The Behavioral Foundations of Corporate Dividend Policy
A Cross-Country Empirical Analysis

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ABSTRACT

We study a model that determines dividend payout policy based on the ideas of mental accounting. The model predicts a positive influence of the investors' loss and ambiguity aversion and a negative influence of the investors' patience on the dividend payout ratio. An empirical analysis across 32 countries and 4,859 firms demonstrates that these relations can be verified empirically. To this end, data on risk and time preferences have been taken from a comprehensive international survey. In fact, we show that loss aversion, ambiguity aversion and the level of time discounting are the main determinants for corporate dividend policies in our sample. Our paper seems to be the first that verifies empirically in a straightforward way the relevance of behavioral patterns as relevant determinants for corporate dividend policy, while previous studies could address this issue only indirectly. Moreover, our approach reexamines the influence of cultural variables on corporate dividend policy and finds that at least for the Hofstede variables there seems to be some relevance that is independent of the impact of our behavioral variables. However, Individualism seems to become redundant when controlling directly for individuals' preference parameters.

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1. Introduction

Corporate dividend policies differ much across different countries. Traditionally, these variations are explained by differences in the tax system and the relevance of signaling devices as well as of agency problems due to informational asymmetries (see Brockman and Unlu, 2009, La Porta et al., 2000). Recently, cultural aspects have been suggested as another reason for this finding (see Bae et al., in press, Fidrmuc and Jacob, 2010, Shao et al., 2010, Khambata and Liu, 2005). Moreover, it is often argued that behavioral patterns identified by descriptive decision theory may be a main determinant of corporate dividend policy as well. However, up to now, there has been no cross-country analysis aiming at explaining differences in corporate dividend policy by behavioral patterns.

In this paper, we want to close this gap. We show that loss aversion, ambiguity aversion and the level of time discounting (i.e. the extent of investors' (im-) patience) are main determinants for corporate dividend policies across a sample of 4,895 firms from 32 countries for which data on behavioral variables have been collected via a comprehensive survey. By doing so, our paper contributes to the existing literature in several ways. First of all, we are able to offer an alternative explanation for cross-country differences in corporate dividend policy. Secondly, we seem to be the first who verify empirically in a straightforward way the relevance of behavioral patterns as determinants for corporate dividend policy, while previous studies have addressed this issue only in quite an indirect manner. Thirdly, our approach also may serve as a robustness check for the relevance of cultural dimensions as determinants for corporate dividend policy, as we reexamine hypotheses stated in the literature for a data sample incorporating preference parameters as additional control variables. This also sheds new light on the relationship between cultural variables and economic parameters. We find that cultural variables can be sometimes redundant when directly accounting for preference parameters, but in some cases, they complement one

another with behavioral variables. This holds true in particular for the Hofstede cultural variables.

Our paper is organized as follows. In Section 2, we present the current state of research with respect to the determinants of corporate dividend policy. Section 3 explains the role which behavioral variables may play in determining corporate dividend policy. In order to examine relationships in a more rigorous manner, we present a formal model that is motivated by Shefrin and Statman (1984) as well as by Shefrin and Thaler (1988). Moreover, in Section 4, we apply our model numerically to data on preference and return parameters for 35 countries. Based on our theory and the outcomes of our cross-country numerical analysis, we state our hypotheses. Section 5 describes our data and in Section 6 empirical results are presented. Section 7 is devoted to their discussion, where we repeat our empirical analysis for an alternative observation period, study an alternative measure of time preferences, and allow for cultural dimensions as additional control variables. Section 8 concludes.

2. The determinants of corporate dividend policy: literature overview

The analysis of the determinants of corporate dividend policy belongs to the core issues in modern financial theory. Beginning with the celebrated irrelevancy theorem of Miller and Modigliani (1961) which relies on cash dividends and capital gains being perfect substitutes in a perfect capital market, several avenues have been taken to identify reasons for the relevance of corporate dividend policy. First of all, it is easy to understand that the tax system may influence corporate dividend policy. Typically, dividends are more heavily taxed than capital gains and, thus, paying dividends makes no sense under those considerations. This finding leads Black (1976) to speak of a dividend puzzle (see also Feldstein and Green, 1983). In order to resolve the dividend puzzle, informational asymmetries have been propagated as another main determinant of corporate dividend policy. In this regard, in a world with less informed investors, dividend payments may have benefits, for they can be

perceived as a signal for the future profitability of a company (Bhattacharya, 1979, Kumar, 1988, Miller and Rock, 1985).

In addition to signaling aspects, agency problems may affect corporate dividend policy. According to the free cash flow hypothesis (Jensen and Meckling, 1976), firm management will invest in projects even with negative net present values just in order to increase its utility by a growth in power and company size. Such an overinvestment problem can be counteracted by increasing dividend payments in order to reduce free cash flow available to the firm. Therefore, corresponding agency costs turn out to be smaller for high dividend companies. This will enhance the popularity of dividends as a commitment device (see Easterbrook, 1984, Grossman and Hart, 1982).

However, dividend payments also increase the risk of default by reducing the amount of assets that is accessible for debt holders. Thus, Kalay (1982) suggests that the observed dividend restrictions serve as a prerequisite for borrowing to take this issue under control. This would imply that firms with a higher debt to equity ratio should comply with a lower dividend rate.

Even if tax considerations, signaling aspects, and agency problems may influence corporate dividend policies, these theories come up short to explain several issues such as reactions to stock dividends, which are basically stock splits (De Bondt and Thaler, 1985), or a preference for non-decreasing dividends (Lintner, 1963) or why companies with growth opportunities should pay dividends, although there is no relevant free cash flow problem. Moreover, many empirical studies suggest a higher marginal propensity to consume from dividends than from capital gains (see Baker et al., 2007) indicating that investors do not treat dividends in the same way as capital gains and process them in different accounts.

Hence, those observations led to a search for other possible determinants for dividend policies. The behavioral explanation of dividend policy of Shefrin and Statman (1984) provides such an approach. Its main element is the distinction of different mental accounts for

dividends and capital gains which brings us to the behavioral life cycle model of Shefrin and Thaler (1988). According to this model, people allocate their income in three different accounts: the current income account (*I*), the (current) asset account (*A*), and the future income account (*F*). Based on this differentiation, several reasons have been proposed to explain why dividends may be preferred to capital gains under certain circumstances.

1) Consumption financed from the accounts *A* and *F* involve subjectively felt "penalties", as investors want to exercise self-control regarding the potential danger of excessive consumption due to time-inconsistency problems. Cash dividends are placed into the *I* account and therefore there is no penalty involved for the consumption financed by cash dividends, whereas capital gains through stock price increases are placed into the *A* account and consuming from this account will cause disutility. Hence, dividends are better suited for consumption purchases and impatient investors who want to consume with a clear conscience will prefer firms to pay out a certain share of gains as dividends. On the other hand, when investors want to save, but lack the willpower to do so, companies should retain earnings. In both scenarios, the dividend policy should account for investors' time preferences.

2) Dividends are "a bird in the hand", while retained gains only lead to uncertain future earnings so that investors prefer dividends even if retained gains and future earnings are completely reflected in current stock prices. People thus tend to perceive dividends as a safety net which is solely a psychological phenomenon, because selling a stock yields the same monetary effect as dividend payments. The study of Cyert and March (1993) emanates from this "bird in the hand" explanation as well and argues that people prefer dividend payments to retained earnings, because they are ambiguity averse.

3) Mental accounts may not always be segregated. Thaler and Johnson (1990) have proposed a so-called hedonic editing model based on the prospect theory of Kahneman and Tversky (1979) which states that different accounts are segregated or aggregated so that a decision maker's satisfaction becomes maximal. Capital gains and dividends are viewed in a

segregated manner and dividends thus should be paid out when either the stock price of the company has increased more than the considered dividend payout or the stock price has decreased by a significant amount. This result is driven by the specific curvature of an investor's value function according to prospect theory which implies risk aversion in the domain of gains and risk seeking behavior in the domain of losses while the negative utility consequences of losses are generally more pronounced than the positive utility consequences of gains of the same size. Due to this "loss aversion", one will try to avoid falling stock prices even if they are compensated by higher dividends of the same amount and vice versa.

Behavioral aspects of individuals' decision making thus provide an alternative approach to explain the relevance of corporate dividend policies. Under consideration of these approaches, they also suggest that different clienteles may favor different companies because of their respective dividend policies which suit their saving and consumption decisions best.

Up to now, there are two kinds of empirical approaches in order to verify the behavioral theory of corporate dividend policy – with both of them being of a somewhat indirect character. First of all, one may show that traditional approaches like tax considerations, signaling aspects, and agency problems are not suited to explain actual corporate dividend policies and thus conclude that there must be "something else", i.e. behavioral aspects of dividend policy (see, e.g., Baker et al., 2007). Secondly, one may refer to potential clientele effects which may have a behavioral background compatible to the approaches presented above. For instance, the early empirical study of Lease et al. (1976) supports the theoretical conclusions of Shefrin and Statman (1984) by comparing the investment decisions of different clienteles distinguished by demographic factors. According to their study, different clienteles prefer stocks with different dividend to earnings ratios. While young people favor stocks with lower dividend payments, the elderly prefer stocks with high dividend payments. No possible reason other than mental editing can account for this outcome, since both groups can achieve the same consumption position selling a portion of

their stock holdings on their own. The empirical study of Graham and Kumar (2006) focuses on the relation between portfolio structures and demographic factors and confirms the earlier findings of Lease et al. (1976) as well.

