-2001 period, the introduction of the liquidity and risk measures does not affect much the contribution of each of the factors to the overall change.

Finally, to test the robustness of the decomposition of the total change of the percentage of payers, it is conducted the same procedure for the rolling window (Table A4, in the appendix).

For the 1983-2001 period, model d) determine that 23.4% of the total change in percentage of payers is imputable to changes in firm characteristics whereas the outstanding 76.6% refer to changes in the propensity to distribute (Panel C, columns 4 and 5). Model e) estimates that changes in company characteristics account for 37.5% percent of the change in overall percentages of payers, while changes in the propensity of payment account for the remaining 62.5% percent (Panel D, columns 4 and 5).

For the reappearing dividends period, model d) predicts a 109.9% impact for the variation of propensity because the variation from the expected fraction of payers decreases causing a negative impact of 9.9% on the upward slope of the total percentage of payers (Panel G, columns 4 and 5). Lastly, 34.3% of the overall change in the percentage of payers is attributable to changes in characteristics while the remaining 65.7% are associated to the changes in the proclivity of payers.

As anticipated in the previous subsection, for the disappearing dividend period (1983-2001) model d) presents similar results in terms of the decomposition of the total change in the percentage of payers. In contrast, for the 2001-2014 period, the results from the fixed and rolling window approaches are contradictory because the former predicts a high positive impact of the change in firm characteristics over the total change while the latter estimates a decreasing impact for this same factor being considered. Regarding model e), the decomposition is consistent across the two approaches (FW and RW) for the 1983-2001 period. On the other hand, the reappearing phenomenon is mainly explained by the changes in firm characteristics for the fixed window approach whereas using the rolling window procedure the higher impact is attributable to the change in the proclivity to pay dividends. Lastly, there is no evidence of meaningful changes from model d) to e) caused by the incorporation of liquidity and risk measures.

8. Conclusion

The current dissertation explores the main determinants of the payment of dividends as well as the historical evolution of the fraction of dividend payers in the United States.

The objective is to confirm the impact of commonly discussed determinants on dividend payment while adding some others that are less frequently studied but present compelling results when previously tested. Moreover, this dissertation analyzes the evolution of the fraction of dividend-paying firms and examine the potential existence of the disappearing dividend phenomenon as well as the subsequent period characterized by the reappearance of dividends.

Diving into the determinants studied, larger and more profitable firms tend to pay more dividends while the effect of investment opportunities is mixed. Furthermore, firms that accumulate higher retained earnings are more likely to distribute dividends whereas firms with higher amounts of debt are prone to pay less dividends. Conversely, companies with higher cash balances, thus less financially constrained, present higher likelihood of distributing dividends. In addition, risk plays an important role in explaining dividend policy since firms with higher risk exposure, either idiosyncratic or systematic, tend to pay less dividends. Lastly, higher cash-flow uncertainty is expected to decrease the propensity to pay dividends while liquidity shows a weak impact on dividend policy.

Regarding the evolution of the percentage of dividends payers, there are observed the two patterns as discussed on past literature. The disappearing dividend puzzle goes from 1983 to 2001 while the increasing pattern reported on Michaely and Moin (2022) lasts from 2001 until 2014. The change in firm characteristics explain 46% of the decline in the total percentage of payers for the dividend disappearance while the decreasing propensity to pay dividends drives the remaining 54%. In contrast, 80% of the increase in the total fraction of payers is attributable to the effect of the change in firm characteristics whereas the remaining 20% is driven by the rising propensity to pay dividends.

Besides the important findings, the analysis might be subject to some biasness and lack of robustness. Since the current dissertation only analyzes US firms, it would be interesting to test the same determinants on different countries. Additionally, to prove for robustness, this study could test the models for different sub periods and use other proxies for the determinants observed. Moreover, one could divide non-payers into former payers or firms that never distributed dividends as well as account for dividend initiations and omissions while trying to figure out potential explanations. Lastly, considering the low R^2 values observed in the

regression analysis, the logit coefficients do not have an accurate predictive power useful to conduct a precise out of sample estimate. The issue would be solved by using machine learning to estimate the coefficients for a very large sample.

