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Abstract	<p>In this article, we evaluate CEO behavior in terms of his or her preferences to risk, and how the actions of boards of directors interplay with these behaviors. Specifically, we set out to test whether the actions of boards of directors can overcome the negative impacts of CEO behavior on various aspects of payout policy. We set out to examine these tendencies in terms of the levels of payout, the propensity to pay, and the choice of payout channel utilized. We use several compensation-based proxies to measure CEO risk preferences on a sample of non-financial and non-utility companies from the US for 2007 to 2016 from the S&P 1500 Index. Our contribution is threefold. First, the findings fill the gaps in the research on the impact of CEO risk preferences on the decision to start paying dividends and on the decisions to switch between cash dividend and share repurchase. The results indicate that CEOs who are encouraged by the boards to take more risks paid out more through repurchases, while less risky CEOs are more likely to initiate paying</p>	

dividends. Second, by means of quantile regression we demonstrate that the level of repurchases is more sensitive to the CEO's risk preferences in the companies from top quartiles. Third, by introducing our index of corporate governance quality, we may document that corporate governance tools reduce or even eliminate the negative effects of CEO risk preferences. In companies with high corporate governance index, the risk preferences of the CEO do not affect payout decisions.

Keywords (separated by '-') Corporate governance - Payout policy - CEO risk preferences - Share repurchase

JEL Classification (separated by '-') G34 - G35 - G40

Footnote Information



1 Do boards of directors affect CEO behavior? Evidence 2 from payout decisions

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4
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6 Abstract

7 In this article, we evaluate CEO behavior in terms of his or her preferences to risk, **AQ1**
8 and how the actions of boards of directors interplay with these behaviors. Specifi-
9 cally, we set out to test whether the actions of boards of directors can overcome the
10 negative impacts of CEO behavior on various aspects of payout policy. We set out
11 to examine these tendencies in terms of the levels of payout, the propensity to pay,
12 and the choice of payout channel utilized. We use several compensation-based prox-
13 ies to measure CEO risk preferences on a sample of non-financial and non-utility
14 companies from the US for 2007 to 2016 from the S&P 1500 Index. Our contribu-
15 tion is threefold. First, the findings fill the gaps in the research on the impact of CEO **AQ2**
16 risk preferences on the decision to start paying dividends and on the decisions to
17 switch between cash dividend and share repurchase. The results indicate that CEOs
18 who are encouraged by the boards to take more risks paid out more through repur-
19 chases, while less risky CEOs are more likely to initiate paying dividends. Second,
20 by means of quantile regression we demonstrate that the level of repurchases is more
21 sensitive to the CEO's risk preferences in the companies from top quartiles. Third,
22 by introducing our index of corporate governance quality, we may document that
23 corporate governance tools reduce or even eliminate the negative effects of CEO
24 risk preferences. In companies with high corporate governance index, the risk pref-
25 erences of the CEO do not affect payout decisions. **AQ3**

26 **Keywords** Corporate governance · Payout policy · CEO risk preferences · Share
27 repurchase

28 **JEL Classification** G34 · G35 · G40

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29 1 Introduction

30 Recent research has shown that the behavioral characteristics of chief executive
31 officers (CEOs) may affect a company's payout policy. The risk preferences of CEOs
32 are among such behavioral characteristics. Given the significance of risk tolerance
33 and a specific CEO's appetite for risk, the board of directors set up a framework
34 to determine the level of risk that the CEO should take. Within such a framework,
35 the incentives component of executive pay packages could play an important role.
36 Research shows that a CEO will pay out less to investors if his or her compensation
37 plan is risk-oriented (Sundaram and Yermack 2007; Burns et al. 2015; Geiler and
38 Renneboog 2016), and a CEO will pay out more if the compensation is less risk-
39 oriented (Minnick and Rosenthal 2014). Risk-averse CEOs also tend to pay higher
40 dividends despite market trends and investor preferences (Sundaram and Yermack
41 2007; Caliskan and Doukas 2015).