Apparently, there is a lack of studies examining in a more direct way the relevance of behavioral aspects in corporate dividend policy. The simple reason for this problem is that one would need access to investors' preference parameters for different firms under consideration in order to identify the consequences of those differences for corporate dividend policy. In this paper, we want to resolve this issue by referring to differences in preference parameters across countries. This makes it possible for us to trace back differences in corporate dividend policies across different countries to behavioral differences among investors, since thanks to the well-documented home bias, a large group of the investors will be from the companies' home country.

Our cross-country approach is also related to recent literature which focuses on the role of cultural determinants for corporate dividend policy. Although such studies can rely on comprehensive cross-country data, cultural analyses still lack a sound theoretical foundation which makes them compatible to economic and financial mainstream approaches. Here lies a clear advantage of investigations based on findings of descriptive decision theory like the one propagated in our paper. Nevertheless, by considering cultural variables as additional controls later in our paper, we are also able to contribute to the issue of whether there are certain relationships between cultural variables and preference parameters known from standard economic theory.

3. Behavioral patterns of corporate dividend policy: a simple model

As outlined in the preceding section, most of the theoretical literature on "behavioral corporate dividend policy" is based on quite an intuitive presentation of the most relevant relationships. To broaden the basis for our empirical examination in the next section, we therefore want to present a formal model in order to derive our hypotheses.

The main purpose of our formal model is to demonstrate the relation between dividend policy and the level of time discounting (i.e. investors' "*(Im-) Patience*"), of ambiguity aversion and of loss aversion which have already been mentioned in the informal discussion of the preceding section. Investors will attach a higher weight to future income, if they are patient, and will thus transfer more wealth from the present time to the future; therefore they will not ask for immediate compensation for their investments and will be more willing to wait for dividend payments. Although the aforementioned clientele theories indirectly support these results, there has been no study focusing directly on this aspect of dividend policies. Furthermore, ambiguity aversion should lead to higher dividend payout levels, as ambiguity averse investors will shy away from uncertain investments more and instead prefer to realize their gains. Moreover, we propose that loss averse investors will experience more fear, when they invest in a project with loss probabilities. Since there is a loss possibility linked with corporate investments, loss averse investors may prefer higher dividend ratios.

To grasp these ideas more rigorously, it is necessary to set up a formal model. Unfortunately, at least up to now, such approaches seem to be quite rare in the literature. We only know of Yang et al. (2009) who have tried to analyze in a more formal manner some aspects of behavioral corporate dividend policy. However, they assume a value function that is not completely in line with prospect theory, they refrain from taking ambiguity aversion into account and they do not distinguish between different mental accounts for dividends and assets which are at the core of the general ideas of Shefrin and Thaler (1988). In what follows, we mainly attempt to depict the approach of Shefrin and Thaler (1988) in a more quantitative framework. As opposed to their original work, which focuses on the possible influence of wealth transfer among accounts on household savings, we take a closer look at the subjective perception of these simple transfers by investors.

In order to do so, consider a two-period model (see also Figure 1). At time $t = 1$ a dividend d_1 is paid out, thus reducing the value of the company x_1 (before dividends) to $S_1 =$

$x_1 - d_1$. The company is now investing the remaining value S_1 into its operations yielding an uncertain return r_1 with probability distribution f. At time $t = 2$, the company's value is therefore $S_2 = (1+r_1)\cdot S_1$.

For this very simple setting, we are now interested in that dividend policy d_1 that maximizes the investor's overall utility U which is computed as the sum of utility $u(d_1 - d_1^{(R)})$ and $u(S_1 - S_1^{(R)})$ in the first period and the subjectively discounted expected utility $\int_{-\infty}^{\infty} u(S_2 - S_2^{(R)}) f(r_1) dr_1$ of the second period:

$$U(d_1) := u(d_1 - d_1^{(R)}) + u(S_1 - S_1^{(R)}) + \beta\cdot(2-\delta)\cdot\int_0^{\infty} u(S_2 - S_2^{(R)}) f(r_1) dr_1 + \beta\cdot\delta\cdot\int_{-\infty}^{0} u(S_2 - S_2^{(R)}) f(r_1) dr_1 \quad (1)$$

In (1), the index "(R)" denotes reference values to distinguish between gains and losses, i.e. for $x \in \{d, S\}$ we assume

$$u(x_t - x_t^{(R)}) = \begin{cases} (x_t - x_t^{(R)})^{\alpha^+} \\ -\lambda\cdot(x_t^{(R)} - x_t)^{\alpha^-}, \end{cases} \quad (2)$$

with λ being a loss aversion parameter typically greater than 1 and α^+ as well as α^- being variables that determine the curvature of u in the region of gains and of losses, respectively. Analogously to Shefrin and Thaler (1988), we interpret the term $u(d_1 - d_1^{(R)})$ as the utility contribution of the current income account while $u(S_2 - S_2^{(R)})$ stands for the (uncertain) utility effect of the future income account and $u(S_1 - S_1^{(R)})$ for the investor's current asset account.

The future income account is discounted by a discount factor β. In addition, we want to allow for effects of ambiguity aversion. However, as a general problem, up to now, it is not clear how to formally model ambiguity aversion in a consistent way. As we are mainly interested in comparative static results, we refer to just one main consequence of ambiguity

aversion: Instead of simply evaluating a future alternative by its expected utility, ambiguity averse individuals will levy a discount on this value thus reducing the overall positive utility effect of an alternative. We do so by introducing an ambiguity parameter δ between 1 and 2 where δ = 1 describes the absence of ambiguity aversion and ambiguity aversion gets higher for higher values of δ. As a consequence, the subjectively discounted expected utility is decreasing in ambiguity aversion. Our setting can be interpreted as a simplified version of the approach by Klibanoff et al. (2005).

>>> Insert Figure 1 about here <<<

Certainly, an investor exhibiting such preferences is only boundedly rational, as full rationality would imply to set all reference values equal to zero and the ambiguity aversion parameter equal to 1, neglect the asset account and to discount expected future stock prices by a risk-adjusted capital market interest rate. It is well-known that under these conditions we would arrive at the irrelevancy of corporate dividend policy. Nevertheless, we are interested in the consequences of limited rationality and mental accounting for optimal dividend decisions. In particular, we are asking how loss aversion λ, ambiguity aversion δ, and patience β affect the optimal dividend level d_1. In order to so, we assume $S_2^{(R)}$ to be identical to S_1 which means that the individual is computing the gain or loss of his or her stock holding from $t = 1$ to $t = 2$ in the future income account. We thus have

$$S_2 - S_2^{(R)} = (x_1 - d_1) \cdot (1 + r_1) - (x_1 - d_1) = (x_1 - d_1) \cdot r_1. \qquad (3)$$

In such a situation, there will be a loss in the future income account only for $r_1 < 0$ and thus independent of the specific level of d_1 (at least, as long as dividends at time $t = 1$ are not greater than the overall value of the firm x_1). Nevertheless, the "exposure" for a given negative rate of return is determined by d_1. From this finding, we may directly conclude that higher values of the loss aversion parameter λ will lead to greater dividend levels d_1 at time $t = 1$ just in order to reduce the exposure to losses in the future income account.

Similarly, dividends will also reduce the exposure to uncertainty which affects the utility of the future income account negatively. For investors with higher ambiguity aversion δ, this problem will be more acute and they will prefer to realize capital gains rather than to wait for the uncertain outcomes from investments.

The influence of the patience level β on the optimal dividend level is somewhat more complex. First of all, higher values of β also imply a higher relevance of the utility contribution of the future income account. However, smaller values of d_1 will only be induced by increased values of β if future reference point violations are sufficiently improbable. Otherwise, we should expect to find a *positive* relationship between β and d_1. Therefore, in particular, the mean and the risk of r_1 become relevant as determinants of the relationship between β and d_1. If the overall utility contribution of the future income were indeed negative, the investor would certainly prefer to liquidate his or her stock holding at time $t = 1$. This means that investors who are willing to hold their stocks will be characterized by quite positive subjective expectations regarding future rates of return r_1. Therefore, we should typically observe a negative relationship between β and d_1 for our simple decision problem.

All of our findings so far can also be verified by a more formal analysis of the decision problem under consideration. The maximization of (1) with respect to d_1 thus gives us the following necessary condition for an inner solution:

$$g(d_1) := U'(d_1) = u'(d_1 - d_1^{(R)}) - u'(x_1 - d_1 - S_1^{(R)}) - \beta \cdot (2-\delta) \cdot \int_0^{\infty} u'((x_1 - d_1) \cdot r_1) \cdot r_1 \cdot f(r_1) dr_1$$
$$-\beta \cdot \delta \cdot \int_{-\infty}^{0} u'((x_1 - d_1) \cdot r_1) \cdot r_1 \cdot f(r_1) dr_1 = 0. \qquad (4)$$

First, we observe that as long as g is a decreasing function around the optimal value of d_1, i.e. the sufficient condition for an inner maximum is fulfilled,

$$g'(d_1) = u''(d_1 - d_1^{(R)}) + u''(x_1 - d_1 - S_1^{(R)}) + \beta \cdot (2-\delta) \cdot \int_0^{\infty} u''((x_1 - d_1) \cdot r_1) \cdot r_1^2 \cdot f(r_1) dr_1$$
$$+\beta \cdot \delta \cdot \int_{-\infty}^{0} u''((x_1 - d_1) \cdot r_1) \cdot r_1^2 \cdot f(r_1) dr_1 < 0, \tag{5}$$

the root of g increases when g increases. We therefore just need to study how g changes, when β, δ, and λ change, thus we estimate $\partial g/\partial\beta$, $\partial g/\partial\delta$, and $\partial g/\partial\lambda$:

Dependence on β: Only the last two terms of g depend on β. Due to $\int_0^{\infty} u'((x_1 - d_1) \cdot r_1) \cdot r_1 \cdot f(r_1) dr_1 = \text{Prob}(r_1 > 0) \cdot \text{E}\left[u'((x_1 - d_1) \cdot r_1) \cdot r_1 \,\middle|\, r_1 > 0 \right]$ and the analogous relationship for $r_1 < 0$, we have

$$\frac{\partial g}{\partial \beta} = -(2-\delta) \cdot \text{Prob}(r_1 > 0) \cdot \text{E}\left[u'((x_1 - d_1) \cdot r_1) \cdot r_1 \,\middle|\, r_1 > 0 \right]$$
$$-\delta \cdot \text{Prob}(r_1 < 0) \cdot \text{E}\left[u'((x_1 - d_1) \cdot r_1) \cdot r_1 \,\middle|\, r_1 < 0 \right]. \tag{6}$$

As long as positive rates of return being sufficiently probable, i.e. $\text{Prob}(r_1 > 0)$ being sufficiently large, we get $\partial g/\partial\beta < 0$ and therefore a negative relationship between optimal dividend level d_1 and β. This in turn will be supported by situations where the overall utility from holding the stock until $t = 2$ is positive. As a consequence, for high enough probabilities of positive rates of returns, the investor will be willing to hold the asset until $t = 2$ and optimal dividends d_1 should be decreasing in the investor's patience level β.

Dependence on δ: Again, just the last two summands of g are functions of δ,

$$\frac{\partial g}{\partial \delta} = \beta \cdot \int_0^{\infty} u'((x_1 - d_1) \cdot r_1) \cdot r_1 \cdot f(r_1) dr_1 - \beta \cdot \int_{-\infty}^{0} u'((x_1 - d_1) \cdot r_1) \cdot r_1 \cdot f(r_1) dr_1. \tag{7}$$

This term is clearly positive, as the left integral with positive returns is positive and the right integral with negative returns is negative. This means that the optimal dividend payout level d_1 should be increasing in ambiguity aversion.

Dependence on λ: First, consider a situation without reference point violation at time $t = 1$. Then, regarding $t = 2$, the loss aversion coefficient increases the marginal utility *u'* in

losses, i.e. for $r_1 < 0$, and leaves *u'* otherwise unchanged so that again only the third term of *g* is affected. As $\int_{-\infty}^{0} u'((x_1 - d_1) \cdot r_1) \cdot r_1 \cdot f(r_1) dr_1$ is a *decreasing* function of λ, we get $\partial g/\partial \lambda > 0$.

Now consider a situation with $d_1 < d_1^{(R)}$. Apparently, the first summand of *g* is then a decreasing function of λ as well, confirming our previous comparative static finding. However, only in situations where there is a reference point violation $S_1 < S_1^{(R)}$ with certainty, the sign of $\partial g/\partial \lambda$ *could* become negative. Nevertheless, at least for long-term oriented investors with reference points $S_1^{(R)}$ being identical to former (small) purchasing prices of their shares, we are allowed to refrain from this countervailing effect completely. Moreover, in our empirical analysis we are only analyzing firms with positive earnings during the observation period which also reduces the danger of decreasing stock prices and thus violation of corresponding reference points. As higher loss aversion could lead to smaller optimal dividend payments only for firms with the majority of investors already facing violations of their reference points $S_1^{(R)}$, we consider a positive relationship between optimal dividend payments and loss aversion parameter λ to be the most plausible case.

4. Numerical analysis of cross-country differences in corporate dividend policy

Even if we are thus able to determine reasonable results of comparative statics in a more formal way, it remains interesting if numerical optimizations of d_1 for a set of country-specific variables and return moments will also support our conjecture of d_1 being positively related to λ and negatively related to β across countries. As already pointed out, it is difficult to implement ambiguity aversion in formal decision models. We do have information about the magnitude of ambiguity aversion in our sample of countries, but we do not know adequate values of the ambiguity aversion parameter δ utilized in the previous section for our comparative static analysis. Therefore, we have to refrain from also implementing ambiguity considerations in our numerical investigation.

To become somewhat more specific, we refer to data on subjective preference parameters λ and β from the international test of risk attitudes (INTRA) survey carried out among economics students in 46 countries. A total of 6,000 university students participated in the survey. Each participant was asked to fill in a questionnaire that included several questions on decision making, cultural attitudes, and some information about his or her personal background (Rieger et al., 2011, Wang et al., 2009).

In order to measure time preferences, participants answered several hypothetical questions involving a smaller sooner and a larger later reward (for example (1) money now versus money next month or (2) money now versus money in ten years). The survey includes both matching task and choice task methods in order to determine several time preference parameters. For our numerical analysis we have to rely on a variable "*Patience*" that refers to the one year discount factor, as we have just two points in time, $t = 1$ and $t = 2$, in our formal model. A higher value of this factor corresponds to a higher patience level of the residents of the respective country, ranging from 12 % (Romania) to 83 % (Thailand). It should be mentioned that purchasing power differences were taken into account when asking the questions and that the questions were formulated in the countries' own currencies. Differences between countries were large, even when considering the variation in inflation rates (see Wang et al., 2009, for more details on methodology and results).

Similarly, loss aversion has been determined via hypothetical lotteries with a fifty-fifty chance of winning or losing money. The participants had to declare a minimum acceptable gain prospect of X for a given potential loss of Y both in the domestic currency of the respective countries, so that they were just willing to participate in the lottery. The magnitude of the loss aversion has been estimated from this answer. Its theoretical fundaments go back to Kahnemann and Tversky (1979). In a similar manner, ambiguity aversion has been deduced from well-known Ellsberg's urn experiments where participants can choose a risky or an uncertain alternative with the winning probability (for the same potential payoff) being higher

for the uncertain investment. Therefore, a tendency to invest in the less profitable risky rather than the more profitable uncertain lottery points to a stronger ambiguity aversion.

In addition to β and λ, preference parameters α^+ and α^- have been determined. These parameters, defining the risk attitude in gain and loss domains, are also ascertained by asking participants' willingness to pay for some hypothetical lotteries (see Rieger et al., 2011, for details)

>>> Insert Table 1 about here <<<

In what follows, we utilize these results on students' time and risk preferences as proxies for preference patterns of the whole population in the respective countries. One might criticize such an approach because students are relatively young and inexperienced compared to the rest of a country's society. Yet, several papers in the field of experimental economics have repeated their experiments with non-student (sometimes even with non-human) participants and were able to replicate the findings of the experiments with students. For instance, King et al. (1993) have demonstrated that asset market bubbles occur in a similar way, when professional fund managers instead of university students participate in the markets. In dictator and ultimatum games, Carpenter et al. (2003) have found no significant differences between choices of student and non-student participants. This result has been confirmed later with a trust game designed by Falk et al. (in press). Moreover, since we are focusing on a cross-country empirical comparison, the differences between the students of different countries are more important for our analysis than the absolute levels of loss and ambiguity aversion as well as patience and there is no reason to believe that the differences of these preference parameters should be distributed differently for students compared to general public opinion. Summarizing, time and risk preferences as revealed by students in different countries should enable us to perform reasonable cross-country comparisons even for the field of corporate finance.

In our numerical examination, we assume r_1 to be lognormally distributed with expectation value μ and standard deviation σ taken from the working paper of Rangvid et al. (2010) for 35 countries of the initial 46 ones. For a list of these countries, see Table 1. For ease of exposition, we set reference values for dividends and stock prices at time $t = 1$ to zero. As discussed in the previous section, results are mainly unaffected by a variation of these values. For a similar reason, we are allowed to simply set $x_1 = 100$ without loss of generality.

>>> Insert Table 2 about here <<<

However, in our numerical analysis we have to take into account that investors' expectations with respect to μ must be sufficiently optimistic so that stock holding until time $t = 2$ is really desirable. We therefore adjust μ for each country (if necessary) in such a way that the expected utility contribution of the future income account is nonnegative given the optimal dividend level d_1. In other words: If the reported average returns according to Rangvid et al. (2010) are so low that on the basis of these *ex-post* values an investment in our model from $t = 1$ to $t = 2$ would not have been preferable on average, we adjust the investors' *expected ex-ante* return upwards to overcome this hurdle for investment.

On this basis, we perform a cross-country analysis by computing the optimal level of d_1 predicted by our model for given parameter values of each country. Results of outcomes of corresponding ordinary least squares (OLS) regressions are presented in Table 2. Even with our unambiguous comparative statics regarding the relationship between optimal values of d_1 and preference parameters β and λ, the outcomes of these regressions are of additional interest, as there are six variables simultaneously varying across countries (four preference parameters α^+, α^-, β, and λ as well as two return moments μ and σ). The combined influence of all these variables on the predicted optimal dividend level might a priori undo our previous comparative findings.

Certainly, we may not expect optimal dividends according to our model of Section 3 to be identical to observable real-life dividend levels, as we only allow for six independent variables and do not take country- or company-specific factors into account. Moreover, our model is a simple two-period one which therefore may imply somewhat higher optimal current dividend levels than in reality with a longer planning period. In fact, from our theoretical model, we always get optimal inner solutions for dividend to company value ratios that range from a minimum of 4.41 % for Spain to a maximum of 21.26 % for Romania with an (non-weighted) average value of 10.41 % across all countries under consideration). In general, our results seem to be quite reasonable. For example, for the US, the optimal dividend yield d_1/x_1 amounts to 4.68 %. In reality, according to Reuters Ecowin, average dividend yields from 1990 to 2007 for a subsample of 27 countries under consideration are 2.56 % and thus in fact smaller than in our calculations. However, such deviations in absolute levels are not important for our numerical investigation which simply addresses the issue whether certain preference parameters can explain cross-country differences in dividend policy, while six independent variables including return moments simultaneously vary across countries.

