



# Country culture matters: dividend policy when information is asymmetric

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## Abstract

The paper addresses the impact of information asymmetry on dividend policy. The international literature expects/finds opposite signs of the relationship: a positive sign according to the signaling, agency and “bird in hand” theories; a negative one, according to the pecking order hypothesis. This paper focuses on which mediator role the country culture plays in this context, by adopting the national culture dimensions from Schwartz and Hofstede approaches. Dividend policy, when information is asymmetric, configures a sort of contrast between unequally informed managers and investors: less dividends to guarantee the firm growth/survivorship (the supply-side perspective) or more dividends to match the shareholder personal expectations to have money in hand, to avoid risks, to prevent managerial opportunistic behaviors (the demand-side perspective)? In this context, the subjective perceptions (that hinge on national culture) of asymmetric information (and agency) problems within a firm by managers/investors become relevant and define the ways this contrast is solved (i.e., which perspective prevails). The sample is a balanced panel of 3509 firm-year observations: the nonfinancial companies listed at the STOXX Europe 600 index are considered over the decade 2010–2019. A new approach in considering the national culture impact is adopted. The culture framework cannot be analyzed by considering the cultural dimensions one by one, since they are correlated among them and their impact on dividend policy and on its relationship with asymmetric information cannot depend on each individually considered, but on various mixes of them that configure different country culture profiles. Therefore, a factor analysis is conducted that identifies three latent cultural factors that mix culture dimensions in relevant patterns. The extracted factors are then used to cluster countries in four different cultural profiles, used to mediate the impact of determinants on dividend payout. The empirical findings show that the culture matters. The payout policy of the country culture clusters: (i) differs; (ii) differently reacts to asymmetric information; (iii) is differently stable over time; (iv) differently reacts to the other firm characteristics, that traditionally affect the dividend policy.

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## 1 Introduction

The dividend policy of non-financial firms is still a “puzzle decision” in the modern finance. Many theories differently explain its determinants and the international empirical findings not univocally support the theoretical expectations of significance/sign of their impacts. Particularly challenging is, furthermore, the identification of the impact of asymmetric information on dividend policy, since the managerial decision-making on dividend policy crucially needs to balance the likely contrasting interests/perspectives of unequally informed stakeholders: less dividends to guarantee the firm growth/survivorship (the supply-side perspective) or more dividends to match the shareholder personal expectations to have money in hand, to avoid risks, to prevent managerial opportunistic behaviors (the demand-side perspective)? In this context, the subjective perceptions of asymmetric information (and agency) problems within a firm by managers/investors become relevant, and they hinge on national culture. International research has asked whether differences in national culture could help to explain cross-country differences in various management practices. More rarely, however, the impact of country culture dimensions on dividend decisions is analyzed and much more rarely the effect on the relationship between asymmetric information and dividend policy.

Therefore, the objective of this study is to verify whether and how the country culture dimensions impact the corporate dividend policy, mainly indirectly, i.e., mediating the effects of the information asymmetry (as well as of other determinants) that probably exacerbates the conflict between supply-side and demand side perspectives.

This paper contribution to the international literature is threefold:

- Firstly, to shed light on how the asymmetric information affects the dividend policy, by considering two alternative theories, i.e., signaling and POH hypotheses, that expect an opposite sign of the impact. To the best of my knowledge, the direct impact of asymmetric information on dividend policy has been rarely analyzed in literature.
- Secondly, to consider not only the direct effect of the cultural dimensions but to focus on the indirect one, i.e. the mediating effect on asymmetric information (and other firm characteristics that are usually considered determinants of dividend policy).
- Finally, to adopt a new approach in considering the national culture impact. The culture framework cannot be analyzed by considering the cultural dimensions one by one. In fact: (i) the cultural dimensions are likely correlated among them, both within the same set and across the two groups identified by Schwartz (2006) and Hofstede (2011) frameworks; in fact, many previous studies consider as re-

gressors only a few cultural variables (from the above frameworks), that are often included individually in the tested models, by strongly oversimplifying the nuances of the cultural impact; (ii) their impact on dividend policy and on its relationship with asymmetric information likely result from a mix of different cultural dimensions, which change as a pattern the subjective perceptions of managers/shareholders. Therefore, a factor analysis is here adopted, to consider the bilateral correlations among the various dimensions and identifies the latent cultural factors that mix various culture dimensions in relevant patterns. The extracted factors are then used to cluster countries on the basis of their cultural profiles, which are specific combinations of the cultural patterns.

The analysis has been conducted on a total of 3509 firm-year observations from 12 EU countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden, and United Kingdom. The sample is a balanced panel of 319 nonfinancial companies, listed at the STOXX Europe 600 index, over the decade 2009–2019 (i.e., a normal scenario without potential bias deriving from the COVID-19 pandemic). The homogeneity of the European countries in the sample from the point of view of macroeconomic and financial scenarios can favor the respect of the “*ceteris paribus*” condition of these aspects in the comparison, therefore reducing the risk of omitted explanatory variables and giving robustness to the explanatory ones included in the analysis. In addition, the similarity among the sample countries from the cultural point of view results to be not strong, as shown below in Table 3 (if compared with data provided by Schwartz/Hofstede from the original full sample of worldwide countries) and in Table 6, where the strong statistical significance of the differences of the country clusters obtained is proved.

The empirical findings show that country culture matters: it influences both directly the dividend yield and indirectly the impact of the asymmetric information (and of the other frequently considered determinants of dividend policy) on it. The resulting four culture profiles of countries, extracted through a cluster analysis conducted on the three culture factors (which are expressed as linear combinations of the individual culture variables by Schwarz/Hofstede approaches) affect how the belonging companies solve the assumed contrast in dividend policy between the “supply-side perspective” (i.e., the firm interests to reinvest profits in order to strengthen the financial autonomy/solidity as well as to have resources to guarantee their financial flexibility against future constraints or to favor prompt investments for growth, without incurring in transaction costs) and the “demand-side perspective” (i.e., the shareholder personal expectations to have money in hand, to avoid risks, to prevent managerial opportunistic behaviors and so on), both in standard conditions and in exacerbated scenarios, when information is asymmetric. In addition, the mediating role of the culture profile on the impact of the other dividend determinants, like cash flow, growth and previous dividend yield, results to be supported by our findings in line with the assumptions.

Moreover, the fiscal determinants (which are important in a multi-country sample) are statistically significant and affect the dividend policy consistently with the hypotheses: firms pay more dividends when the total tax rate (that considers taxation

at the personal level and at the corporate level) on dividends is lower and when the fiscal system corrects the double taxation of dividends.

The paper is structured as follows: in Sect. 2 a review of the international literature is provided, regarding the impact on dividend policy both of asymmetric information and country culture variables, and the tested hypotheses are formulated; Sects. 3 and 4 describe the sample and the dependent/independent variables utilized in the empirical test, respectively, also including the latent cultural variables resulted from the factor analysis. Therefore, tested model and methodological issues are presented in Sect. 5; Sect. 6 presents and discusses the empirical results, and Sect. 7 concludes by indicating some lines of further research.

## 2 Literature review and tested hypotheses

### 2.1 Dividend policy and information asymmetry

Many theoretical and empirical studies address the association between dividend policy and information asymmetry. The main theoretical approaches that directly explore this association assume opposite signs of the relationship between dividends and asymmetric information.

Firstly, the signaling theory (Lintner, 1956; Bhattacharya, 1979; Miller & Rock, 1985; John & Williams, 1985) highlights that dividends might solve various information gaps: future earnings, free cash flow, maturity, access to additional funds, and valuation, among others. A positive sign of the relationship between asymmetric information and distributed dividends is therefore expected.

Secondly, in a more general framework of pecking order hypothesis (POH from now on) applied to financial structure decisions (Myers & Majluf, 1984; Donaldson, 1961, 1984), a negative sign of the relationship is expected, since more asymmetric are the expectations, lower should be the dividends since they reduce the earnings to be reinvested, that are the preferred financial sources. In the presence of asymmetric information, the firm may underinvest in certain states of nature. The underinvestment arises when the firm has inadequate funds for investment purposes and does not want to bear the lemons-premium associated with new capital issues. This analysis implies that, other things equal, the need for slack increases with the level of asymmetric information between the firm and its outside investors. This reasoning suggests that the higher the level of asymmetric information, the lower the dividends. Because of asymmetric information, the POH predicts a hierarchical order in firm financial policies: internal funds are the most preferred sources of financing, followed by lower risk debt financing only if internal funds become insufficient, with equity financing being the last choice. Although POH was originally introduced to explain the capital structure puzzle, it can be easily applied to the dividend puzzle, because dividends could have been internal free cash flows if they had not been issued. The POH implications on dividend policy contrast with that provided by the signaling models and have been largely ignored in the empirical literature on dividend policy.

However, many other theories explain the dividend puzzle and indirectly the association between dividend policy and information asymmetry, founded mainly in agency theory and “bird in hand” approach.

In detail, the agency theory (Grossman & Hart, 1980; Easterbrook, 1984; Jensen, 1986) supports the positive relationship since managers and shareholders are typically far from perfectly aligned: insiders’ self-serving behavior and in turn outsiders’ efforts to constrain management’s ability to abuse money cause agency costs. Easterbrook (1984) argues that dividends serve as an inexpensive tool to alleviate agency problems such as expropriation by insiders (managers or dominating owners), since dividends reduce free cash-flows and therefore may force firms to raise capital in financial markets and, as a result, subject firms to the monitoring by outside investor. Therefore, when asymmetric information is more important, this impact is more valuable.