9. References

- Aivazian, Varouj, Laurence Booth, and Sean Cleary. 2003. "Dividend Policy and the Organization of Capital Markets." *Journal of Multinational Financial Management* 13 (2): 101–21. [https://doi.org/10.1016/S1042-444X\(02\)00038-5](https://doi.org/10.1016/S1042-444X(02)00038-5).
- Banerjee, Suman, Vladimir A. Gatchev, and Paul A. Spindt. 2007. "Stock Market Liquidity and Firm Dividend Policy." *Journal of Financial and Quantitative Analysis* 42 (2): 369–97. <https://doi.org/10.1017/S0022109000003318>.
- Bernheim, B. Douglas. 1990. "Tax Policy and the Dividend Puzzle." Working Paper 3434. Working Paper Series. National Bureau of Economic Research. <https://doi.org/10.3386/w3434>.
- Black, Fischer. 1976. "The Dividend Puzzle." *The Journal of Portfolio Management* 2 (2): 5–8. <https://doi.org/10.3905/jpm.1976.408558>.
- Brav, Alon, John R. Graham, Campbell R. Harvey, and Roni Michaely. 2005. "Payout Policy in the 21st Century." *Journal of Financial Economics* 77 (3): 483–527. <https://doi.org/10.1016/j.jfineco.2004.07.004>.
- Bulan, Laarni, Narayanan Subramanian, and Lloyd Tanlu. 2007. "On the Timing of Dividend Initiations." *Financial Management* 36 (4): 31–65.
- Chay, J. B., and Jungwon Suh. 2009. "Payout Policy and Cash-Flow Uncertainty." *Journal of Financial Economics* 93 (1): 88–107. <https://doi.org/10.1016/j.jfineco.2008.12.001>.
- DeAngelo, Harry, and Linda DeAngelo. 2006. "The Irrelevance of the MM Dividend Irrelevance Theorem." *Journal of Financial Economics* 79 (2): 293–315. <https://doi.org/10.1016/j.jfineco.2005.03.003>.
- DeAngelo, Harry, Linda DeAngelo, and Douglas J. Skinner. 2000. "Special Dividends and the Evolution of Dividend Signaling." *Journal of Financial Economics* 57 (3): 309–54. [https://doi.org/10.1016/S0304-405X\(00\)00060-X](https://doi.org/10.1016/S0304-405X(00)00060-X).
- DeAngelo, Harry, Linda DeAngelo, and Douglas J Skinner. 2004. "Are Dividends Disappearing? Dividend Concentration and the Consolidation of Earnings." *Journal of Financial Economics* 72 (3): 425–56. [https://doi.org/10.1016/S0304-405X\(03\)00186-7](https://doi.org/10.1016/S0304-405X(03)00186-7).
- DeAngelo, Harry, Linda DeAngelo, and René M. Stulz. 2006. "Dividend Policy and the Earned/Contributed Capital Mix: A Test of the Life-Cycle Theory." *Journal of Financial Economics* 81 (2): 227–54. <https://doi.org/10.1016/j.jfineco.2005.07.005>.

- Denis, David J., and Igor Osobov. 2008. "Why Do Firms Pay Dividends? International Evidence on the Determinants of Dividend Policy." *Journal of Financial Economics* 89 (1): 62–82. <https://doi.org/10.1016/j.jfineco.2007.06.006>.
- Eije, Henk von, and William L. Megginson. 2008. "Dividends and Share Repurchases in the European Union." *Journal of Financial Economics* 89 (2): 347–74. <https://doi.org/10.1016/j.jfineco.2007.11.002>.
- Fama, Eugene F, and Kenneth R French. 2001. "Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay?" *Journal of Financial Economics* 60 (1): 3–43. [https://doi.org/10.1016/S0304-405X\(01\)00038-1](https://doi.org/10.1016/S0304-405X(01)00038-1).
- Ferris, Stephen P., Narayanan Jayaraman, and Sanjiv Sabherwal. 2009. "Catering Effects in Corporate Dividend Policy: The International Evidence." *Journal of Banking & Finance* 33 (9): 1730–38. <https://doi.org/10.1016/j.jbankfin.2009.04.005>.
- Floyd, Eric, Nan Li, and Douglas J. Skinner. 2015. "Payout Policy through the Financial Crisis: The Growth of Repurchases and the Resilience of Dividends." *Journal of Financial Economics* 118 (2): 299–316. <https://doi.org/10.1016/j.jfineco.2015.08.002>.
- Grullon, Gustavo, and Roni Michaely. 2002. "Dividends, Share Repurchases, and the Substitution Hypothesis." *The Journal of Finance* 57 (4): 1649–84. <https://doi.org/10.1111/1540-6261.00474>.
- Grullon, Gustavo, Roni Michaely, and Bhaskaran Swaminathan. 2002. "Are Dividend Changes a Sign of Firm Maturity?" *The Journal of Business* 75 (3): 387–424. <https://doi.org/10.1086/339889>.
- Guay, Wayne, and Jarrad Harford. 2000. "The Cash-Flow Permanence and Information Content of Dividend Increases versus Repurchases." *Journal of Financial Economics* 57 (3): 385–415. [https://doi.org/10.1016/S0304-405X\(00\)00062-3](https://doi.org/10.1016/S0304-405X(00)00062-3).
- Hellevik, Ottar. 2009. "Linear versus Logistic Regression When the Dependent Variable Is a Dichotomy." *Quality & Quantity* 43 (1): 59–74. <https://doi.org/10.1007/s11135-007-9077-3>.
- Hoberg, Gerard, and Nagpurnanand R. Prabhala. 2009. "Disappearing Dividends, Catering, and Risk." *The Review of Financial Studies* 22 (1): 79–116. <https://doi.org/10.1093/rfs/hhn073>.
- Jensen, Michael C. 1986. "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers." *The American Economic Review* 76 (2): 323–29.