Furthermore, despite globalization, in this cross-country examination, we implicitly assume that a country's dividend policy is mainly determined by preferences of domestic investors. Though this view is certainly a simplification of actual capital market conditions, according to the well-known home bias anomaly, most individuals are reluctant to invest in stocks from other countries than their own. For instance, French and Poterba (1991) report that investors with residence in the U.S., Japan, and the U.K. hold 94 %, 98 %, and 82 % of their equity investments in domestic stocks, respectively. Moreover, recent papers that investigate the influence of cultural differences across countries on corporate dividend policy must ultimately also rely on such an argument. Hence, we deem it admissible to examine the

potential consequences of domestic investors' preferences for optimal corporate dividend policy across countries.

Against this background, the results of Table 2 confirm our analytical findings. The patience level β and loss aversion λ exhibit a highly significant influence on the optimal dividend level d_1 with the predicted signs. We therefore conclude the following three hypotheses on the basis of our numerical and theoretical analysis so far:

H1: In countries with more patient investors (with larger β), the general dividend level is lower than in countries with less patient investors.

H2: In countries with high levels of loss aversion λ, the general dividend level is higher than in countries with low levels of loss aversion.

H3: In countries with high levels of ambiguity aversion δ, the general dividend level is higher than in countries with low ambiguity aversion.

The empirical testing of these hypotheses is the object of the next section.

5. Empirical analysis of cross-country behavioral patterns of corporate dividend policy

For the empirical analysis, we estimate multivariate regression models of corporate dividend policies. While we study mainly behavioral aspects, Section 2 has made it clear that there are other factors that may influence dividend policy besides behavioral dimensions. Therefore, we include a set of company- and country-specific control variables in our regressions. All variables in our regressions are explained in more detail in the following subsections.

5.1 Data on dividend ratios and behavioral dimensions

There are several possible ways in which to measure firms' dividend levels. In particular, one may relate total dividends to total net income (*Div/Inc)*, to total cash flow (*Div/Cash*) or to total sales (*Div/Sales).* All these measures have their merits and weaknesses, for instance, *Div/Inc* can easily be manipulated by firm management. Furthermore, different accounting conventions in different countries aggravate the problem of cross-country

comparability based on this measure. Besides, in some cases, dividends are reported before the final net earnings are reckoned, which also casts doubt on the relevancy of earnings for corporate dividend policy. However, one may expect that firm management will try to manipulate the quotient *Div/Inc* in such a way as it is preferred by shareholders so that the corresponding corporation looks attractive to investors even if firm management is not very successful.

On the other hand, sales and cash flows are only poor proxies for a firm's actual earnings situation. Therefore, we take all three dividend measures into account. For each company in our analysis we take the median values of *Div/Cash*, *Div/Inc*, and *Div/Sales* for the time period between 2005 and 2007. Focusing on median dividend levels across firms seems to be more representative than average values in the case of skewed frequency distributions. The necessary items (dividends, net income, cash flow and sales) to calculate these variables are from the Capital IQ database.

We include a firm in our analysis, only when the data set is complete for the whole observation period for this firm. In order to have a meaningful basis for our cross-country analysis, we also remove countries with less than 10 observations. Moreover, we exclude firms with negative net income, since the ratio *Div/Inc* cannot be compared to positive values in this case. We also omit all financial and utility companies (four digit SIC classification numbers between 6000-6999 and 4900-4949, respectively), since these firms are mostly regulated. In addition, we focus on those countries that are part of the INTRA study and for which we also have information at least on the cultural dimensions according to Schwartz (1994), as we utilize such information for our robustness check. Summarizing, there are 37 countries out of 46 of the INTRA study for which we have such cultural data. From these 37 countries, five have to be omitted due to their small sample size so that we are eventually left with 4,859 firms from 32 countries. Additional information can be found in Table 1.

As described in the previous section, data on investors' loss aversion, ambiguity aversion, and patience levels are taken from the INTRA study of the University of Zurich. In contrast to our numerical approach where we explicitly focused on a one-year measure for time preference, in the empirical part of our study we use as a proxy for patience a more robust measure from the INTRA study that is of greater relevance for multi-period decisions. To be more precise, we look at the percentage of subjects in a country willing to wait in a binary time choice (see Wang et al., 2009, for details).

5.2 Data on control variables

According to our discussion of Section 2, we have to allow for several control variables in our analysis, which may have an impact on corporate dividend policies. Our goal is not to challenge the theories that claim such aspects to be relevant; rather we try to reveal some missing ingredients of corporate dividend policy. We allow for firm-specific as well as country-specific control variables, as mentioned above.

We rely once again on the CapitalIQ database in order to utilize firm specific controls, which are *Firm Size*, *Debt-Equity Ratio*, *Sales Growth*, and *Earnings Risk* in our analysis. Besides, we extend the set of our control variables by categorizing all companies into 49 sectors according to the Fama and French methodology (1997) using 49 industry dummies.

Firm Size is simply defined as the market value of a company in US dollars. The relevance of such a variable is well-known from the empirical literature regarding firm capital structure decisions. The information flow between investors and managers is slower for larger companies, since the shares are spread among more investors, which aggravates externalities and free rider problems attached to manager monitoring. In order to counteract the agency problems resulting from inefficient monitoring, the investors of larger firms will demand higher dividend payouts. We therefore deem it reasonable to control for company size effects also when looking at corporate dividend policy.

Debt-Equity Ratio describes the ratio between the book value of debt and the market value of equity. We would expect a negative relationship between *Debt-Equity Ratio* and our dividend measures because of dividend constraints set by debt holders in order to reduce the agency problems of debt financing.

Sales Growth is the relative increase in the operating revenues of a company from $t-1$ to t. Higher growth rates should lead to smaller dividend levels because of the higher financing needs of growing firms and the reduced problems of free cash flow. Hence, we expect a negative relationship between sales growth and dividends.

With respect to *Firm Size*, *Debt-Equity Ratio*, and *Sales Growth* we once again rely on median values for the time period 2005 to 2007. In addition, we use the standard deviation of net income for the observation period 2005 to 2007 as a proxy for the *Earnings Risk* of a company. Increasing risk will deteriorate agency problems of debt financing thus leading to tighter dividend restrictions imposed by lenders. Moreover, since investors prefer non-decreasing dividend payments over time, dividend payment levels should decrease in firm's riskiness in order to avoid future reference point violations in the current income account. Hence we expect to observe a negative relationship between earnings risks and dividend levels.

In addition to company-specific control variables, we also have several country-specific ones. The data for *Total Taxes* − which stems from Djankov et al. (2009) − expresses country-specific tax ratios. According to our consideration of Section 2, one would expect higher taxes to coincide with lower dividends as capital gains, e.g. profits from stock sales, are generally less heavily taxed than dividend incomes.

We have repeated our empirical analysis with an alternative measure of tax influences which refers to the *differences* in taxation regarding dividends and capital gain (data taken from Fidrmuc and Jacob, 2010, who adopted the concept defined by La Porta et al., 2000, to quantify tax disadvantages of dividends and expanded their analysis to more countries). The

results are the same with this alternative tax measure as well. We refrain from presenting these additional results, since the data on *Tax Differences* are only available for 28 out of all 32 countries.

The index *Protection of Minority Shareholders* is taken from Djankov et al. (2008) and is helpful to control for the relevance of informational asymmetries and agency problems. The same holds true for the *Anti-Self-Dealing Index* – also reported by Djankov et al. (2008) − which measures the extent of legal restrictions of insider trading. For example, higher values of *Protection of Minority Shareholders* point out that it will be easier for outside investors to directly overcome managerial overinvestment problems so that dividend payments may be ceteris paribus higher. In the same vein, the higher the *Anti-Self-Dealing Index*, the more negative incentive effects may be mitigated by effective insider control thus leading to higher dividend payments. To sum up, legal protections of such sort effectively prohibit insiders and majority owners to expropriate minority owners and force the former to payout dividends (La Porta et al., 2000). In any case, it seems necessary to account for these considerations in our analysis. Therefore, we integrate both variables in our regressions.

We standardize both the dependent and independent variables (the mean is set to zero and the standard deviation to one) so that the estimates for regression coefficients are comparable within and across different models. Furthermore, we winsorize all of our dependent variables at a 1 % level in order to reduce the impact of possibly spurious outliers on our results. Table 3 gives an overview of descriptive statistics with respect to all variables in our regressions. As we see, the distributions of *Firm Size*, and *Debt-Equity Ratio* are positively skewed, which contravenes the assumptions of linear regressions. For this reason, we take the natural logarithms of these variables and the resulting distributions fit better for linear regressions, as they are more in line with the normality assumption. Moreover, Table 4 presents the correlation matrix of all independent variables.

>>> Insert Tables 3 and 4 about here <<<

6. Results

In what follows, we will rely on multivariate OLS regression models with *Div/Cash*, *Div/Inc*, and *Div/Sales* being the respective dependent variables: In columns (3) and (4) of Tables 5, 6, and 7 we represent regression results for the time period 2005 to 2007. The first regressions (in column (3)) is only based on the control variables introduced before, while the regressions in column (4) presents results based on all control variables as well as on the three behavioral parameters. For all regressions, we check multicollinearity problems with the help of the variance inflation factor VIF (Kutner et al., 2004). In addition, we take care of serial correlation. While there are some cases in regressions of Section 7, where we have to omit variables due to multicollinearity, there are no problems of serial correlation (Durbin-Watson statistics are always between 1.5 and 2.5).