As far as the “bird in hand” approach is concerned (Gordon, 1959, 1962), the stock of high dividend firms seems to be particularly attractive to risk-averse investors who are concerned with security and worried about risks related to business cycles, managerial ability, unexpected expenses, etc. Therefore, more the information asymmetry, higher the dividends issued. Then in both cases, a positive sign of the relationship.

The empirical literature also confirms that dividend payers create less information asymmetry than non-dividend payers. Consistent evidence with signaling theory is found in two surveys conducted among CFOs in the US (Brav et al., 2005) and across 16 European countries (Bancel et al., 2005). The finding that managers are reluctant to change their dividend policies suggests that dividends are a costly signal that can convey information not previously known to the market, and hence can change market perceptions concerning future earnings prospects. Such signals are credible if other firms, whose future prospects are not as good, cannot deceptively mimic the dividend actions of firms with good future prospect.

Howe and Lin (1992) find a positive association between the dividend yield and bid–ask spread, so they infer that a dividend payment conveys information to the market and reduces information asymmetry. Li and Zhao (2008) find that firms with lower earnings forecast errors are more likely to be dividend payers.

Empirical event studies also confirm that stock price reactions to dividend payments tend to be significant and that dividends have some information content, because stock prices react to dividend changes (Aharony & Swary, 1980; Dielman & Oppenheimer, 1984; Healy & Palepu, 1988). Michaely et al. (1995) show that dividend initiations increase the stock price; omissions are followed by stock price declines.

The empirical studies that directly verify the relationship between dividend policy (in some cases by including buybacks) and information asymmetries (Deshmukh, 2005; Li & Zhao, 2008; Lin et al., 2018) find a negative relationship, supporting the POH and contrasting the signaling theory.

## 2.2 National culture and dividend policy

In a multi-country framework, the culture differences could be relevant.

International research has asked whether differences in national culture can help to explain cross-country differences in various management practices. For instance, studies have examined the relation between culture and firms' risk behaviors (Diez-Esteban et al., 2019; Li et al., 2013; Shao et al., 2013), foreign market entry modes (Kogut & Singh, 1988), corporate governance and organizational design (Harrison et al., 1994; Adams et al., 2011), compensation practices (Schuler & Rogovsky, 1998), capital structure choice (Chui et al., 2002; Li et al., 2011), cross-border M&As (Chakrabarti et al., 2009; Ahern et al., 2015), relationship between corporate social performance and firm performance (Shi & Veenstra, 2021).

The culture framework has been variously analyzed and broken down.

Schwartz (2006) considered seven cultural dimensions, analyzed in terms of three couples of polarizations.

The first problem is to define the nature of the relations and boundaries between the person and the group: to what extent are people autonomous vs. embedded in their groups? In autonomy cultures (autonomy is distinguished in intellectual and affective), people are viewed as autonomous, bounded entities. In cultures with an emphasis on embeddedness, people are viewed as entities embedded in the collectivity. Meaning in life comes largely through social relationships, through identifying with the group, participating in its shared way of life, and striving toward its shared goals. Embedded cultures emphasize maintaining the status quo and restraining actions that might disrupt in-group solidarity or the traditional order. Important values in such cultures are social order, respect for tradition, security, obedience, and wisdom.

The second societal problem is to guarantee that people behave in a responsible manner that preserves the social fabric. Here the polarization is between egalitarianism and hierarchy. Egalitarian cultures seek to induce people to recognize one another as moral equals who share basic interests as human beings. They try to socialize their members to internalize a commitment to cooperate and to feel concern for everyone's welfare. Hierarchy cultures rely on hierarchical systems of ascribed roles to insure responsible, productive behavior. They define the unequal distribution of power, roles, and resources as legitimate and even desirable. People are socialized to take the hierarchical distribution of roles for granted, to comply with the obligations and rules attached to their roles, to show deference to superiors and expect deference from subordinates. Values like social power, authority, humility, and wealth, are highly important in hierarchical cultures.

The third societal aspect is to regulate how people manage their relations to the natural and social world. Here the polarization is between harmony vs. mastery. The cultural response to this problem labeled harmony emphasizes fitting into the world as it is, trying to understand and appreciate rather than to change, direct, or to exploit. Important values in harmony cultures include world at peace, unity with nature, and protecting the environment. Mastery is the polar cultural response to this problem. It encourages active self-assertion in order to master, direct, and change the natural and social environment to attain group or personal goals. Values such as ambition, success, daring, and competence, are especially important in mastery cultures.

As far as the dividend policy is concerned, we focus on four cultural dimensions (harmony, embeddedness, hierarchy, and mastery), differentiating countries in terms of high or low values of them (see § 4.3).

Hofstede (2011, 2018), moving from previous studies based on individual level of cultural data analyses, identifies six dimensions, among which the following four seem to be relevant as far as the dividend policy is concerned (see § 4.3): (i) *power distance*, related to the different solutions to the basic problem of human inequality. It has defined as the extent to which the less powerful members of organizations and institutions (like the family) accept and expect that power is distributed unequally; (ii) *uncertainty avoidance*, related to the level of stress in a society in the face of an unknown future. It is not the same as risk avoidance, but it indicates to what extent a culture programs its members to feel either uncomfortable or comfortable in unstructured situations. Uncertainty avoiding cultures try to minimize the possibility of such situations by strict behavioral codes, laws and rules, disapproval of deviant opinions, and a belief in absolute truth; (iii) *individualism versus collectivism*, related to the integration of individuals into primary groups. On the individualist side we find cultures in which the ties between individuals are loose: everyone is expected to look after him/herself and his/her immediate family. On the collectivist side, we find cultures in which people from birth onwards are integrated into strong, cohesive in-groups, that continue protecting them in exchange for unquestioning loyalty, and oppose other in-groups; (iv) *long term versus short term orientation*, related to the choice of focus for people's efforts: the future or the present and past. Values found at long-term orientation pole are perseverance, thrift, ordering relationships by status, and having a sense of shame; values at the opposite short term pole are reciprocating social obligations, respect for tradition, protecting one's 'face', and personal steadiness and stability.

Each country has been positioned relative to other countries through a score on each dimension. The dimensions are statistically distinct and do occur in all possible combinations, although some combinations are more frequent than others.

The impact of culture values on dividend policy has been less explored than on other firm decisions.

Shao et al. (2010) empirically verified the assumption that dividend policy may be determined not only by an objective assessment of the severity of agency and asymmetric information problems within a firm, but also by management and investor subjective perceptions of these problems, which hinge on their national culture. Using Schwartz's national culture dimensions "conservatism" and "mastery", they find that conservatism is positively related, and mastery negatively related, to dividend payouts for a sample of 27,462 firm-years from 21 countries between 1995 and 2007. They amply discussed the effects of conservatism and mastery on the determinants of dividend policy assumed by the various theories (above discussed) and finally demonstrated that the national culture may explain corporate dividend policies by affecting people's perceptions of dividend-related issues (e.g., agency conflicts and asymmetry problems).

Bae et al. (2012) also analyzed the impact of cultural variables on dividend policy (here measured as ratio between dividends and total assets) in an ample sample of industrial firms from 33 countries and a 1993–2024 period. Since the ample sample in terms of considered countries, they also include among the regressors the anti-director index from Djankov et al. (2008), which measures the degree of minority shareholder protection; in addition, they only analyzed the direct impact of culture

variables on dividends and limited their analysis to only three variables of the Hofstede framework (masculinity, uncertainty avoidance and long-term orientation). They found a significant impact of culture variables on dividend policy, mainly individually included in regression, since very correlated each other. Only two cultural variables by the Hofstede framework (uncertainty avoidance and individualism) are used in Chang et al. (2020) study, on a sample of about 150,000 observations from 35 countries for the period from 1987 to 2017. They focus on how the high/low levels of the two cultural variables considered (by interactions between cultural dummies and firm characteristics) modify the sensibility of the dividend policy to some firm characteristics.

In the same vein, but more focused on agency problems, Byrne and O'Connor (2017) analyze the impact of cultural dimensions on dividend policy, both directly and indirectly, as a mediator effect of creditor rights. Following Hofstede, they reduce the country culture differences in two dimensions, i.e., individualism and collectivism, and test the dividend-creditor rights relationship with dividend policy in individualist and collectivist traditions. Under strong creditor rights they expect large (small) dividend payouts to remain in individualist (collectivist) traditions. Under weak creditor rights, they hypothesize that where the relationship between corporate insiders and outsiders is harmonious in collectivist cultures, creditors may not demand lower dividends. In this instance, creditors perceive that the agency costs of debt are much lower than those suggested under the legal code, and place few if any restrictions on corporate dividend payouts. In contrast, where both culture and the law suggest high agency costs of debt, creditors are much more likely to restrict dividend payouts.

### 2.3 Research questions and tested hypotheses

A univocal sign of the impact of asymmetric information on dividend policy cannot be assumed, since the two most important theories expect opposite signs. Therefore, we could hypothesize a positive or negative sign, depending on the prevalence of signaling hypothesis (and bird in hand and agency ones) or POH.

However, we consider the mediating role of cultural dimensions. The direct impact on dividend policy of culture framework as well as its mediator role on the relationship with asymmetric information cannot be analyzed by considering the cultural dimensions one by one. In fact: (i) the cultural dimensions are likely correlated among them, both within the same set and across the two groups identified by Schwartz and Hofstede frameworks; in fact, in studies where the cultural variables are individually considered (as, for example, Bae et al., 2012, and Chang et al., 2020), the analysis of their impact is necessarily limited to one variable at a time, since they cannot be included in the same regression, being mutually correlated; (ii) their impact on dividend policy or on its relationship with asymmetric information likely result from a mix of different cultural dimensions, which changes as a pattern the subjective perceptions of managers/shareholders. With respect to studies where the cultural variables (mostly just a few) are individually analyzed (Bae et al., 2012; Chang et al., 2020), considering the mix of cultural variables ensures that the impact

of the full cultural profile of a country can be analyzed and consequently be univocally referred to each cultural pattern.