- Kuo, Jing-Ming, Dennis Philip, and Qingjing Zhang. 2013. "What Drives the Disappearing Dividends Phenomenon?" *Journal of Banking & Finance* 37 (9): 3499–3514. <https://doi.org/10.1016/j.jbankfin.2013.05.003>.
- Lintner, John. 1956. "Distribution of Incomes of Corporations Among Dividends, Retained Earnings, and Taxes." *The American Economic Review* 46 (2): 97–113.
- Michaely, Roni, and Amani Moin. 2022. "Disappearing and Reappearing Dividends." *Journal of Financial Economics* 143 (1): 207–26. <https://doi.org/10.1016/j.jfineco.2021.06.029>.
- Miller, Merton H., and Franco Modigliani. 1961. "Dividend Policy, Growth, and the Valuation of Shares." *The Journal of Business* 34 (4): 411–33.
- Pástor, Luboš, and Veronesi Pietro. 2003. "Stock Valuation and Learning about Profitability." *The Journal of Finance* 58 (5): 1749–89. <https://doi.org/10.1111/1540-6261.00587>.
- Skinner, Douglas J. 2008. "The Evolving Relation between Earnings, Dividends, and Stock Repurchases." *Journal of Financial Economics* 87 (3): 582–609. <https://doi.org/10.1016/j.jfineco.2007.05.003>.
- Venkatesh, P. C. 1989. "The Impact of Dividend Initiation on the Information Content of Earnings Announcements and Returns Volatility." *The Journal of Business* 62 (2): 175–97.
- Vermaelen, Theo. 1981. "Common Stock Repurchases and Market Signalling: An Empirical Study." *Journal of Financial Economics* 9 (2): 139–83. [https://doi.org/10.1016/0304-405X\(81\)90011-8](https://doi.org/10.1016/0304-405X(81)90011-8).
- Xu, Yexiao, and Burton G. Malkiel. 2003. "Investigating the Behavior of Idiosyncratic Volatility." *The Journal of Business* 76 (4): 613–45. <https://doi.org/10.1086/377033>.

10. Appendix

Table A1: summary on how to compute each variable.

Variables	Proxies	Estimation
Size	$\log(A)$	Log of total assets
Invest. Opportunities	V/A	Market value of assets over the book value of assets
	dA/A	Change in total assets from t-1 to year t over the total assets for t-
Profitability	E/A	Earnings before interest over total assets
Life-cycle	RE/BE	Ratio of retained earnings to total equity
Leverage	D/E	Debt divided by equity
Cash holdings	CASH	Cash and short term investments over total assets
Liquidity	TOR	Volume of shares traded over the number of shares outstanding
Cash-flow uncertainty	SRVOL	Standard deviation of monthly stock returns over the most 2 most recent years
	EVOL	Ratio of the change in earnings before interest ($E_t - E_{t-1}$) to the average of book total assets from period t and t-1 $[(A_t + A_{t-1})/2]$, raised to the power of 2
Risk	IDIOS	Standard deviation of the residuals from a regression of the stock excess returns on the 3 Fama and French factors (HML, SMB and MKT)
	SYS	Standard deviation of the predicted values used to compute IDIOS

Table A2: Firm characteristics by dividend payment group

Table A2 describe firm characteristics by dividend payment group over 1972-2020, with the following sub periods: 1972-1990, 1991-2000, 2001-2011, 2011-2020. The observations detail the amounts as well as the historical evolution of the following variables: The explanatory variables used are: Size [$\log(A)$]; Investment Opportunities have two proxies, the market-to-book ratio (V/A) and the asset growth (dA/A); Profitability (E/A); Life-cycle (RE/BE); Leverage (D/E); Cash Holdings (CASH); Liquidity (TOR); Cash-flow Uncertainty have 2 proxies, SRVOL and EVOL; Risk have 2 proxies, IDIOS and SYS. For brevity and due to the high number of determinants, they further explained in Table A1 in the Appendix. The values shown are aggregate values for the firms in each payout group, averaged over the years in a period.