Our findings are essentially identical for all three dividend measures. The adjusted R^2 is considerably higher when introducing *Patience*, *Loss Aversion*, and *Ambiguity Aversion* as independent variables than without them. Moreover, the signs of the corresponding coefficients are always in line with our hypotheses and different from zero on high significance levels. The most important control variables seem to be *Firm Size, Debt-Equity Ratio, and Total Taxes* with signs in line with our conjectures. *Anti-Self-Dealing Index* and *Protection of Minority Shareholders* have also significant impact on dividends in line with the previous research, but they either do not remain significant after the addition of behavioral variables or signs of their coefficients are reversed. This suggests that our behavioral parameters can capture the impact of these factors that were found to be important determinants of dividend policy before us.

>>> Insert Tables 5, 6, and 7 about here <<<

According to our findings, *Patience*, *Loss Aversion*, and *Ambiguity Aversion* seem to be of high practical importance for the determination of cross-country differences. The influence is also economically significant. An increase of one standard deviation in the

standardized regression coefficient of *Patience* causes a decrease in the original dividend to cash flow (income, sales) ratio of about 5.9 (9.1, 6.9) % of the corresponding mean and thus seems to be economically highly significant. For *Loss Aversion*, a one standard deviation increase in this figure implies an increase in the original dividend to cash flow (income, sales) ratio of 25.6 (21.73, 25.65) % compared to the respective mean value. Once again, this change seems to be of high economic significance. For ambiguity aversion, this effect is even stronger with the corresponding values of 27.2 (29.62, 29.4) %.

7. Discussion

7.1 An alternative observation period

In order to certify that the validity of our results is a recurring and robust phenomenon, we repeat our empirical analysis with the preceding observation period from 2002 to 2004 for the same countries.

For the same set of countries, we have enough data for this time period as well and overall our sample size is even larger for this time period. Our behavioral parameters preserve in all but just one case their high statistical and economical significance for all of the three versions of dependent variables, as is also depicted in Tables 5, 6, and 7. Furthermore, we see again that *Firm Size, Debt-Equity Ratio* and *Total Taxes* feature strong significance levels. Moreover, *Anti-Self-Dealing Index* and *Protection of Minority Shareholders* are not consistently significant with once again altering signs for this alternative time period. Actually, the only difference for this time period is that we observe significant results for *Earnings Risk* both with and without our behavioral parameters as well (but mostly at lower significance levels). Hence, our results are to a great extent time-invariant.

It should also be kept in mind that we use the same data for the country-specific control variables as for the 2005 to 2007 period. Still, we do not deem this a major problem for our robustness check, since country-specific features are only subject to small changes

over time so that the assumption of their time-invariance may be acceptable at least for robustness tests.

7.2 An alternative measure of time preferences

Up to now, our empirical results seem to be quite promising. Nevertheless, our findings critically hinge upon the fact that our cross-country data regarding *Patience*, *Loss Aversion*, and *Ambiguity Aversion* are sufficiently reliable. As our data set is unique, it is difficult to verify its quality. However, at least, it seems possible to compare our data for the *Patience* level with a related variable that is called *Future Orientation*. In the Project Globe (House et al., 2004), leadership and processes within firms were studied with respect to cross-country differences, whereby one of the considered dimensions was "future orientation", reflecting the tendency to think and act in a future-oriented way, such as planning, investing in the future, and delaying gratification. In the survey, managers from 30 of the 32 countries included in our empirical study judged on a scale from one to seven whether people in their country were more present-oriented or more future-oriented. Lower values indicate lower future orientation, whereas higher values indicate higher future orientation. Since the Project Globe only investigates work values in the working environment and is also related to aspects like flexibility of organizations in a country and the level of importance attached to spiritual fulfillment, it is not as adequate for dividend determination as our data underlying the *Patience* variable, but it may be utilized to cross-check the results of the preceding section. First of all, the correlation between *Patience* and *Future Orientation* is 0.62, which is significantly positive at the 1 % level for a two-tailed Pearson correlation test. Replacing *Patience* with *Future Orientation* in our multivariate regression approach actually verifies all of our results of Tables 5 to 7. This is not only true for our main observation period 2005 to 2007, but also for the time period from 2002 to 2004 (with the only exception of loss aversion becoming insignificant for this earlier period). In particular, the influence of Future Orientation is always significantly different from zero at the 1 % level.

7.3 Cultural explanation of dividend payments

According to our results so far, a behavioral explanation seems in fact to add to our understanding of the determinants of corporate dividend policy. However, as has been mentioned in the introduction of our paper, recently, another approach has emerged to explain cross-country differences in corporate dividend policy which refers to cultural variations. The notion of culture seems to attract increasing interest in empirical work on corporate finance (see, for example, the surveys by Reuter, 2010, and by Breuer and Quinten, 2009). A very common definition of "culture" was given by the Dutch researcher Geert Hofstede (1984, p. 82): "Culture is the collective programming of the mind which distinguishes the members of one group or society from those of another." Thereby, values are the most fundamental element of cultures. Values shape attitudes which again form individuals' behavior. There are several different cultural models with the one of Hofstede (2001) certainly being the most prominent one. However, recently, the cultural value model propagated by Schwartz (1994) has attracted particular attention as well.

While Hofstede (1984) distinguishes between four main cultural dimensions (*Individualism/Collectivism*, *Power Distance*, *Masculinity/Femininity*, *Uncertainty Avoidance*), Schwartz relies on six dimensions which are grouped together in three opposing pairs (*Embeddedness* versus (Affective and Intellectual) *Autonomy*, *Hierarchy* versus *Egalitarianism*, *Mastery* versus *Harmony*). These two cultural models have also been analyzed with respect to their relevance in explaining cross-country differences in corporate dividend policy. The papers of Bae et al. (2012), Fidrmuc and Jacob (2010) and Khambata and Liu (2005) investigate the relevance of cultural aspects for dividend policy on the basis of Hofstede's cultural dimensions, while Shao et al. (2010) utilize the Schwartz cultural model. After all, there seems to be evidence that the Hofstede as well as the Schwartz cultural dimensions may explain corporate dividend policy. To be more precise, according to these articles, empirical analysis reveals a negative influence of higher values in the cultural

dimensions of *Mastery*, *Power Distance*, and *Uncertainty Avoidance* on dividend payouts and a positive interrelation between *Embeddedness* as well as *Individualism* and dividends.

Moreover, there are some studies that try to investigate the relevance of *Long-Term Orientation* – a cultural dimension later on introduced by Hofstede. Although this latter variable is not quite easy to understand, there is certainly a connection to time preferences. Results by Bae et al. (2012) as well as Khambata and Liu (2005) suggest a negative influence of this cultural dimension on dividend levels which would be in line with our finding for *Patience* and thus may serve as another robustness check. As *Long-Term Orientation* is however difficult to characterize and only available for 14 of our 32 countries, we refrain from adding this variable to our regressions.

In contrast to behavioral explanations of corporate dividend policy, cultural approaches are – at least for the time being – only loosely connected to generally accepted basic principles of human decision making in economics and finance. As a consequence, empirical investigations in the field of finance that rely on cultural value models have – up to now – only rarely found their way into high-quality finance journals. However, there may be connections between behavioral preference parameters and cultural value models. This holds particularly true, as cultural value models aim at identifying most fundamental concepts of human behavior. We thus would expect that cultural values are also a determinant of behavioral parameters like *Loss Aversion*, *Ambiguity Aversion*, and *Patience* and vice versa. Nevertheless, this issue does not form the main goal of this paper and has to be analyzed in a separate study. In this paper, we simply want to ask whether our behavioral parameters keep their significant influence even if we control for cultural dimensions as well.

The data of the Schwartz cultural variables stem from the Israel Social Science Data Center at the Hebrew University Jerusalem and comprise 93 ethnic groups from 73 countries. The possible range of the values for each variable is from 7 (supremely important) to −1 (opposed to my values). The data of the Hofstede cultural variables have been taken from his

own analysis in 2001. In this edition, which is based on the previous IBM study of Hofstede (1984), scores are listed for 74 countries and regions, partly based on replications and extensions of his former study on different international populations. The minimum score allocated is 5 and the maximum is 112, which has been calculated by weighing the answers to several paper and pen questions.

Results are presented in columns (1) to (2) and (4) to (5) of Tables 8 to 10 for the Schwartz (1994) and columns (3) and (6) for the Hofstede (2001) model. As a consequence of the bipolar character of the Schwartz cultural dimensions, we perform two corresponding regressions – one based on the cultural dimensions of *Embeddedness*, *Hierarchy*, and *Mastery* (columns (1) and (4)), and the other one based on the opposing cultural dimensions of *Autonomy*, *Egalitarianism*, and *Harmony* (columns (2) and (5)) (see, for such an approach. e.g., Kwok and Tadesse, 2006). Because of space restrictions, we present outcomes for bipolar dimensions in the same rows with results for *Autonomy*, *Egalitarianism*, and *Harmony* presented in parentheses. It should be noted that all firm- and country-specific control variables are taken into account as in Tables 5 to 7, but once more due to space limitations we omit reporting their regression coefficients here.

Apparently, the integration of cultural variables in our regression does not affect the general relevance of our behavioral parameters in explaining corporate dividend policy as there are only 3 out of 54 regression coefficients for our behavioral parameters not being significantly different from zero. On the other hand, given the high correlation between many cultural and behavioral variables, multicollinearity becomes however a relevant concern. Indeed, as already mentioned we have to omit some cultural variables due to problems of multicollinearity. This fact might hint at potential relationships between behavioral parameters on the one side and cultural variables on the other. In particular, *Autonomy*, *Hierarchy*, *Harmony*, and *Individualism* seem to be affected by problems of multicollinearity. In these cases, our behavioral parameters are able to substitute for these cultural variables.