42 In addition to compensation policies, a board of directors may use its monitoring
43 power to induce CEOs to pay out more (Bhabra and Luu 2015; Yarram and Dollery
44 2015; Detthamrong et al. 2017; Green and Homroy 2018). It is assumed that if the
45 board of directors is not too small and not too big, and/or if the number of independ-
46 ent directors and women on the board is optimal, the board will be efficient in setting
47 corporate policies and will have sufficient monitoring power. While a CEO's risk
48 preferences may be influenced by different board policies, there is still no clear evi-
49 dence as to whether corporate governance reduces the possible detrimental effects of
50 CEO behavior in payout decisions.

51 Although the literature shows that risk preferences may affect corporate decision-
52 making, there are some limitations. First, the results for total payout are mixed:
53 some authors find positive relationships (Geiler and Renneboog 2016) and others
54 find negative relationships (Cuny et al. 2009). Second, the impact of a CEO's risk
55 preferences on the decision to *start* paying out has not yet been adequately exam-
56 ined. Third, the influence of a CEO's risk preferences on the decisions to *switch*
57 between dividends and share repurchases is also under-studied. Fourth, there are no
58 significant results on the ability of corporate governance to overcome the negative
59 effects of a CEO's risk preferences on various aspects of payout policy.

60 Thus, in filling these informational gaps we aim to improve the understanding
61 of the role of boards of directors in eliminating the negative effects of CEO risk
62 preferences on payout decisions. This paper provides new empirical evidence on the
63 ability of the strategic oversight of boards to offset the possible negative impact of a
64 CEO's risk preferences on payout policy and the choice between dividends or share
65 repurchases.

66 To investigate the remuneration policy as a tool for defining a CEO's risk
67 preferences, we not only examine cash compensation, but also compensation by
68 way of restricted stocks and the relative proportion of total stocks that are owned
69 by the CEO. Cash compensation and restricted stocks have not been assumed to
70 encourage a CEO to take higher risk, because the former component is accounted
71 for by salary, which in almost all cases does not depend on the company's value,
72 whereas the latter component is used to compensate for the achievement of

73 long-term goals. Thus, such CEOs may be reluctant to invest in high-risk projects
74 and may distribute money among the shareholders instead.

75 In contrast, a higher share of stocks in the CEO's remuneration may stimulate
76 CEOs to take additional risks to increase the expected return of the companies'
77 stocks in the short-term and to make some speculative profits. Dividends decrease
78 the price of the shares and the value of the CEO's portfolio. As a result, he or she
79 may end up paying out less to the shareholders and not acting in their interests.

80 Our findings add to the literature in the following ways. First, we fill in the
81 gaps in understanding how CEO risk preferences impact the decision to initiate
82 paying dividends. We then add new empirical results on the role of compensa-
83 tion schemes set up by the boards for a CEO (to prevent him or her from taking
84 more risk) and document how this stimulates higher levels of payout. Given these
85 results, we demonstrate how the boards influence CEO risk preferences through
86 remuneration policies. Our empirical evidence shows that risk preferences affect
87 the probability of starting the payment of cash dividends: less risky CEOs are
88 more likely to initiate cash dividends than riskier ones. The decision to initiate
89 share repurchases is not affected by the risk preferences of the CEOs.

90 Second, our findings show that the quality of the board's work matters for
91 overcoming the possible negative impact of CEO risk preferences on payout poli-
92 cies. By introducing our corporate governance quality index, we differentiated
93 between companies which have higher and lower rankings and show that higher-
94 quality governance may reduce or even eliminate the negative effects of CEO
95 risk preferences on the payout policy. We also found that the ability of corporate
96 governance to eliminate the negative impact of CEO behavior on the payout pol-
97 icy decreases for companies with the highest levels of payout. Risk preferences
98 still significantly influence the level of payout and the choice of payout channel
99 in these companies. We assume that shareholders are satisfied with such levels
100 of payout and do not ask for protection against the negative effects of CEO risk
101 preferences.