	1972-1980	1981-1990	1991-2000	2001-2010	2011-2020	1972-2020
log(A)						
All firms	1.892	1.833	2.133	2.607	2.918	2.264
Payers	2.146	2.444	2.867	3.270	3.500	2.778
Non-Payers	1.548	1.385	1.827	2.308	2.567	1.947
V/A						
All firms	1.160	1.539	1.992	1.913	2.061	1.767
Payers	1.152	1.381	1.716	1.773	1.876	1.546
Non-Payers	1.170	1.656	2.107	1.976	2.172	1.903
E/A						
All firms	0.079	0.022	-0.021	-0.032	-0.042	-0.003
Payers	0.091	0.082	0.071	0.069	0.064	0.077
Non-Payers	0.062	-0.022	-0.059	-0.077	-0.107	-0.051
dA/A						
All firms	0.142	0.141	0.208	0.123	0.137	0.154
Payers	0.146	0.123	0.113	0.097	0.080	0.114
Non-Payers	0.136	0.154	0.248	0.135	0.172	0.179
RE/BE						
All firms	0.463	-0.207	-0.828	-1.417	-1.936	-0.813
Payers	0.690	0.687	0.622	0.539	0.466	0.613
Non-Payers	0.154	-0.863	-1.431	-2.303	-3.381	-1.689
D/E						
All firms	1.461	1.799	1.833	1.722	2.028	1.781
Payers	1.139	1.367	1.653	1.781	2.074	1.561
Non-Payers	1.898	2.116	1.908	1.695	2.001	1.916
CASH						
All firms	0.083	0.127	0.154	0.207	0.224	0.161
Payers	0.085	0.103	0.092	0.120	0.130	0.104
Non-Payers	0.081	0.145	0.180	0.247	0.281	0.195
TOR						
All firms	0.337	0.569	1.140	1.779	2.171	1.205
Payers	0.303	0.513	0.651	1.555	1.805	0.886
Non-Payers	0.384	0.610	1.343	1.880	2.391	1.401

SRVOL						
All firms	0.131	0.138	0.158	0.163	0.130	0.146
Payers	0.110	0.101	0.096	0.105	0.089	0.101
Non-Payers	0.164	0.173	0.188	0.187	0.156	0.177
EVOL						
All firms	0.005	0.024	0.036	0.165	0.048	0.058
Payers	0.002	0.004	0.005	0.008	0.006	0.005
Non-Payers	0.010	0.043	0.050	0.232	0.073	0.095
IDIOS						
All firms	0.083	0.098	0.118	0.115	0.094	0.104
Payers	0.069	0.068	0.071	0.071	0.060	0.068
Non-Payers	0.106	0.128	0.141	0.133	0.116	0.128
SYS						
All firms	0.114	0.103	0.114	0.110	0.096	0.108
Payers	0.080	0.067	0.059	0.067	0.062	0.068
Non-Payers	0.093	0.086	0.097	0.097	0.083	0.092

Table A3: Average marginal effects for logit estimated in Table 1

Table A3: presents the average marginal effects for the logit regressions estimated in Table 1, for the 1972-2020 period. The marginal effects estimate the impact of a unit change in one explanatory variable in the dependent variable, keeping all the rest constant. The dependent variable is equal to one if the company distributes dividends in year t and zero otherwise. Columns (1), (2), (3) and (4) correspond to models I, II, IIIa and IIIb, respectively. The explanatory variables used are Size [$\log(A)$]; Investment Opportunities have two proxies, the market-to-book ratio (V/A) and the asset growth (dA/A); Profitability (E/A); Life-cycle (RE/BE); Leverage (D/E); Cash Holdings ($CASH$); Liquidity (TOR); Cash-flow Uncertainty have 2 proxies, $SRVOL$ and $EVOL$; Risk have 2 proxies, $IDIOS$ and SYS . For brevity and due to high number of determinants, they further explained in Table A1 in the Appendix. The table exhibit the coefficients for the four models being analyzed. In parenthesis there are represented the t-statistics. The asterisks correspond to the significance levels for the coefficients presented in the table (* $\alpha < 0.1$, ** $\alpha < 0.05$, *** $\alpha < 0.01$)