Moreover, we utilize the empirical evidence regarding the influence of cultural variables on dividend policy as a cross-check of earlier findings in the literature. With respect to the Schwartz cultural dimensions, results are somewhat disappointing. The negative sign of *Mastery* cannot be confirmed in our study for the time period between 2002 and 2004. Similarly, we cannot verify the findings regarding the relevance of *Embeddedness*, as this variable is not always significant and its sign is negative in contrast to the results of Shao et al. (2010). But these results are altogether not too surprising, since Shao et al. (2010) have only analyzed 22 countries compared to our 32 countries, which can change outcomes quite drastically.

On the other hand, the Hofstede cultural dimensions and their influence on dividend policy have been studied more extensively; hence, we expect their influence to be more robust. Indeed, we can confirm the results of the earlier studies investigating the influence of these cultural dimensions, as *Power Distance* and *Uncertainty Avoidance* have a negative and significant impact on dividend payout levels. Furthermore, we have also found evidence for a negative relationship between *Masculinity* and dividend payout levels, yet to a lesser extent.

To recap, our empirical analysis suggests that the Schwartz cultural variables can be substituted by behavioral parameters, but not the other way around, as the behavioral parameters remain strongly significant even after the inclusion of cultural variables. On the other hand, none of the Schwartz cultural variables has a consistent impact on dividend policy for both time periods after controlling for behavioral parameters; sometimes their signs even change over time. Yet, the Hofstede cultural variables carry a more important meaning for dividend policies and – to a certain extent – they can coexist with our behavioral parameters, as both dimensions feature mostly very significant estimates, which agree with the earlier cultural finance studies as well. In this respect, our paper raises the issue of what are the reasons for this potential "coexistence" of behavioral and cultural variables, because an

answer to this question would help us to identify the value added by cultural studies in the field of finance.

>>> Insert Tables 8, 9, and 10 about here <<<

8. Conclusions

The main objective of our study was to investigate the relevance of behavioral preference patterns for corporate dividend policy. To be more precise, we showed analytically, numerically and empirically that there is a negative (positive, positive) relationship between investors' patience level (loss aversion, ambiguity aversion) and dividends. As we relied on cross-country comparisons for the numerical and empirical part of our study, we also contributed to the literature researching the differences in corporate dividend policies across countries. Behavioral preference parameters like loss aversion, ambiguity aversion, and patience can capture the impact of the Schwartz cultural variables and can coexist with the Hofstede variables (with the exception of multicollinearity problems regarding *Individualism*). Hence, our study demonstrates also that the Hofstede cultural dimensions are superior to the variables of Schwartz in explaining financial decisions and they complement behavioral parameters to a certain extent and cannot be completely substituted by them. In addition to our findings regarding *Individualism*, in a number of cases, behavioral and Schwartz cultural parameters are also highly correlated so that one of them has to be omitted in our regressions. Certainly, in such situations one should rely on behavioral parameters because of their unambiguous economic relevance, while cultural variables are much harder to interpret from an economical point of view. In fact, the economic background of cultural values is up to now still an underresearched area and the link to economic terms should be carefully examined by future work.

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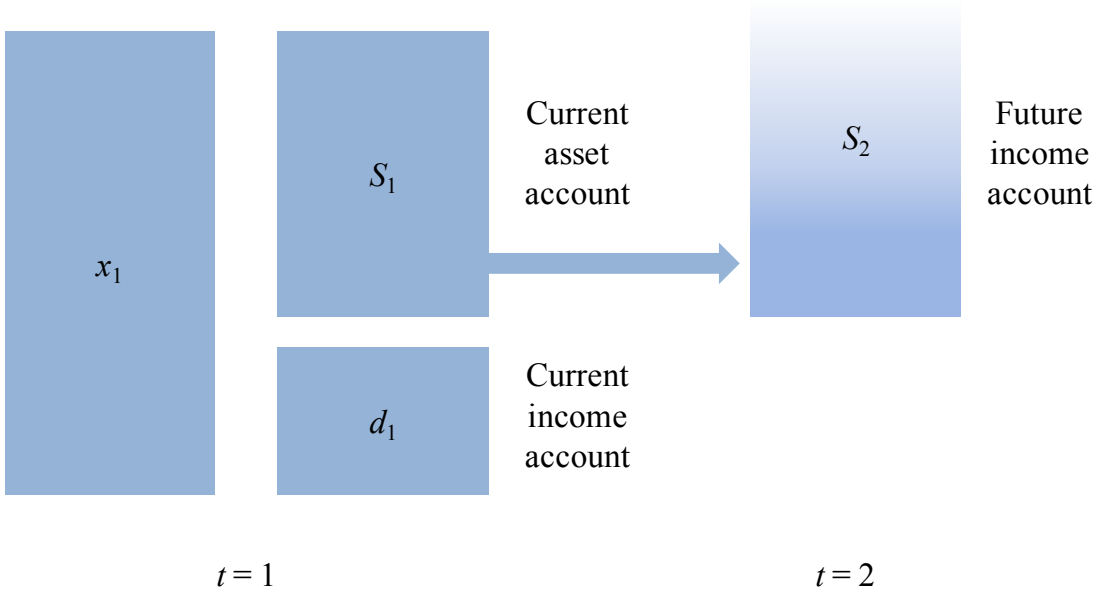

Figure 1: Illustration of our two-period model and its three mental accounts

Country	***Number of Firms in Sample***	***Missing Elements on Country Level***
Argentina	25	
Australia	180	
Austria	29	
Canada	225	
Chile	52	*Future Orientation*
China	166	
Croatia*	8 (< 10)	Hofstede Cultural Variables, *Future Orientation*
Czech Republic	5 (< 10)	*Future Orientation*
Denmark	39	
Estonia*	6 (< 10)	*ASD Index*, *Future Orientation*
Germany	183	
Greece	44	
Hong Kong	206	
Hungary	9 (<10)	
Ireland	19	
Israel	36	
Italy	68	
Japan	714	
Korea South	202	
Malaysia	224	
Mexico	41	
The Netherlands	56	
New Zealand	38	
Nigeria*	14	
Norway	40	*Future Orientation*
Portugal	18	
Romania	7 (< 10)	*Future Orientation*
Russia	30	
Slovenia	11	*ASD Index*, Hofstede Cultural Variables
Spain	56	
Sweden	84	
Switzerland	97	
Taiwan	294	
Thailand	140	
Turkey	43	
United Kingdom	329	
USA	1,167	

Countries marked with an asterisk ("*") could not be considered in our numerical analysis of Section 4. Countries marked by "(< 10)" in the second column were excluded from our empirical study of Sections 5 and 6. Moreover, Colombia entered our numerical analysis, but not the empirical study due to a complete lack of cultural variables.

Table 1: A list of all 37 countries entering the INTRA study for which cultural variables are available and their consideration in our numerical and empirical investigation

Independent Variables	***Dependent Variable: dividend d_1***		
Patience	-0.480		-0.458
	*-3.145***		*3.555****
Loss Aversion		0.509	0.489
		*3.401****	*3.792****
Constant (*t*-values)	*7.602****	*7.355****	*6.920****
R^2	0.231	0.260	0.469
F	*8.891****	*11.567****	*14.141****
Standard error	0.04	0.039	0.034
Observations	35	35	35
Adjusted R^2	0.207	0.237	0.436

Least squares regressions of dividend on the behavioral preference parameters based on a numerical analysis for a cross-section of countries. *** $p \leq 1$ %, ** $p \leq 5$ %, * $p \leq 10$ %. *t*-values directly below regression coefficients.

Table 2: Results of regressions of dividend on behavioral preference parameters

Variable	Mean	S.D.	Min	Max	N
Div/Cash	0.20	0.20	0	0.71	4870
Div/Inc	0.28	0.26	0	0.85	4870
Div/Sales	0.02	0.03	0	0.11	4870
Behavioral Variables					
Patience	0.69	0.11	0.08	0.89	4870
Future Orientation	4.09	0.34	3.06	4.80	4778
Loss Aversion	3.81	3.11	0.43	13.66	4870
Ambiguity Aversion	0.66	0.47	0	1	4870
Company-Specific Control Variables					
Company Size	6.19	2.24	-7.62	13.01	4870
Debt-Equity Ratio	-2.15	1.52	-12.16	0.67	4870
Earnings Risk	76.25	309.33	0,00	8421	4870
Sales Growth	0.42	11.16	0.40	719.70	4870
Country-Specific Control Variables					
Total Taxes	45.71	12.18	24.35	107.38	4870
Protection of Minority Shareholders	5.60	0.62	3.70	6.50	4870
ASD-Index	0.62	0.20	0.17	0.96	4859
Cultural Variables (Schwartz)					
Embeddedness	3.53	0.25	3.21	3.97	4870
Hierarchy	2.42	0.47	1.55	3.75	4870
Mastery	3.99	0.33	3.13	4.64	4870
Autonomy	4.06	0.53	2.33	5.16	4870
Egalitarianism	4.57	0.38	3.77	5.42	4870
Harmony	3.81	0.60	2.61	4.92	4870
Cultural Variables (Hofstede)					
Power Distance	50.25	18.30	11	104	4859
Individualism	59.22	28.71	17	91	4859
Masculinity	60.17	19.79	5	95	4859
Uncertainty Avoidance	58.36	22.00	23	112	4859