102 Third, we provide evidence for the impact of CEO risk preferences on the choice
103 of payout channels. We found that CEOs who were encouraged to take more risks
104 paid out more through repurchases than through dividends to shareholders: the level
105 of total payout is made up mostly of repurchases. We divided the sample into quar-
106 tiles by the size of total payouts and found that companies with the highest levels
107 of payout are more likely to follow a policy of repurchases than companies with
108 the lowest levels of payouts. We show that companies from top quartiles are more
109 affected by the CEOs risk preferences than the companies from the lowest quartiles.
110 From this, we may conclude that the level of repurchases is more sensitive to the
111 CEO's risk preferences in the companies from top quartiles. Therefore the funda-
112 mental financial variables, and not the behavioral ones, determine payout decisions
113 in the companies from the lowest quartiles. It may ultimately be postulated that
114 when a company starts to generate more cash flows, and hence more cash is made
115 available for distribution among shareholders, the CEO's decisions on payout policy
116 become more acutely affected by his or her risk preferences. CEOs may therefore be
117 more inclined to seek more investment opportunities with high risks instead of those
118 with less risky but lower payouts.

119 We organize the paper as follows. In Sect. 2, we review the payout policy litera-
120 ture with respect to the risk preferences of CEOs and the literature on the ability of
121 corporate governance to influence the strategic policies of companies, including the
122 payout policy. Section 3 outlines the hypotheses, and discusses models and data.
123 Section 4 presents the results. Section 5 concludes the analysis and introduces pos-
124 sible future research agendas.

125 2 Literature review

126 Although there are several conceptual explanations of dividend policies and their
127 empirical tests (based on the assumption of rational behavior), they cannot fully
128 explain the drivers of payout decisions. These approaches are not sufficient to fully
129 account for agent behavior, especially when it is subject to biases. The existence
130 of a number of such biases (for example, overconfidence, over-optimism, hindsight,
131 anchoring) and their ability to affect the decisions of top management are already
132 recognized conceptually and have been confirmed in empirical papers (Kahneman
133 and Tversky 1979). In addition to these anomalies, the patterns of behavior of top
134 management, based on a variety of managerial traits beyond individualism and
135 opportunism may be significant drivers of payments to shareholders. According
136 to behavioral studies in finance, CEOs act within bounded rationality; their deci-
137 sions are significantly influenced by cultural values, emotions and cognitive biases
138 (Anilov 2017). Given the leading role of CEOs in the decision-making process, there
139 are a number of existing studies on their personal traits and behavioral biases. Such
140 studies attempt to approximate, for example, the behavioral patterns of top manage-
141 ment and their consequences for key financial decisions on strategic deals (Graham
142 et al. 2013) and capital structure (Chava and Purnanandam 2010). However, direct
143 empirical evidence outlining the behavioral foundations of payout policies is still
144 missing (Baker and Wurgler 2013; Breuer et al. 2014).

145 In this section, we discuss the literature with respect to (1) the determination
146 of CEO risk preference in relation to compensation policy; (2) the effects of risk
147 preferences on the different aspects of payout policy; (3) the quality of corporate
148 governance.

149 2.1 Remuneration policy and CEO risk preferences

150 Managers are assumed to be affected by several biases, which are related to various
151 levels of risk preferences. Given these biases, CEOs may promote a payout policy
152 that may not be the one most favorable for shareholders. It has been shown that the
153 pay-for-performance mix can motivate an agent to change his or her appetite towards
154 risk and therefore it has an impact on corporate policies. Risk-taking CEOs are paid
155 with a higher proportion of performance-based compensation packages and less
156 with cash-based packages.