	(1)	(2)	(3)	(4)
Variables				
log (A)	0.0608*** -15.68	0.116*** -16.93	0.147*** -18.59	0.108*** -16.08
V/A	0.00351*** -9.07	0.00817*** -8.54	0.00988*** -7.91	0.00700*** -7.92
E/A	0.0634*** -11.24	0.112*** -9.63	0.142*** -9.52	0.0975*** -9.07
dA/A	-0.0102*** (-9.11)	-0.0211*** (-7.79)	-0.0283*** (-8.09)	-0.0197*** (-7.81)
RE/BE	0.00484*** -8.58	0.0127*** -8.6	0.0150*** -8.33	0.0120*** -8.66
D/E	-0.00292*** (-10.68)	-0.00363*** (-7.35)	-0.00409*** (-6.59)	-0.00306*** (-6.79)
TOR		0.000204 -0.25	0.00209* -1.91	-0.000115 (-0.16)
IDIOS		-0.379*** (-10.18)	-0.00949 (-0.27)	-0.340*** (-9.80)
SYS		-0.319*** (-9.83)	0.0636* -1.77	-0.290*** (-9.56)
Cash			0.0635*** -6.61	0.0467*** -6.86
SRVOL			-0.896*** (-11.31)	
EVOL				-0.0118*** (-4.24)
<i>N</i>	58714	43297	43297	43297

Table A4: Decomposition of the changes in the total percentage of payers

Table A4 presents the decomposition of the change in the total percentage of payers into the change in firm characteristics and the change in the proclivity to pay dividends. The expected change is the one driven by changes in firm characteristics while the remaining difference to the actual is explained by changes in the proclivity to distribute dividends. Panels A, B, C and D, use year 1983 to explore the impact of the two factors on the disappearing dividend phenomenon while panels E, F, G and H examine those impacts on the reappearing dividend period using year 2001 to compute the changes. Panels A, B, E and F employ the fixed window approach whereas panels C, D, G and H apply the rolling approach.

	(1)	(2)	(3)	(4)	(5)
Panel A: Changes since 1983 for model I FW					
Year	Total change since 1983	Expected change (characteristics)	Unexpected change (from propensity)	Percentage attributable to changing characteristics	Percentage attributable to changing propensity
1988	-14.22	-5.89	-8.32	41.45	58.55
1992	-13.81	-4.73	-9.08	34.25	65.75
2001	-23.06	-3.90	-19.17	16.89	83.11
Panel B: Changes since 1983 for model II FW					
1988	-11.91	-0.40	-11.52	3.33	96.67
1992	-13.15	-3.44	-9.71	26.14	73.86
2001	-27.22	-12.56	-14.66	46.14	53.86
Panel C: Changes since 1983 for model I RW					
1988	-14.22	-1.12	-13.10	7.87	92.13
1992	-13.81	3.53	-17.34	-25.56	125.56
2001	-23.06	-5.40	-17.67	23.40	76.60
Panel D: Changes since 1983 for model II RW					
1988	-11.91	5.09	-17.00	-42.70	142.70
1992	-13.15	8.29	-21.43	-63.02	163.02
2001	-27.22	-10.21	-17.01	37.50	62.50
Panel E: Changes since 2001 for model I FW					
Year	Total change since 2001	Expected change (characteristics)	Unexpected change (from propensity)	Percentage attributable to changing characteristics	Percentage attributable to changing propensity
2012	14.55	12.01	2.53	82.58	17.42
2014	13.88	10.31	3.57	74.29	25.71
2018	11.60	7.82	3.79	67.36	32.64
Panel F: Changes since 2001 for model II FW					
2012	13.75	11.27	2.47	82.01	17.99
2014	14.27	11.43	2.84	80.09	19.91
2018	12.41	8.29	4.12	66.81	33.19
Panel G: Changes since 2001 for model I RW					
2012	14.55	-3.37	17.92	-23.15	123.15
2014	13.88	-1.38	15.26	-9.91	109.91
2018	11.60	-2.57	14.17	-22.17	122.17
Panel H: Changes since 2001 for model II RW					
2012	13.75	6.53	7.22	47.48	52.52
2014	14.27	4.89	9.38	34.26	65.74
2018	12.41	2.83	9.58	22.80	77.20