Therefore, we opt (see § 4.3 below for details) for a factor analysis that considers the bilateral correlations among the various dimensions and identifies the latent cultural factors that mix various culture dimensions in relevant patterns. The extracted factors are then used to cluster countries on the basis of their cultural profile, which are a specific mix of the cultural patterns.

A country culture defines the nature of agency relations and conflicts in the firm and reveals managers' and investors' subjective perceptions on the degree of agency costs and information asymmetry. Similarly, a firm's need of financial flexibility is documented as an important aspect for setting the firm's dividend policy, and people's subjective perceptions on the benefit of financial flexibility hinge on the nation's culture. In this regard, a country culture can determine the suitability of firms' dividend strategies.

We can observe that in dividend policy decisions there is a sort of contrast between managers and investors subjective interests and preferences, as far as information asymmetry, agency problems and financial flexibility are concerned. From a supply-side perspective, we find the managers' interests to reinvest profits in order to strengthen the financial autonomy and solidity as well as to have resources to guarantee their financial flexibility against future constraints or to favor prompt investments for growth, without incurring in transaction costs; from the demand-side perspective, we have the shareholders' personal expectations to have money in hand, to avoid risks, to prevent managerial opportunistic behaviors.

Culture dimensions like "mastery" and "individualism" orient towards a prevalence of supply-side perspective: success and effectiveness are prevailing values, that find satisfaction in firm's growth and competition. On the contrary, low values of "mastery" and "individualism" as well as high values of "harmony" make the demand-side perspective prevails. Therefore, we expect that:

**Hypothesis 1:** *Firms in countries where mastery and individualism are higher and harmony lower pay less dividends, maintain a more stable dividends over time, further reduce dividends when information is asymmetric and give less importance to the agency problems.*

"Power distance" and "uncertainty avoidance" define a societal order where behavioral codes, laws and rules define the balance of power between the two parties: there could be expected a sort of "carrot and stick" approach. In details, we expect that:

**Hypothesis 2:** *Firms in countries with high values of power distance and uncertainty avoidance in normal conditions adopt a more generous dividend policy (the carrot), while they reduce dividends (the stick) when information is asymmetric, by imposing the priority order of contrasting expectations (supply-side prevails).*

As far as the mediator role of culture patterns on the effects of other determinants on dividend policy is concerned, we could expect that:

**Hypothesis 3:** *In countries where power distance and uncertainty avoidance are high, the relationships with free cashflows and growth are significant, respectively: the carrot can be used without great problems for the firm in scenarios of high liquidity and no-growth; however, the stick is needed in the opposite scenarios.*

“Embeddedness” and “hierarchy” are two different ways to mediate between the opposite perspectives: embedded individuals accept the supply-side expectations prevail; in hierarchical societies, they are obliged to accept. Therefore, we expect that:

**Hypothesis 4:** *In countries with high values of embeddedness or hierarchy, in normal conditions firms adopt a more generous dividend policy (the carrot), while they reduce dividends (the stick) when information is asymmetric, by imposing the priority order of contrasting expectations (supply-side prevails).*

“Long-term orientation” favors the demand-side perspective, since from the point of view of the firm management it means satisfying shareholders’ expectations. In addition, combined with high harmony and low embeddedness, in presence of asymmetric information, it gives priority to shareholders’ expectations to have money in hand and avoid risks. Therefore, we expect that:

**Hypothesis 5:** *In countries with high values of long-term orientation and harmony and low embeddedness, firms distribute more dividends in presence of asymmetric information and maintaining them over time.*

Both signaling theory and POH assume a smoothed dividend policy, by avoiding sudden changes, mostly when decreasing. Therefore, we expect:

**Hypothesis 6:** *A positive and statistically significant relationship with previous year dividends; however, we could expect a stronger link in countries more focused on supply-side perspective (high values of mastery and individualism) and a weaker link in countries where the above defined “carrot and stick” approach requests more flexibility, to adapt to the changing conditions.*

## 2.4 Multi-country framework

When a multi-country approach is used, other factors impact on dividend policy. Firstly, the fiscal system differences among countries. Fama and French (2001) analyzed the impact of the difference of tax rate between dividends and capital gains (i.e., alternative ways for distributing cash to shareholders). The “clientele effect” should be the consequence of this fiscal disparity. However, Kalay (1982) formulated the “dividend capture” strategy that involves buying a stock before the ex-dividend date to earn the dividend, then sell it on or after the ex-dividend date. If transactional costs are low, traders can capture net profits if the price of the stock drops less than the dividend amount or rises above the purchase price. Their strategy obviously depends on their fiscal profile. Grullon and Michaely (2002) and Farre-Mensa et al. (2014) support the substitution effect between dividend and capital gains; however,

they found that, while the fiscal advantage of capital gains on dividends in the most countries, dividends are already an important way to pay cash to shareholders.

The fiscal system differs also in terms of kind of taxation. Alzahrani and Lasfer (2012) distinguish between *classical system* (where shareholders pay taxes on dividends after the company has paid taxes on profits), *partial imputation system* (investors receive a tax credit that partially reimburses taxes paid by the company) and *full imputation system* (investors receive a tax credit that totally reimburses taxes paid by the company). Obviously, the first system penalizes dividends more than the last two.

Therefore, we can formulate the following:

**Hypothesis 7** *The fiscal determinant affects the dividend policy: in countries that have higher level of dividend taxation or/and do not correct in some way the double taxation of dividends, companies pay less dividends to shareholders.*

In addition to being a significant explanatory variable of the dividend policy, the fiscal system characterizes each country as an “almost fixed” effect: therefore, it should be included in the explanatory model in order to separate its impact on dividend policy from that of country cultural profile; moreover, an interaction between these two country characteristics cannot be excluded (for example, it is reasonable that when the demand-side cultural perspective prevails, a more favorable taxation might be expected), but it goes beyond the purpose of this study.

Differently from previous studies that consider a larger and non-homogeneous sample of countries, we omit to consider the corporate governance characteristics (i.e., the degree of investor protection) as regressors: the EU countries here considered do not more significantly differ in terms of anti-director rights index (Spamann, 2010).

### 3 The sample

The sample is a balanced panel including 319 nonfinancial companies, listed at the STOXX Europe 600 index, over the decade 2009–2019 (i.e., a normal scenario without potential bias deriving from the COVID-19 pandemic), i.e., a total of 3509 firm-year observations. From the original sample, firms from Poland and Portugal are eliminated, since only two companies of each country are present in the index. Other firms (134) are also excluded since financial data are not available in Datastream. Further 41 companies from Norway and Switzerland are eliminated since these countries are not members of the European Union. The objective is to create a dataset as homogeneous as possible from the financial and economic perspectives, lessening the risk of omitted macro-economic determinants that could impact the dividend policy.

The resulting companies come from 12 countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden, and United Kingdom. Tables 1 and 2 show the composition per country and per size class (based on market capitalization) of the sample firm-year observations.

Countries are clustered in groups through the culture dimensions: an integrated framework is used, by elaborating a factor analysis to consider the correlations

**Table 1** The sample per country.

Source: author's elaborations from Refinitiv/LSEG Datastream

Country	Observations (number)	%
Austria	55	1.6%
Belgium	99	2.8%
Denmark	165	4.7%
Finland	121	3.4%
France	627	17.9%
Germany	484	13.8%
Ireland	66	1.9%
Italy	165	4.7%
Netherland	209	6.0%
Spain	143	4.1%
Sweden	396	11.3%
United Kingdom	979	27.9%
Total	3509	100.0%

**Table 2** The sample per size (market capitalization).

Source: author's elaborations from Refinitiv/LSEG Datastream

Size class	Observations number (%)
Small cap ( $\leq 1$ million)	6.5%
Medium cap ( $>1$ million & $\leq 5$ million)	28.8%
Large cap ( $>5$ million)	64.7%

among the culture dimensions by Schwartz and Hofstede approaches and clustering on the basis of the extracted factors (see § 4.3).

Data come from Datastream; some of them are provided by World Bank and IBES (Institutional Brokers Estimate System); sources of macroeconomic and fiscal data are OECD and Bank of Italy (Branzoli et al., 2018).

## 4 The relevant variables

### 4.1 Measures of dividend policy

Various measures are used in literature for the dependent variable, often in the same study: the dividend yield (Deshmukh, 2005; Lin et al., 2018), the dividend payout (Lin et al., 2018), the ratio between dividends and book value (Li & Zhao, 2008), the ratio between dividends and total assets (Bae et al., 2012; Chang et al., 2020), the dummy variable of being or not a dividend payer (Li & Zhao, 2008; Lin et al., 2018). Since, unlike the latter studies cited, our sample is highly unbalanced in favor of dividend-paying companies (more than 90% of the observations), the dummy variable cannot be used. The dividend yield is chosen as dependent variable since the level of dividends should be assessed with reference to the cashflows rights of shareholders (total assets don't reflect them). The calculation of the dividend per share includes only ordinary dividends, with a high informative content, while extraordinary dividends are omitted, since they are outside the medium-long term payout policy and are often influenced by contingent factors.

## 4.2 How to measure asymmetric information?

Two measures are mainly used in literature.