Table 3: Summary statistics for all variables in our regression models

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	*Div/Cash*	1.00																							
2	*Div/Inc*	0.82***	1.00																						
3	*Div/Sales*	0.74***	0.71***	1.00																					
4	*Patience*	-0.10***	-0.13***	-0.15***	1.00																				
5	*Future*	-0.13**	-0.14***	-0.16***	0.62***	1.00																			
6	*Loss Aversion*	0.27***	0.25***	0.25***	-0.40***	-0.12***	1.00																		
7	*Ambiguity Aversion*	0.23***	0.25***	0.18***	-0.03**	-0.18***	0.02	1.00																	
8	*Company Size*	-0.01	0.00	0.09***	0.05***	0.09***	-0.21***	-0.11***	1.00																
9	*Debt-Equity Ratio*	-0.08***	-0.02	-0.08***	-0.02	-0.01	0.00	-0.03**	0.06***	1.00															
10	*Sales Growth*	0.01	0.00	0.03**	0.02	-0.01	-0.01	-0.01	0.01	0.00	1.00														
11	*Earnings Risk*	-0.02	-0.01	0.07***	0.03*	0.03**	-0.05***	-0.07***	0.40***	0.06***	0.00	1.00													
12	*Total Taxes*	-0.13***	-0.12***	-0.12***	-0.18***	-0.20***	-0.07***	-0.08***	0.13***	0.02	-0.01	0.00	1.00												
13	*Protection of MSH*	-0.05***	-0.07***	-0.09***	0.40***	0.72***	-0.04***	-0.43***	0.07***	0.00	0.01	0.04***	-0.27***	1.00											
14	*ASD-Index*	0.14***	0.09***	0.16***	-0.24***	-0.10***	0.51***	0.06***	-0.16***	-0.03**	0.00	-0.06***	-0.33***	0.11***	1.00										
15	*Embed-dedness*	0.03**	0.06***	-0.02	0.13***	-0.14***	-0.15***	0.59***	-0.01	-0.04***	0.01	-0.05***	0.19***	-0.45***	-0.14***	1.00									
16	*Hierarchy*	-0.02	-0.01	-0.06***	0.22***	-0.07***	-0.09***	0.48***	0.02*	-0.05***	-0.01	-0.05***	0.22***	-0.40***	0.04**	0.85***	1.00								
17	*Mastery*	-0.12***	-0.10***	-0.16***	0.45***	0.21***	-0.30***	0.23***	0.16***	0.00	0.01	0.01	0.38***	-0.13***	-0.30***	0.59***	0.74***	1.00							
18	*Autonomy*	-0.09***	-0.06***	-0.17***	0.55***	0.53***	-0.33***	0.06***	0.21***	0.03	0.01	0.06***	0.24***	0.34***	-0.47***	0.20***	0.27***	0.75***	1.00						
19	*Egalitarianism*	-0.04**	-0.01	-0.09***	0.42***	0.39***	-0.30***	0.01	0.19***	0.06***	0.03*	0.09***	0.16***	0.27***	-0.51***	-0.03**	-0.01	0.53***	0.87***	1.00					
20	*Harmony*	0.06***	0.12***	-0.02	0.31***	0.19***	-0.18***	0.36***	0.12***	0.01	0.01	0.02	0.30***	0.00	-0.60***	0.46***	0.34***	0.63***	0.80***	*0.74***	1.00				
21	*Power*	0.09***	0.09***	0.11***	-0.34***	-0.31***	0.31***	0.48***	-0.17***	-0.06***	-0.01	-0.05***	0.01	-0.61***	0.24***	0.48***	0.36***	-0.12***	-0.49***	*-0.57***	*-0.13***	1.00			
22	*Individualism*	-0.18***	-0.21***	-0.16***	0.10***	0.44***	-0.15***	-0.69***	0.19***	0.05***	0.00	0.08***	0.08***	0.68***	0.05***	-0.69***	-0.54***	-0.11***	0.26***	*0.30***	*-0.22***	*0.75***	1.00		
23	*Masculinity*	-0.20***	-0.16***	-0.22***	0.16***	0.28***	-0.11***	-0.01	0.15***	-0.06***	0.04***	-0.03**	0.34***	0.12***	-0.02	0.24***	0.43***	0.53***	0.48***	*0.13***	*0.32***	*0.36***	*012***	1.00	
24	*Uncertainty Avoidance*	-0.09***	0.01	-0.12***	-0.07***	-0.18***	-0.30***	0.30***	0.07***	-0.02	-0.02	-0.02	0.21***	-0.32***	-0.62***	0.43***	0.29***	0.35***	0.30***	*0.16***	*0.54***	*0.10***	*-0.39***	0.35***	1.00

Table 4: Correlation matrix: Correlation coefficients and corresponding significance. *** $p \leq 1$ %, ** $p \leq 5$ %, * $p \leq 10$ %

Independent Variables	***Dependent Variable: Div/Cash***			
	2002-2004		2005-2007	
	(1)	*(2)*	*(3)*	*(4)*
Patience		*-0.144*		*-0.059*
		*-10.193****		*-3.549****
Loss Aversion		*0.090*		*0.256*
		*5.725****		*15.358****
Ambiguity Aversion		*0.203*		*0.272*
		*12.295****		*17.008****
Firm Size	*0.265*	*0.266*	*0.033*	*0.089*
	*21.998****	*22.567****	*2.089***	*5.819****
Debt-Equity Ratio	*-0.081*	*-0.064*	*-0.085*	*-0.082*
	*-6.917****	*-5.646*	*-5.878****	*-5.993****
Earnings Risk	*-0.027*	*-0.023*	-0.010	-0.012
	*-2.311***	*-2.016***	-0.641	-0.825
Sales Growth	-0.005	-0.005	0.009	0.010
	-0.399	-0.481	0.641	0.794
Total Taxes	*-0.065*	*-0.037*	*-0.105*	*-0.100*
	*-5.108****	*-2.649****	*-6.790****	*-6.591****
Protection Minority SH	*-0.032*	*0.138*	*-0.078*	*0.096*
	*-2.698****	*9.483****	*-5.186****	*5.309****
Anti-Self-Dealing Index	*0.120*	*0.043*	*0.104*	*-0.095*
	*9.444****	*3.050****	*6.873****	*-5.582****
Industry Dummies	Yes	Yes	Yes	Yes
Constant (*t*-values)	-0.653	*-8.628****	*7.533****	*-5.211****
R^2	0.151	0.196	0.075	0.177
F	*23.489****	*30.387****	*7.806****	*19.465****
Observations	6,660	6,660	4,859	4,859
Adjusted R^2	0.144	0.190	0.065	0.168

Least squares regressions of dividend to cash flow ratio on the behavioral dimensions for a cross-section of firms from up to 32 countries. *** $p \leq 1$ %, ** $p \leq 5$ %, * $p \leq 10$ %. *t*-values below regression coefficients.

Table 5: Results of regressions of *DivCash* on *Patience* and *Loss Aversion* controlling for several other factors

Independent Variables	***Dependent Variable: Div/Inc***			
	2002-2004		2005-2007	
	(1)	*(2)*	*(3)*	*(4)*
Patience		*-0.106*		*-0.098*
		*-7.594****		*-5.867****
Loss Aversion		*0.019*		*0.234*
		1.212		*14.005****
Ambiguity Aversion		*0.256*		*0.319*
		*15.680****		*19.911****
Firm Size	*0.314*	*0.310*	*0.035*	*0.090*
	*26.396****	*26.579****	*2.194***	*5.897****
Debt-Equity Ratio	*-0.039*	*-0.023*	*-0.032*	*-0.028*
	*-3.345****	*-2.037***	*-2.192***	*-2.030***
Earnings Risk	*-0.032*	*-0.027*	-0.017	-0.017
	*-2.810****	*-2.473***	-1.124	-1.198
Sales Growth	-0.007	-0.008	0.001	0.003
	-0.652	-0.697	0.057	0.231
Total Taxes	*-0.041*	-0.009	*-0.099*	*-0.090*
	*-3.217****	-0.653	*-6.331****	*-5.972****
Protection Minority SH	0.006	*0.161*	*-0.068*	*0.143*
	0.491	*11.164****	*-4.498****	*7.928****
Anti-Self-Dealing Index	*0.068*	-0.007	*0.058*	*-0.150*
	*5.414****	-0.507	*3.781****	*-8.764****
Industry Dummies	Yes	Yes	Yes	Yes
Constant (*t*-values)	*2.613****	*-11,086****	*8.761****	*-5.534****
R^2	0.170	0.214	0.058	0.175
F	*27.118****	*33.973****	*5.947****	*19.289****
Observations	6,660	6,660	4,859	4,859
Adjusted R^2	0.164	0.208	0.048	0.166

Least squares regressions of dividend to earnings ratio on the behavioral dimensions for a cross-section of firms from up to 32 countries. *** $p \leq 1$ %, ** $p \leq 5$ %, * $p \leq 10$ %. *t*-values below regression coefficients.