Firstly (Li & Zhao, 2008; Lin et al., 2018; Elton et al., 1984), the estimation errors that analysts make when forecasting EPS (earnings per share) for the subsequent year. Intuitively, the greater the deviation between forecasts and actual earnings per share, the greater the degree of information asymmetry. Analytically, the formula used is as follows:  $AERR = \text{abs}(\text{EPS1FD12} - \text{EPS})/\text{EPS}$  where EPS1FD12 represents analysts' estimate of EPS for the next 12 months, while EPS is the earnings per share that are actually realized. The difference is therefore normalized by EPS and considered in absolute value. Many studies (for example, Ajinkya et al., 1991; Lang & Lundholm, 1993, 1996; Bowen et al., 2002), consider this measure appropriate since these estimation errors decrease when companies improve their information disclosure. Deshmukh (2005) uses the logarithm of the number of analysts and the size of the firm as a proxy for asymmetry, following Bhushan (1989), Brennan and Hughes (1991), Lang and Lundholm (1996), Womack (1996), and D'Mello and Ferris (2000).

The second indicator is the dispersion of analysts' forecasts (ADISP): the greater the dispersion, the lower the consensus among analysts, the greater the degree of information asymmetry. The dispersion is calculated as the standard deviation of the estimation forecasts, using the mean of the forecasts as a scale factor (for cross-sectional comparability). Since the forecast errors could be biased by conflicts of interests (Chan et al., 2007), because non-independent analysts tend to lower the consensus forecasts of EPS near the quarterly financial reporting, in order to avoid negative surprises that have a negative strong impact on stock pricing, the second indicator should be preferred. However, we calculate both variables and since we find no mutual correlation, the second measure has been included in the regressions. In addition, we also consider size among the control variables.

## 4.3 Culture variables

We consider four variables from Schwartz (i.e., harmony, embeddedness, hierarchy, and mastery which are called SCHW\_1, SCHW\_2, SCHW\_3 and SCHW\_4, respectively) and four from Hofstede (i.e., power distance, individualism, uncertainty avoidance and long-term orientation, here called HOF\_1, HOF\_2, HOF\_3 and HOF\_4, respectively). Table 3 shows their scores per country.

However, in order to consider the mutual correlations of these variables, we operate a factor analysis (PCA with Oblimin rotation and Kaiser normalization) and obtained the three factors showed in Table 4 (structure matrix), that explains the 88% of the total variability (to better understand the extracted factors, the factor loadings less than 0,4 are omitted).

Therefore, we clustered the sample countries (by using the average linkage between groups and the squared Euclidean distance) on the basis of the three factors and obtained the four clusters showed in Table 5 (we repeated the cluster analysis by using a 3–5 range of clusters and chose the most efficient solution)<sup>1</sup>.

<sup>1</sup> For brevity, detailed results are omitted. They could be provided on request.

**Table 3** Scores of cultural variables (Schwartz/Hofstede).

Source: Schwartz, 2006 and Hofstede, 2018

	SCHW_1	SCHW_2	SCHW_3	SCHW_4	HOF_1	HOF_2	HOF_3	HOF_4
Austria	4.31	3.11	1.75	3.92	11	55	70	60
Belgium	4.35	3.25	1.69	3.84	65	75	94	82
Denmark	4.16	3.19	1.86	3.91	18	74	23	35
Finland	4.34	3.37	1.80	3.66	33	63	59	38
France	4.21	3.20	2.21	3.72	68	71	86	63
Germany	4.62	3.03	1.87	3.86	35	67	65	83
Ireland	3.77	3.41	2.09	4.04	28	70	35	24
Italy	4.62	3.46	1.60	3.81	50	76	75	61
Netherlands	4.05	3.19	1.91	3.97	38	80	53	67
Spain	4.47	3.31	1.84	3.80	57	51	86	48
Sweden	4.46	3.12	1.83	3.81	31	71	29	53
United Kingdom	3.91	3.34	2.33	4.01	35	89	35	51
<i>Average</i>	4.27	3.25	1.90	3.86	39.08	70.17	59.17	55.42
<i>Variation coeff.</i>	0.0622	0.0405	0.1117	0.0294	0.4525	0.1478	0.4102	0.3218
<i>Variation coeff.</i> <i>(original full sample)</i>	0.0749	0.1070	0.1873	0.0399	0.3548	0.5307	0.3347	0.5328

**Table 4** Factor analysis (structure matrix)

	Factors		
	1	2	3
SCHW_1	-0.897		0.611
SCHW_2	0.487		-0.850
SCHW_3	0.882		
SCHW_4	0.703	-0.702	
HOF_1		0.969	
HOF_2	0.904		
HOF_3		0.918	
HOF_4			0.934

Note: Factor loadings &lt; 0.4 are omitted

**Table 5** Country clusters based on extracted factors

Clusters	Belonging countries	Observations number
Cluster_1	Austria, Denmark, Sweden	616
Cluster_2	Belgium, Finland, France, Italy, Spain	1,155
Cluster_3	Ireland, Netherlands, UK	1,254
Cluster_4	Germany	484
Total		3,509

The characterization of the four country clusters on the basis of the three culture factors are shown in Table 6, where the Kruskal-Wallis test is conducted in order to verify the statistically significant differences among them (confirmed).

The homogeneity of the European countries in the sample from the point of view of macroeconomic and financial scenarios doesn't imply a strong similarity from the cultural point of view. In fact: (i) in Table 3, the last two rows compare the sample variation coefficients – standard deviation on average ratio – with the original data provided by Schwartz/Hofstede from the full samples of worldwide countries (80 countries in Schwartz and 111 in Hofstede); except for SCHW\_2 (embeddedness) and HOF\_2 (individualism), the sample variation coefficients aren't significantly lower than full sample; (ii) in Table 6, the KW test shows a strong statistical significance of the differences of the country culture clusters obtained.

The first factor in Table 4 shows high positive loading of “mastery”, “hierarchy”, and “individualism”, and negative (as expectable) of “harmony”, while “embeddedness” is limited. Therefore, we expect that company interests prevail in presence of asymmetric information: the reassuring personal expectations by shareholders are weaker than company's needs of solidity and financial autonomy. The second factor, with high positive loadings of “power distance” and “uncertainty avoidance”, could be considered the symbol of “carrot and stick” method: the balance between supply- and demand-side perspectives is stated by societal order (see § 2.3 above). The negative loading of “mastery” strengthens the role of “carrot” in presence of normal conditions and therefore favors more generous dividend policy. Finally, the third factor shows high positive loading of “long term orientation” and negative of “embed-

**Table 6** Kruskal-Wallis test on factors (among country clusters) panel A: in the last column decimal point instead of coma; panel B: analogously all numbers with decimals

Panel A	Country clusters	Number of observations	Ranks of average linkage
FACTOR_1	1	616	851,31
	2	1155	1276,66
	3	1254	2881,50
	4	484	1122,50
	Total	3509	
FACTOR_2	1	616	356,40
	2	1155	2931,00
	3	1254	1218,76
	4	484	2111,50
	Total	3509	
FACTOR_3	1	616	1494,87
	2	1155	1817,59
	3	1254	1240,14
	4	484	3266,50
	Total	3509	
Panel B	FACTOR_1	FACTOR_2	FACTOR_3
H of	2569,719	3245,467	1494,924
Kruskal-Wallis			
Degrees of freedom	3	3	3
Asym. Signif.	.000	.000	.000

dedness”, while “harmony” is medium-high. In this case, we could expect that when information is asymmetric, the societal order (guaranteed by “harmony” and not by “embeddedness”) pushes firms to satisfy the reassuring expectations of shareholders/investors and therefore more dividends in presence of asymmetric information. The “long-term orientation” also favors this attitude since companies look at maintaining confidence of investors over time.

In addition, it is the mix of factors that characterize the country cultural attitudes. As Table 6 shows, countries of cluster 2 have a high rank of factor 2 and low of factor 1. On the contrary, countries of cluster 3 have a high rank of factor 1 and low of factors 2 and 3. Germany (cluster 4) shows a high rank of factor 3 and low of factor 1. Countries of cluster 1 show a more undefined profile, i.e. low ranks for factor 1 and 2 and a low-average rank of factor 3. Therefore, we can expect that firms from Ireland, Netherlands, and UK (cluster 3) pay less dividends and decrease them when information is asymmetric: summing up, in these countries the supply-side perspective wins. Firms from countries of cluster 2 (Belgium, Finland, France, Italy, Spain) are likely to pay more generous dividends in normal conditions but decrease them when information is asymmetric: summing up, the “carrot and stick” approach prevails. Firms from Germany are expected to increase dividends in presence of asymmetric information: summing up, the demand-side perspective wins here. No assumptions can be formulated as far as firms from countries of cluster 1 (Austria, Denmark, and Sweden) are concerned, since their cultural profile seems paler: the low ranks of both factors 1 and 2 compensate each other the expectations about the payout level in normal conditions and the average rank of factor 3 is likely not enough to support a positive sign of the linkage with the asymmetric information.

We use the country cluster dummies (CLU\_1, CLU\_2, CLU\_3 and CLU\_4, which are 1 for observations of firms belonging to the respective countries, and 0 otherwise) both as direct regressors of the dependent variable and as mediator variables of other regressors. See Sect. 5 below on the empirical test design.

#### 4.4 Other determinants

We describe below the other variables included in the regression models.

##### 4.4.1 Fiscal system

Since we use a multi-country sample, the tax system differences are to be considered. Following Alzahrani and Lasfer (2012), two variables are considered in this study:

- The total fiscal rate (FRATE) on dividends. We utilize OECD data. In detail (see Table 7) we use “Overall PIT+CIT rate”, i.e., the overall rate that considers taxation at the personal level (PIT=Personal Income Tax) and at the corporate level (CIT=Corporate Income Tax). The indicator is calculated as:  $((\text{Pre-tax Distributed Profit} - \text{Distributed Profit} + \text{Personal Net Tax}) / \text{Pre-Tax Distributed Profit}) * 100$ . The expected link between FRATE and DY is negative: in countries with a higher level of dividend taxation, companies are less likely to pay dividends to shareholders.

**Table 7** Total fiscal rate (%) on dividends of the sample countries (corporate and personal level). Source: OECD

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	43.75	43.75	43.75	43.75	43.75	43.75	42.86	45.63	45.63	45.63	45.63
Belgium	43.89	43.89	43.89	50.49	50.49	50.49	32.68	51.81	53.79	50.71	50.71
Denmark	58.75	56.50	56.50	56.50	56.50	56.21	57.76	54.76	54.76	54.76	54.76
Finland	40.50	40.50	40.50	41.41	41.41	41.76	52.87	43.12	43.12	43.12	43.12
France	54.17	54.17	57.58	59.67	64.38	64.38	43.47	64.38	69.82	56.73	56.73
Germany	48.00	48.08	48.13	48.15	48.20	48.25	38.34	48.33	48.38	48.39	48.39
Ireland	48.38	48.38	57.13	57.13	57.13	57.13	78.12	57.13	57.13	57.13	57.13
Italy	36.56	36.56	36.56	42.00	42.00	42.00	40.67	46.35	43.76	43.76	43.76
Netherlands	44.13	44.13	43.75	43.75	43.75	41.50	42.86	43.75	43.75	43.75	43.75
Spain	42.60	43.30	43.30	48.90	48.90	48.90	37.67	42.25	42.25	42.25	42.25
Sweden	48.41	48.41	48.41	48.41	45.40	45.40	51.54	45.40	45.40	45.40	44.98
United Kingdom	46.00	54.00	52.72	51.44	46.53	45.14	55.00	50.48	49.86	49.86	49.90

**Table 8** Fiscal system of the sample countries (2009–2019). Source: OECD

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
Belgium	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
Denmark	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL
Finland	FI	FI	PIN	PIN	PIN	PIN	PIN	PIN	PIN	PIN	PIN
France	PIN	PIN	PIN	PIN	PIN	PIN	PIN	PIN	PIN	PIN	PIN
Germany	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
Ireland	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
Italy	CL/PIN	CL/PIN	CL/PIN	CL/ PIN	CL/ PIN	CL/ PIN	CL/ PIN	CL/ PIN	CL/ PIN	CL/ PIN	CL
Netherlands	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
Spain	MCL	MCL	MCL	MCL	MCL	MCL	CL	CL	CL	CL	CL
Sweden	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL
United Kingdom	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI	PI

Notes: The listed typologies are the following: CL=classical system (shareholders pay taxes on dividends after the company has paid taxes on profits); PI=partial imputation system (investors receive a tax credit that partially reimburses taxes paid by the company); FI=full imputation system (investors receive a tax credit that totally reimburses taxes paid by the company); MCL=modified classical system (similar to CL, but dividends are taxed less than other revenues, as for example interests); PIN=partial inclusion system (similar to CL, but only a part of dividends are taxed at personal level)

- The tax system dummy: Alzahrani and Lasfer (2012) distinguish among *classical system*, *partial imputation system* and *full imputation system* (see § 3.3 above and Table 8). We consider the dummy NODIMP which means no double taxation and has value 1 in countries with full or partial imputation system and 0 in countries with classical system. Therefore, we expect a positive link between DY and NODIMP dummy.

#### 4.4.2 Firm's characteristics

The following variables are also included as determinants in the regression models:

- Growth: according to the most international literature, we use the market to book value (MB), calculated as stock price and book value per share, which better catches, than past growth rates of revenues/assets/values added/employees, the “forward-looking” growth. The expected relationship with DY is negative, since higher growth means larger financial needs and therefore less dividends, that cut the re-investable profits.
- Size: we consider LMV, which is the natural logarithm of market capitalization. The logarithmical transformation solves the likely nonlinear relationship with the dependent variable. We cannot define in advance the sign of the relationship with the dividend yield; in fact, size could be a proxy of many other determinants: information asymmetry (less in larger companies), availability and consistency over time of the profits, more disciplining power by the market, and so on. However, the positive sign of the relationship is more frequently observed in previous studies.
- Cashflow: we consider the ratio between cashflow (as provided by Datastream) and turnover (CF): the expected link is positive, according with all theories on dividend policy.
- Risk: we use the volatility (i.e., the standard deviation) of stock price (VOL), as provided by Datastream: the greater the risk, the lower the firm's propensity to pay dividends. Risk likely increases the information asymmetry. Our hypothesis is that the inclusion in the regression model of this determinant can absorb the component that could influence the information asymmetry.
- Financial stress: instead of leverage, that in some previous studies results to be redundant as it is highly correlated with cashflow, it measures better than leverage (that could be influenced by other drivers) the liquidity shortfall of a firm. It is measured as the reciprocal of the product of cashflow/turnover and MB ratios (by controlling for cases with both ratios negative and checking to be not significantly correlated with other regressors). The impact on dividend yield is expected to be negative.

It is also included the GDP growth rate (GDPG): real data (%) from the International Monetary Fund. The expected sign of the linkage is not univocal: (i) positive if more dividends are likely to be paid in favorable economic conditions; (ii) negative if higher GDP growth rate is proxy of more investment opportunities. Time dummies are also included, to consider time conditions other than GDPG. Country dummies are omitted, since other determinants (for example, the fiscal variables) absorb the country effect for the aspects that have relevant impact on dividend policy.

## 5 Testing design and methodology

### 5.1 The tested model

We tested the following model:

$$\begin{aligned}
 DY_{it} = & const + CLU_c + CLU_c * ADISP(-1)_{it} + CLU_c * DY(-1)_{it} \\
 & + CLU_c * CF(-1)_{it} + CLU_c * MB(-1)_{it} + LMV_{it} + FRATE_{ct} \\
 & + NODIMP_{ct} + VOL(-1)_{it} + FS(-1)_{it} + GDPG_{ct} + TD_t + \varepsilon_{it}
 \end{aligned}$$

where  $DY$ =dividend yield,  $CLU$ =country cluster dummy,  $ADISP$ =asymmetric information measure,  $CF$ =cashflow/turnover,  $MB$ =market to book value of equity,  $LMV$ =market capitalization (natural logarithm),  $FRATE$ =total fiscal rate on dividends,  $NODIMP$ =dummy of non-double imputation tax system,  $VOL$ =volatility of stock price,  $FS$ =financial stress [ $1/(\text{cashflow/turnover} * MB)$ ],  $GDPG$ =GDP growth rate,  $TD$ =time dummies,  $i$ =firms (1 ... 319),  $t$ =years (2010 ... 2019) (2009 is absorbed by lagged variables),  $c$ =country clusters (1 ... 4) [ $CLU\_3$  – Ireland, Netherlands, and UK – is used as reference term).

We include in the regressions the lagged dependent variable (LDV), following the Monte Carlo simulation findings from Wilkins (2018) who demonstrates that if correlation between lagged variables and error terms is excluded<sup>2</sup>, the inclusion yields more accurate parameter estimates. In general, regressions that exclude the lagged dependent variable often obtain larger coefficient estimates for independent variables, compared with regressions that include the LDV. Consequently, the choice about whether or not to include a LDV in regression analysis would likely have a substantial impact on the conclusions of empirical analyses across a number of literatures. However, the inclusion of LDV helps against the bias of omitted explanatory variables and, from a financial perspective, the most theories on dividend policy proves a likely stationary component of dividend policy over time. In addition, we include also the lagged (-1) independent variables ( $ADISP$ ,  $CF$ ,  $MB$ ,  $VOL$  and  $FS$ ). Both the lagged dependent variable and the lagged independent variables  $ADISP$ ,  $CF$  and  $MB$  are mediated by the dummies of country culture dimensions, to verify if the culture dimensions significantly affect the relationships.

### 5.2 Methodological aspects

#### 5.2.1 Cultural factors

To consider the mutual correlations of cultural variables from the Schwartz and Hofstede frameworks, we operate a factor analysis (PCA with Oblimin rotation and Kaiser normalization by IBM-SPSS) and obtained the three factors showed in Table 4 (structure matrix), that explains the 88% of the total variability (to better understand the extracted factors, the factor loadings less than 0,4 are omitted). Generally, it is the PCA output that suggests how many factors to be considered: according to the Kaiser criterium, all the factors whose communality eigenvalues are grater/equal than 1 (this

<sup>2</sup> We verified and excluded the autocorrelation. For brevity data are omitted but can be provided on request.

criterion has been applied in the paper). The rotation method helps to better characterize the extracted factors: the Oblimin method has been used.

The PCA in this case presents many advantages: (i) eliminates the mutual correlations among the original variables, which create robustness problems in the estimation of regression parameters; (ii) identifies the latent variables, underlying the individual variables, that allow to characterize the cultural profiles better than the individual variables; (iii) the international studies that use the individual culture variables don't use all the cultural dimensions of one of the two main theoretical approaches (Schwartz or Hofstede), oversimplifying the nuances of the cultural impact strongly than in PCA used in this paper. Usually, a few cultural variables are used in regression models and often one at a time (since mutually correlated).