Table 6: Results of regressions of *Div/Inc* on *Patience* and *Loss Aversion* controlling for several other factors

Independent Variables	***Dependent Variable: Div/Sales***			
	2002-2004		2005-2007	
	(1)	*(2)*	*(3)*	*(4)*
Patience		*-0.117*		*-0.046*
		*-8.219****		*-2.730****
Loss Aversion		*0.084*		*0.171*
		*5.295****		*10.201****
Ambiguity Aversion		*0.164*		*0.196*
		*9.858****		*12.174****
Firm Size	*0.263*	*0.264*	*0.105*	*0.143*
	*21.897****	*22.320****	*6.745****	*9.301****
Debt-Equity Ratio	*-0.061*	*-0.047*	*-0.097*	*-0.094*
	*-5.227****	*-4.111****	*-6.840****	*-6.858****
Earnings Risk	*-0.024*	*-0.020*	0.004	0.003
	*-2.051***	*-1.800**	0.253	0.190
Sales Growth	0.001	0.000	0.015	0.016
	0.071	0.012	1.074	1.191
Total Taxes	*-0.052*	*-0.025*	*-0.097*	*-0.092*
	*-4.059****	*-1.796**	*-6.369****	*-6.018****
Protection Minority SH	*-0.074*	*0.068*	*-0.125*	0.001
	*-6.265****	*4.662****	*-8.488****	0.058
Anti-Self-Dealing Index	*0.135*	*0.074*	*0.116*	*-0.021*
	*10.609****	*5.165****	*7.871****	*-1.235****
Industry Dummies	Yes	Yes	Yes	Yes
Constant (*t*-values)	1.516	*-5.847****	*7.681****	*-2.120***
R^2	0.156	0.187	0.114	0.164
F	*24.360****	*199.695****	*12.376****	*17.749****
Observations	6,660	6,660	4,859	4,859
Adjusted R^2	0.149	0.181	0.105	0.154

Least squares regressions of dividend to earnings ratio on the behavioral dimensions for a cross-section of firms from up to 32 countries. *** $p \leq 1$ %, ** $p \leq 5$ %, * $p \leq 10$ %. t-values below regression coefficients.

Table 7: Results of regressions of *Div/Sales* on *Patience* and *Loss Aversion* controlling for several other factors

Independent Variables	***Dependent Variable: Div/Cash***					
	2002-2004			2005-2007		
	(1)	(2)	(3)	(4)	(5)	(6)
Patience	*-0.159*	*-0.168*	*-0.166*	-0.015	*-0.065*	*-0.076*
	*-8.326****	*-11.558****	*-9.097****	-0.731	*-3.768****	*-4.048****
Loss Aversion	*0.097*	*0.096*	*0.053*	*0.248*	*0.275*	*0.254*
	*5.888****	*6.111****	*3.248****	*14.860****	*15.267****	*15.207****
Ambiguity Aversion	*0.213*	*0.176*	*0.262*	*0.303*	*0.327*	*0.364*
	*11.896****	*10.397****	*13.521****	*16.925****	*13.500****	*19.630****
Embeddedness (Autonomy)	-0.022	(MC)		*-0.053*	(MC)	
	-0.936	(MC)		*-2.502***	(MC)	
Hierarchy (Egalitarianism)	*-0.074*	*0.103*		MC	*0.120*	
	*-2.341***	*6.697****		MC	*4.500****	
Mastery (Harmony)	*0.082*	(MC)		*-0.050*	*-0.119*	
	*3.503****	(MC)		*-2.267***	*-3.328****	
Power Distance			*-0.055*			*-0.125*
			*-3.360****			*-6.531****
Individualism			MC			MC
			MC			MC
Masculinity			*-0.039*			*-0.111*
			*-2.321***			*-5.552****
Uncertainty Avoidance			*-0.101*			*-0.139*
			*-4.470****			*-5.173****
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant (*t*-values)	*-4.694****	*-10.881****	*-2.559***	-0.790	*-6.884****	-1.070
R^2	0.198	0.201	0.205	0.181	0.180	0.215
F	*29.174****	*30.852****	*30.475****	*19.260****	*19.197****	*23.439****
Observations	6,660	6,660	6,660	4,859	4,859	4,859
Adjusted R^2	0.192	0.195	0.199	0.171	0.171	0.206

Several robustness checks of the impact of behavioral dimensions on the dividend to cash flow ratio for a cross-section of countries. In linear regression models (1), (2), (4), and (5) the relevance of the cultural dimensions of Schwartz (1994) in explaining dividend payments is examined. In the linear regression models (3) and (6) the same is done with respect to the cultural dimensions according to Hofstede (2001). Firm- and country-specific control variables enter all regressions as in columns (3) and (6) of Tables 5 to 7, but results are not presented. MC: Omitted variable due to multicollinearity. *** $p \leq 1$ %, ** $p \leq 5$ %, * $p \leq 10$ %. *t*-values below regression coefficients.

Table 8: Results of regressions of *Div/Cash* on various additional variables as robustness checks

Independent Variables	***Dependent Variable: Div/Inc***					
	2002-2004			2005-2007		
	(1)	(2)	(3)	(4)	(5)	(6)
Patience	*-0.151*	*-0.140*	*-0.117*	*-0.080*	*-0.110*	*-0.104*
	*-8.011****	*-9.811****	*-6.447****	*-3.927****	*-6.352****	*-5.466****
Loss Aversion	*0.041*	*0.027*	-0.005	*0.228*	*0.243*	*0.240*
	*2.529***	*1.767**	-0.293	*13.601****	*13.455****	*14.250****
Ambiguity Aversion	*0.244*	*0.217*	*0.293*	*0.347*	*0.348*	*0.387*
	*13.750****	*13.027****	*15.245****	*19.329****	*14.359****	*20.663****
Embeddedness (Autonomy)	*,044*	(MC)		*-0.063*	(MC)	
	*1.891**	(MC)		*-2.951****	(MC)	
Hierarchy (Egalitarianism)	*-0.133*	*0.148*		MC	*0.107*	
	*-4.271****	*9.767****		MC	*4.028****	
Mastery (Harmony)	*0.139*	(MC)		-0.002	*-0.071*	
	*6.050****	(MC)		-0.105	*-1.994***	
Power Distance			*-0.061*			*-0.135*
			*-3.734****			*-7.027****
Individualism			MC			MC
			MC			MC
Masculinity			-0.020			*-0.090*
			-1.184			*-4.424****
Uncertainty Avoidance			*-0.048*			*-0.080*
			*-2.153***			*-2.942****
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant (*t*-values)	*-9.146****	*-14.624****	*-5.240****	-1.745*	*-6.753****	*-1.616*
R^2	0.219	0.225	0.218	0.178	0.179	0.200
F	*32.988****	*35.587****	*32.799****	*18.848****	*18.990****	*21.383****
Observations	6,660	6,660	6,670	4,859	4,859	4,859
Adjusted R^2	0.212	0.219	0.211	0.168	0.169	0.190

Several robustness checks of the impact of behavioral dimensions on the dividend to net income ratio for a cross-section of countries. In linear regression models (1), (2), (4), and (5) the relevance of the cultural dimensions of Schwartz (1994) in explaining dividend payments is examined. In the linear regression models (3) and (6) the same is done with respect to the cultural dimensions according to Hofstede (2001). Firm- and country-specific control variables enter all regressions as in columns (3) and (6) of Tables 5 to 7, but results are not presented. MC: Omitted variable due to multicollinearity. *** $p \leq 1$ %, ** $p \leq 5$ %, * $p \leq 10$ %. *t*-values below regression coefficients/.

Table 8: Results of regressions of *Div/Inc* on various additional variables as robustness checks

Independent Variables	***Dependent Variable: Div/Sales***					
	2002-2004			2005-2007		
	(1)	(2)	(3)	(4)	(5)	(6)
Patience	-0.103	-0.129	-0.145	0.023	-0.033	-0.068
	-5.369***	-8.823***	-7.928***	1.111	-1.894*	-3.525***
Loss Aversion	0.078	0.087	0.049	0.159	0.207	0.162
	4.687***	5.485***	2.953***	9.480***	11.407***	9.587***
Ambiguity Aversion	0.191	0.150	0.224	0.247	0.290	0.279
	10.620***	8.765***	11.541***	13.724***	11.897***	14.843***
Embeddedness (Autonomy)	-0.057	(MC)		-0.090	(MC)	
	-2.404**	(MC)		-4.224***	(MC)	
Hierarchy (Egalitarianism)	-0.043	0.054		MC	0.091	
	-1.351	3.461***		MC	3.392***	
Mastery (Harmony)	0.034	(MC)		-0.073	-0.183	
	1.455	(MC)		-3.303***	-5.077***	
Power Distance			*-0.034*			*-0.074*
			*-2.029***			*-3.818****
Individualism			MC			MC
			MC			MC
Masculinity			*-0.036*			*-0.093*
			*-2.159***			*-4.591****
Uncertainty Avoidance			*-0.120*			*-0.146*
			*-5.257****			*-5.354****
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant (*t*-values)	-1.257	*-6.798****	-0.611	*3.335****	*-3.985****	0.605
R^2	0.190	0.189	0.197	0.174	0.168	0.193
F	*27.657****	*28.424****	*26.917****	*18.352****	*17.665****	*20.447****
Observations	6,660	6,660	6,660	4,859	4,859	4,859
Adjusted R^2	0.183	0.182	0.190	0.164	0.159	0.183

Several robustness checks of the impact of behavioral dimensions on the dividend to sales ratio for a cross-section of countries. In linear regression models (1), (2), (4), and (5) the relevance of the cultural dimensions of Schwartz (1994) in explaining dividend payments is examined. In the linear regression models (3) and (6) the same is done with respect to the cultural dimensions according to Hofstede (2001). Firm- and country-specific control variables enter all regressions as in columns (3) and (6) of Tables 5 to 7, but results are not presented. MC: Omitted variable due to multicollinearity. *** $p \leq 1$ %, ** $p \leq 5$ %, * $p \leq 10$ %. *t*-values below regression coefficients.

Table 8: Results of regressions of *Div/Sales* on various additional variables as robustness checks