### 5.2.2 Country clusters

The sample countries are clustered (by using the average linkage between groups and the squared Euclidean distance as methods of cluster analysis by IBM-SPSS) on the basis of the three cultural factors above and obtained the four clusters showed in Table 5, that is the most efficient solution (among a range of 3–5 clusters). The Kruskal-Wallis test (in Table 6) confirms the statistically significant differences among the four country clusters (asym. signif. = 0.000).

### 5.2.3 Regression models

The simplest estimator for panel data is pooled OLS. In most cases this is unlikely to be adequate, but it provides a baseline for comparison with more complex estimators. In our case, the panel comprises observations on relatively small set of units of interest, although their choice is not decided upstream but depends on their inclusion in stock index considered. So, we cannot say in advance if it is more appropriate to use fixed effects (FE) or random effects (RE). However, we want include in our explanatory model some variables whose values are specific to the cross-sectional unit, but which do not vary over time (i.e., the culture dimensions, related to countries companies belong to, and the dummy variable of fiscal system). In this case, the fixed effects option is simply not available.

If both FE and RE are feasible for a given specification and dataset, the choice between these estimators may be expressed in terms of the two econometric desiderata: efficiency and consistency. From a purely statistical viewpoint, we could say that there is a tradeoff between robustness and efficiency. The FE estimator “always works”, but at the cost of not being able to estimate the effect of time-invariant regressors. The richer hypothesis set of the RE estimator ensures that parameters for time-invariant regressors can be estimated, and that estimation of the parameters for time-varying regressors is carried out more efficiently. These advantages, though, are tied to the validity of the additional hypotheses. If, for example, there is reason to think that individual effects may be correlated with some of the explanatory variables, then the RE estimator would be inconsistent, while FE estimates would still be valid. We implement and show the three regression models (pooled OLS, FE and RE, the last two as robustness checks), to give the more complete picture of the

relationships between dependent variable and regressors and to verify whether there are differences in the sign of the links or not. However, we test the appropriateness of pooled OLS and RE models with respect to FE model. The first test is the Welch F-test for the null hypothesis that the cross-sectional units all have a common intercept. Only if this hypothesis can be accepted, therefore the general OLS model is adequate. The corresponding test when using random effects is the Breusch–Pagan test. In addition, the Hausman test (Hausman, 1978) is used to verify the consistency of the GLS estimates (used in RE model). The null hypothesis is that these estimates are consistent. The test is based on a measure,  $H$ , of the “distance” between the fixed-effects and random effects estimates. If the value of  $H$  is large, therefore the random effects estimator is not consistent, and the fixed-effects model is preferable.

The following robustness tests (by GRETl package) are used: the VIF (Variance Inflation Factor) test to check the variable multi-collinearity, the analysis of correlation between lagged variables and residual errors, the HAC methodology (Heteroskedasticity and Autocorrelation Consistent) for the error estimation (Arellano, 2003) and the Durbin-Watson statistic to check the null hypothesis of first order uncorrelation. The adjusted R squared is used to measure the explanatory power of the regression model.

#### 5.2.4 Endogeneity problems

The endogeneity could be a potential problem of this kind of analysis. It could depend on both reverse and simultaneous causality (of some independent variables like cash-flow and asymmetric information, for example) and omitted variables.

As far as the reverse causality is concerned, the principal way that the paper uses to address this problem (to avoid poor-quality instrumental variables) is to lag of 1-year the regressors.

In addition, problems related to the simultaneously influence of omitted variables are tentatively solved by: (i) including in regression some macroeconomic variables (GDP growth and fiscal system differences, which result to be significant regressors); (ii) including in regression many control variables at firm level; (iii) considering a sample of relatively homogeneous European countries, from the standpoint of the economic and financial context; (iv) including the 1-year lagged dependent variable among the regressors: in this way the model can capture the effects of potential omitted variables on the current variable as well as it can help to break the causal feedback loop and provide a more reliable estimate of the explanatory variables' effects.

Finally, correlations among the variables most at risk of endogeneity and residuals are checked and excluded (for brevity data are omitted but can be provided on request).

## 6 The results

### 6.1 Descriptive statistics

Table 9 show the descriptive statistics of the dependent variable as well as regressors. We can observe that DY quite changes across panel observations and therefore the explanatory model has practical relevance; similarly, the main regressor (ADISP) shows a significant variability, which means that observations in the sample mutually differ (cross-sectionally and longitudinally) in terms of asymmetric information. A good variation of the other regressors can be observed, except for the stock price volatility (but this seems to be an advantage in this analysis, since it could bias the asymmetric information measurement).

### 6.2 Regression results

Table 10 shows the pooled OLS regression results. We can observe the following statistically significant links (the model explains the 56% of the DY variability):

1. The sign of the impact of asymmetric information on dividend policy is not univocal and it depends on the country culture mediating role (see point 2b).
2. As far as the impact of cultural variables is concerned, we can observe two different findings:
  - a. With regard to the direct impact, we observe that all country clusters pay a higher dividend yield than cluster 3 (Ireland, Netherlands and UK), that is the omitted reference term (for which the constant term is that of the model), although the difference is significant for cluster 2 only; therefore, in average, countries of cluster 2 (Belgium, Finland, France, Italy, Spain) adopt a significantly more generous dividend policy (as expected in H2); on the contrary, countries of cluster 3, with a high rank of factor 1 (high positive loading of “mastery”, “hierarchy”, and “individualism”, and negative (as expectable) of “harmony”) and low ranks of factors 2 (i.e. low power distance and uncertainty avoidance) and 3 (i.e., low harmony and long term orientation and high embeddedness) pay less dividends (as expected in H1).

**Table 9** Descriptive statistics

	DY (%)	ADISP	CF (%)	MB	VOL (%)	FS	FRATE (%)	GDGP (%)
Mean	2.897	0.204	16.654	3.165	23.679	0.082	49.849	1.216
Median	2.490	0.076	13.530	2.260	22.550	0.032	48.410	1.500
5° percentile	0.000	0.028	3.400	0.765	13.340	0.004	41.412	-4.200
95° percentile	6.450	0.362	46.380	8.295	37.235	0.179	64.383	3.900
Coefficient of variation (std deviation/mean)	0.742	11.160	0.886	6.814	0.305	8.691	0.133	1.958
Coefficient of interquartile variation (Q3-Q1)/Q2	1.014	1.028	0.991	0.982	0.398	1.551	1.330	0.933

**Table 10** The results of the pooled OLS regression

	Coefficients	Std. errors	t statistic	p-value	Sign (°)
Constant	1.1072	0.4396	2.518	0.0123	**
CLU_1	0.2545	0.2702	0.9416	0.3471	
CLU_2	0.7962	0.2796	2.847	0.0047	***
CLU_4	0.1099	0.2190	0.5017	0.6162	
CLU_1_ADISP_1	-0.0680	0.1602	-0.4242	0.6717	
CLU_2_ADISP_1	-0.0106	0.0037	-2.889	0.0041	***
CLU_3_ADISP_1	-0.0369	0.0345	-1.0678	0.2864	
CLU_4_ADISP_1	0.1183	0.0106	11.1964	<0.0001	***
CLU_1_DY_1	0.6396	0.0656	9.7541	<0.0001	***
CLU_2_DY_1	0.6121	0.0582	10.5142	<0.0001	***
CLU_3_DY_1	0.7387	0.0542	13.6286	<0.0001	***
CLU_4_DY_1	0.6682	0.0731	9.1369	<0.0001	***
CLU_1_CF_1	0.0009	0.0040	0.2355	0.8140	
CLU_2_CF_1	0.0129	0.0043	2.9922	0.0030	***
CLU_3_CF_1	0.0040	0.0031	1.2898	0.1981	
CLU_4_CF_1	0.0173	0.0137	1.2591	0.2089	
CLU_1_MB_1	-0.0022	0.0020	-1.1371	0.2563	
CLU_2_MB_1	-0.1056	0.0323	-3.2673	0.0012	***
CLU_3_MB_1	0.0005	0.0005	1.0376	0.3003	
CLU_4_MB_1	-0.0366	0.0302	-1.2124	0.2263	
LMV	0.0843	0.0237	3.5645	0.0004	***
FRATE	-0.0212	0.0050	-4.2649	<0.0001	***
NODIMP	0.3189	0.0787	4.0544	<0.0001	***
VOL_1	-0.0104	0.0052	-2.0103	0.0452	**
FS_1	-0.0536	0.0205	-2.6172	0.0093	***
GDPG_1	0.0516	0.0185	2.7938	0.0055	***
dt_3 (2011)	1.0652	0.1476	7.2158	<0.0001	***
dt_4	-0.2787	0.1540	-1.8098	0.0713	*
dt_5	-0.5386	0.1368	-3.9357	0.0001	***
dt_6	-0.2325	0.1298	-1.7906	0.0743	*
dt_7	-0.3100	0.1435	-2.1597	0.0315	**
dt_8	-0.1655	0.1644	-1.0062	0.3151	
dt_9	-0.3644	0.1487	-2.4509	0.0148	**
dt_10	0.0553	0.1807	0.3059	0.7599	
dt_11 (2019)	-0.3750	0.1507	-2.4877	0.0134	**
Average of DY	2.9068		Std dev. of DY	2.1593	
SUM of squared errors	6519.42		S.E. of regression	1.4375	
R-squared	0.5615		R-squared adj	0.5568	
F (34, 318)	244.7109		P-value (F)	9.9e-207	
Log-likelihood	-5666.46		Akaike criterion	11402.92	

**Table 10** (continued)

	Coefficients	Std. errors	t statistic	p-value	Sign (°)
Schwarz criterion	11615.30		Hannan-Quinn	11479.08	
Rho	-0.1219		Durbin-Watson	2.1291	

Notes: The regression uses 3190 observations, 319 cross-section units and the time series include 10 years (one year is absorbed by the lag of variables). The dependent variable is DY. The independent variables (ADISP, CF, MB, VOL, FS and GDPG) are lagged (-1). Both the lagged dependent variable and the lagged independent variables ADISP, CF and MB are mediated by the four dummies of country culture dimensions (CLU\_1, CLU\_2, CLU\_3 and CLU\_4, which are 1 for observations of firms belonging to the respective countries, and 0 otherwise). dt\_3 ... dt\_11 are the time dummies. Dependent and independent variables are explained in Sect. 4. Robust standard errors: HAC

\*\*\* = sign 0.01 \*\* = sign 0.05 \* = sign 0.1

- b. The mediating effects of cultural variables are statistically significant for all the independent variables considered, although not for all country clusters. In detail:
  - i. The dividend yield is negatively influenced by asymmetric information (but is statistically significant for firms of cluster 2 only), except than for firms of cluster 4 (Germany), where the sign of the relationship is positive and statistically significant. This means that POH prevails, except that for Germany (as expected in H5) where signaling and “bird in the hand” hypotheses are empirically supported; Germany (cluster 4) shows a high rank of factor 3 and low of factor 1; therefore, it is characterized by high harmony and long-term orientation and low embeddedness, hierarchy and mastery/individualism: when information is asymmetric, demand-side perspective prevails.
  - ii. The dividend yield is rather stable over time: DY depends more than 60% on previous year DY; however, it seems stabler for country cluster 3 (the prevalence of supply-side perspective persists over time) and less stable for cluster 2 (need for flexibility); these findings confirm H6.
  - iii. The signs of the relationships of DY with CF and MB are those expected (positive and negative, respectively) but they are statistically significant only for firms of cluster 2; they strengthen the assumed “carrot and stick” approach (H3 is confirmed).
3. The fiscal variables significantly impact the dividend policy as expected: firms pay more dividends when the total tax rate on dividends is lower and when the fiscal system corrects the double tax imposition (H7 is confirmed).
4. The volatility of stock price negatively affects the dividend yield.
5. Larger companies pay more dividends, and more financially stressed ones pay less dividends.
6. The GDP growth rate shows a positive and statistically significant impact; when the year dummies are omitted, the link remains positive and becomes more significant: therefore, the year dummies absorb the effect of GDP growth but work better in explaining the DY variability (the adjusted R squared increases).

All the robustness tests are implemented (GRET software): (i) VIF is always less than 10%; (ii) no correlations are observed between lagged variables and residual errors; (iii) the error estimation (heteroskedastic and autocorrelated in series) uses HAC methodology (*Heteroskedasticity and Autocorrelation Consistent*) and therefore can be considered robust (Arellano, 2003); (iv) the Durbin-Watson statistic does not reject the null hypothesis of first order uncorrelation.

Summing up, the empirical findings show that country culture matters: it influences both directly the dividend yield and indirectly the impact of the asymmetric information on it. The culture profile of a country/group of similar countries, defined by considering the cultural dimensions not individually but in a certain pattern, affects how the assumed contrast in dividend policy between the “supply-side perspective” (i.e., the firm interests to reinvest profits in order to strengthen the financial autonomy/solidity as well as to have resources to guarantee their financial flexibility against future constraints or to favor prompt investments for growth, without incurring in transaction costs) and the “demand-side perspective” (i.e., the shareholder personal expectations to have money in hand, to avoid risks, to prevent managerial opportunistic behaviors and so on) has been solved, in standard conditions as well as in exacerbated scenarios, when information is asymmetric. In addition, the mediating role of the culture profile on the impact of other dividend determinants, like cashflow, growth, and previous dividend yield, results to be supported by our findings in line with the assumptions.

Moreover, the fiscal determinants are statistically significant and affect the dividend policy consistently with the hypotheses.

### 6.3 Robustness checks

Alternative rotation methods (Varimax and Promax) are used in culture factor extraction to verify whether they change or not the results: no statistically significant changes are observed (for brevity, the analyses are omitted but can be provided on request).

We use FE and RE models (Tables 11 and 12, respectively) to check the robustness of the previous model (Table 10 above). The RE model confirms the signs of the relationships observed in pooled OLS model; analogously the FE model (but for the time varying variables only), except than for size, which impacts negatively on DY. Obviously, the statistical significance and the parameter values change.

All the tests (Welch, Hausman and Breusch-Pagan) confirm that the FE model is the preferable regression model (in addition, it better explains the DY variability than pooled OLS: the adj-R squared increases to 67%). The Welch F-test rejects the null hypothesis that all the cross-sectional units have a common intercept; however, it should be considered that in our pooled OLS model the intercept is not common, but differs, although not across units but across country clusters. In fact, in the OLS regression CLU\_1, CLU\_2, and CLU\_4 dummies mimic the constant terms, by changing the constant term of the model, which is referred to the omitted CLU\_3 (i.e., the reference term).

Finally, as a further robustness test, a pooled OLS regression has been conducted by referring only to the first five-year period (2010–2014, since 2009 is absorbed by

**Table 11** The results of the FE model

	Coefficients	Std. errors	t statistic	P-value	Sign (°)
Constant	10.0229	1.3232	7.575	<0.0001	***
CLU_1_ADISP_1	-0.3097	0.2027	-1.5281	0.1275	
CLU_2_ADISP_1	-0.0155	0.0057	-2.7191	0.0069	***
CLU_3_ADISP_1	-0.2404	0.0919	-2.6166	0.0093	***
CLU_4_ADISP_1	0.0891	0.0176	5.0533	<0.0001	***
CLU_1_DY_1	0.1470	0.0768	1.9145	0.0565	*
CLU_2_DY_1	0.2693	0.0454	5.9337	<0.0001	***
CLU_3_DY_1	0.4194	0.0787	5.3312	<0.0001	***
CLU_4_DY_1	0.2374	0.0781	3.0408	0.0026	***
CLU_1_CF_1	0.0180	0.0049	3.6516	0.0003	***
CLU_2_CF_1	0.0094	0.0110	0.8526	0.3945	
CLU_3_CF_1	0.0094	0.0101	0.9264	0.3550	
CLU_4_CF_1	0.0155	0.0131	1.1886	0.2355	
CLU_1_MB_1	-0.0003	0.0011	-0.3028	0.7622	
CLU_2_MB_1	0.0482	0.0406	1.1852	0.2368	
CLU_3_MB_1	0.0006	0.0005	1.2897	0.1981	
CLU_4_MB_1	-0.0218	0.0657	-0.3317	0.7403	
VOL_1	-0.0702	0.0180	-3.9052	0.0001	***
FS_1	-0.1181	0.0266	-4.4447	<0.0001	***
LMV	-0.6510	0.1165	-5.5870	<0.0001	***
FRATE	-0.0102	0.0058	-1.7726	0.0773	*
GDPG_1	0.0594	0.0202	2.9369	0.0036	***
dt_3 (2011)	0.7318	0.1497	4.8877	<0.0001	***
dt_4	0.0202	0.1400	0.1441	0.8855	
dt_5	-0.3257	0.1476	-2.2074	0.0280	**
dt_6	-0.2840	0.1569	-1.8104	0.0712	*
dt_7	-0.3304	0.1813	-1.8224	0.0693	*
dt_8	-0.2456	0.1999	-1.2285	0.2202	
dt_9	-0.2832	0.1934	-1.4640	0.1442	
dt_10	-0.0023	0.2200	-0.0102	0.9918	
dt_11 (2019)	-0.2202	0.2218	-0.9931	0.3214	
Average of DY	2.9068		Std dev. of DY	2.1593	
SUM of squared errors	4809.16		S.E. of regression	1.3011	
R-squared LSDV	0.6766		R-squared intra-group	0.2316	
Log-likelihood	-5181.16		Akaike criterion	11060.33	
Schwarz criterion	13177.98		Hannan-Quinn	11819.67	
Rho	0.0031		Durbin-Watson	1.8546	

Notes: \*\*\* = sign 0.01 \*\* = sign 0.05 \* = sign 0.1

the 1-year lag of some variables). The rationale is that in this period both DY (i.e., the dependent variable) and ADISP (i.e., the independent variable of interest) take on higher values and show larger variability. Therefore, in this period the explanatory power of the tested model is more relevant and has a larger practical importance. Figure 1 shows the average values (per year) of DY and ADISP over the whole period. Table 13 shows the regression results, that substantially confirm what obtained over the ten-year period (i.e., results in Table 10).

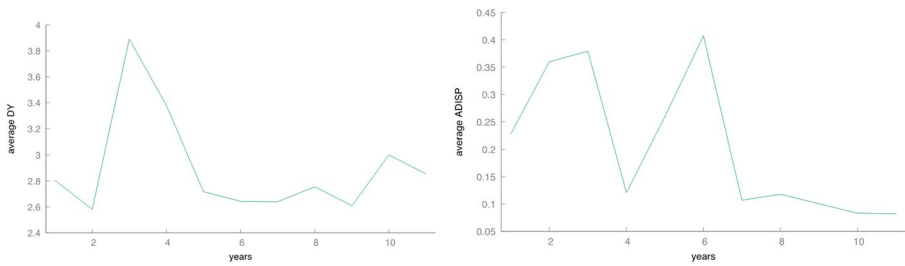
**Table 12** The results of the RE model

	Coefficients	Std. errors	t statistic	p-value	Sign (°)
Constant	1.1072	0.4396	2.5184	0.0118	**
CLU_1	0.2545	0.2702	0.9416	0.3464	
CLU_2	0.7962	0.2797	2.8471	0.0044	***
CLU_4	0.1099	0.2190	0.5017	0.6159	
CLU_1_ADISP_1	-0.0680	0.1602	-0.4242	0.6714	
CLU_2_ADISP_1	-0.0106	0.0037	-2.8897	0.0039	***
CLU_3_ADISP_1	-0.0369	0.0345	-1.0678	0.2856	
CLU_4_ADISP_1	0.1183	0.0106	1.1196	<0.0001	***
CLU_1_DY_1	0.6396	0.0656	9.7541	<0.0001	***
CLU_2_DY_1	0.6121	0.0582	1.0514	<0.0001	***
CLU_3_DY_1	0.7387	0.0542	1.3629	<0.0001	***
CLU_4_DY_1	0.6682	0.0731	9.1369	<0.0001	***
CLU_1_CF_1	0.0009	0.0040	0.2355	0.8138	
CLU_2_CF_1	0.0129	0.0043	2.9922	0.0028	***
CLU_3_CF_1	0.0040	0.0031	1.2898	0.1971	
CLU_4_CF_1	0.0173	0.0137	1.2591	0.2080	
CLU_1_MB_1	-0.0022	0.0020	-1.1371	0.2555	
CLU_2_MB_1	-0.1056	0.0323	-3.2673	0.0011	***
CLU_3_MB_1	0.0005	0.0005	1.0376	0.2995	
CLU_4_MB_1	-0.0366	0.0302	-1.2124	0.2254	
LMV	0.0843	0.0237	3.5645	0.0004	**
FRATE	-0.0212	0.0050	-4.2649	<0.0001	***
NO_DIMB	0.3189	0.0787	4.0544	<0.0001	***
VOL_1	-0.0104	0.0052	-2.0103	0.0444	**
FS_1	-0.0536	0.0205	-2.6172	0.0089	***
GDPG_1	0.0516	0.0185	2.7938	0.0052	***
dt_3 (2011)	1.0652	0.1476	7.2158	<0.0001	***
dt_4	-0.2787	0.1540	-1.8098	0.0703	*
dt_5	-0.5386	0.1368	-3.9357	<0.0001	***
dt_6	-0.2325	0.1298	-1.7906	0.0734	*
dt_7	-0.3100	0.1435	-2.1597	0.0308	**
dt_8	-0.1655	0.1644	-1.0062	0.3143	
dt_9	-0.3644	0.1487	-2.4509	0.0143	**
dt_10	0.0553	0.1807	0.3059	0.7597	
dt_11 (2019)	-0.3750	0.1507	-2.4877	0.0129	**
Average of DY	2.9068		Std dev. of DY	2.1593	
SUM of squared errors	6519.42		S.E. of regression	1.4373	
Log-likelihood	-5666.46		Akaike criterion	11402.92	
Schwarz criterion	11615.30		Hannan-Quinn	11479.08	
Rho	0.0031		Durbin-Watson	1.8546	

Notes: \*\*\* = sign 0.01 \*\* = sign 0.05 \* = sign 0.1

## 7 Conclusions and Lines of further analysis

This study, conducted on a sample of nonfinancial companies listed at the STOXX Europe 600 index, empirically shows that country culture matters: it influences both directly the dividend yield and indirectly the impacts of asymmetric information and



**Fig. 1** 2009–2019 trend of DY (dividend yield) and ADISP (the dispersion of analysts' forecasts)

other determinants of dividend policy on it.

The country cultural profiles, extracted through a cluster analysis conducted on the culture factors, which are expressed (through a factor analysis) as linear combinations of the culture variables by Schwarz/Hofstede approaches, affect how the belonging companies solve the assumed contrast in dividend policy between the “supply-side perspective” (i.e., the firm interests to reinvest profits to strengthen the financial autonomy/solidity and have resources to guarantee their financial flexibility against future constraints and growth financial needs) and the “demand-side perspective” (i.e., the shareholder personal expectations to have money in hand, to avoid risks, to prevent managerial opportunistic behaviors), both in standard conditions and in exacerbated scenarios, when information is asymmetric.

In addition, the mediating role of the country culture profiles on the impact of other dividend determinants, like cash flow growth and past dividend yield, is supported by the provided empirical evidence in line with the assumptions. Furthermore, the fiscal determinants (which differ in a multi-country sample) are statistically significant and affect the dividend policy consistently with the hypotheses: firms pay more dividends when the total (corporate and personal) tax rate on dividends is lower and when the fiscal system corrects the double taxation of dividends.

From the analysis here conducted, lines of further research could be derived. The following are the most relevant:

- (a) The sample could be expanded, by including more heterogeneous countries (although, in this case, the isolation of the impacts of regressors of interest would be more difficult) and more different firms from the point of view of dividend policy; as said above, only 10% of our sample are firms non-paying dividends. Including more non-paying dividend companies could let us analyze the impacts of cultural variables and of information asymmetry on the more radical choice to pay or not to pay dividends. This change could provide room to use different measures of dependent variable and other econometric methodologies (i.e., logit or probit analysis).
- (b) Better measures of information asymmetry could be found, trying to isolate the phenomenon from conflicts of interests (that bias the analyst forecasts) and to better guarantee the “*ceteris paribus*” condition of other firm characteristics, as for example the volatility of stock prices.

**Table 13** The results of the pooled OLS regression on five-year period (2010–2014)

	Coefficients	Std. errors	t statistic	p-value	Sign (°)
Constant	2.5060	0.6368	3.9354	0.0001	***
CLU_1	0.1852	0.2728	0.6787	0.4978	
CLU_2	0.7440	0.3051	2.4387	0.0153	**
CLU_4	-0.0126	0.2882	-0.0438	0.9651	
CLU_1_ADISP_1	-0.0159	0.1882	-0.0844	0.9328	
CLU_2_ADISP_1	-0.0085	0.0042	-2.0300	0.0432	**
CLU_3_ADISP_1	-0.0513	0.0424	-1.2096	0.2273	
CLU_4_ADISP_1	0.1087	0.0151	7.2130	<0.0001	***
CLU_1_DY_1	0.6072	0.0633	9.5915	<0.0001	***
CLU_2_DY_1	0.6041	0.0520	11.6127	<0.0001	***
CLU_3_DY_1	0.6898	0.0594	11.6225	<0.0001	***
CLU_4_DY_1	0.5728	0.1200	4.7730	<0.0001	***
CLU_1_CF_1	0.0004	0.0068	0.0527	0.9580	
CLU_2_CF_1	0.0150	0.0051	2.9487	0.0034	***
CLU_3_CF_1	-0.0010	0.0045	-0.2296	0.8186	
CLU_4_CF_1	0.0391	0.0278	1.4069	0.1604	
CLU_1_MB_1	0.0018	0.0068	0.2597	0.7953	
CLU_2_MB_1	-0.1283	0.0408	-3.1429	0.0018	***
CLU_3_MB_1	-0.0006	0.0009	-0.6547	0.5131	
CLU_4_MB_1	-0.0912	0.0817	-1.1155	0.2655	
LMV	0.0689	0.0292	2.3589	0.0189	**
FRATE	-0.0317	0.0075	-4.2423	<0.0001	***
NODIMP	0.2210	0.0830	2.6637	0.0081	***
VOL_1	-0.0172	0.0070	-2.4660	0.0142	**
FS_1	-0.0658	0.0206	-3.2024	0.0015	***
GDPG_1	0.1332	0.0372	3.5814	0.0004	***
dt_3 (2011)	0.4815	0.2389	2.0157	0.0447	**
dt_4	-0.7665	0.2452	-3.1260	0.0019	***
dt_5	-0.8941	0.2002	-4.4668	<0.0001	***
dt_6	-0.6662	0.2081	-3.2005	0.0015	***
Average of DY	3.0422		Std dev. of DY	2.2981	
SUM of squared errors	3758.99		S.E. of regression	1.5122	
R-squared	0.5749		R-squared adj	0.5670	
F (29. 318)	179.4733		P-value (F)	1.4e-178	
Log-likelihood	-2907.75		Akaike criterion	5875.51	
Schwarz criterion	6036.75		Hannan-Quinn	5935.39	
Rho	-0.1088		Durbin-Watson	2.0110	

Notes: The regression uses 1595 observations, 319 cross-section units and the time series include 5 years (2009 is absorbed by the lag of variables). The dependent variable is DY. The independent variables (ADISP, CF, MB, VOL, FS and GDPG) are lagged (-1). Both the lagged dependent variable and the lagged independent variables ADISP, CF and MB are mediated by the four dummies of country culture dimensions (CLU\_1, CLU\_2, CLU\_3 and CLU\_4, which are 1 for observations of firms belonging to the respective countries, and 0 otherwise). dt\_3 ...dt\_6 are the time dummies. Dependent and independent variables are explained in Sect. 4. Robust standard errors: HAC

\*\*\* = sign 0.01 \*\* = sign 0.05 \* = sign 0.1

- (c) The likely endogeneity of asymmetric information is here only partially solved by lagging the independent variables. In fact, in the case of a dividend policy strongly stable over time, the one-year lag doesn't completely solve the endogeneity problems. However, the inclusion of the lagged dependent variable among the regressors almost partially helps in separating the endogenous component from the exogenous one.

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**Data availability** The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Declarations

**Conflict of interest** The author has no competing interests to declare with respect to the research, authorship, and/or publication of this article.

**Ethical approval** Not applicable (this article does not contain any studies with human or animal participants).

**Consent for publication** Not applicable.

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