157 Boards introduce equity-based payments, particularly in the form of stock
158 options, to induce optimal risk-taking behavior (Financial behavior 2017). Stock

159 options allow a CEO to make a profit in two ways. First, a CEO may want to increase
160 the company's equity value to exercise options to get more profit. In this case, a
161 CEO must combine profitable projects with positive NPV while also concentrating
162 on risk control. This is to keep the spread between return on capital and the required
163 rate of return at a positive level for the overall portfolio of projects. Second, he or
164 she may want to increase the volatility of underlying shares to increase the value
165 of the related options. To do so, the CEO needs to invest more heavily in projects
166 with higher risk. As the CEO's investment set increases, so does the risk (Caliskan
167 and Doukas 2015). Higher risk results in higher volatility of the company's stocks,
168 which leads to an increase in the value of executive stock options. This is why he or
169 she would rather pursue investing in projects with a higher-than-average risk factor
170 (from the company's perspective), hoping that it will boost the company's capitaliza-
171 tion, volatility and the CEO's pay (Douglas 2007; Sundaram and Yermack 2007;
172 Burns et al. 2015; Geiler and Renneboog 2016). The evidence also shows that lower
173 risk levels prevail in those firms with low levels of stock options pay in their CEO
174 incentive plans, compared to companies with risky CEOs (Low 2009).

175 To motivate CEOs to adopt less risk, compensation may be tied to the market
176 value of the company's debt, which has a negative correlation with risk (Sundaram
177 and Yermack 2007). If the board of directors implement this compensation policy,
178 the CEO becomes a creditor of the company and does not benefit from an increase
179 of the share price or its volatility. Instead, he or she will allocate as many resources
180 within the company as possible to decrease the probability of default. This makes
181 the CEO less risky. If the compensation of the CEO is based only on salary and
182 bonuses, he or she is not encouraged to increase the company's value. In these cases,
183 the investment set may be limited to projects with low risk that guarantee an accept-
184 able level of cash flow (Berger et al. 1997).

185 Therefore, the compensation policy may define the risk preferences of the CEO
186 through the available investment set. Now, we move to a discussion of how risk pref-
187 erences may affect the payout policy.

188 2.2 CEO risk preferences and payout policy choice

189 We start with a discussion of how risk preferences may affect the level of sharehold-
190 ers payout. If the CEO's compensation is equity-based, especially in the form of
191 stock options, the CEO does not have any strong risk burdens. Such CEOs will allo-
192 cate more money to investment projects pursuing high returns and will choose the
193 projects that are riskier. As a result, they will be left with a lower cash flow and will
194 pay out fewer dividends (Douglas 2007; Burns et al. 2015; Geiler and Renneboog
195 2016). On the other hand, such CEOs may consider the shares of their company to
196 be undervalued and will distribute more through share repurchases. However, the
197 increase in repurchases is usually not enough to cover the dividend reduction, so the
198 total payout will be less if the CEO is a risk-taker (Cuny et al. 2009).

199 The companies where compensation is tied to the market value of the compa-
200 ny's debt pay out more on average, as CEOs avoid risky projects and have free cash
201 flows that can be distributed among shareholders (Caliskan and Doukas 2015). In

202 addition, the risk appetite of the CEO may also be reduced, if the compensation
203 scheme is built on restricted stock units (RSU—those which cannot be sold before
204 a specified point in the future but that bear dividends). Such a remuneration policy
205 encourages CEOs to pursue long-term goals. If a CEO takes additional risks, he or
206 she may not achieve these goals in the future and will not get compensation. The
207 CEO will choose investment projects more carefully, with lower risk and will have
208 more cash to be distributed among shareholders (Minnick and Rosenthal 2014). If
209 such compensation plans are not used in the company, the shareholders will be left
210 with lower dividends.

211 The risk preferences of the CEO may affect not only the level of dividends or
212 repurchases, but also the choice of payout channel. The literature provides some
213 insights into the relationship between stock-option-based compensation and the
214 choice of share repurchase to pay shareholders (Kahle 2002). The use of execu-
215 tive stock options and restricted stock by boards is associated with a reduction in
216 cash dividends and a shift to share repurchases (Aboody and Kasznik 2008). Geiler
217 and Renneboog (2016) come to the same conclusion and show that the use of
218 stock options and RSU as remuneration is positively related to the choice of share
219 repurchase.

220 CEO risk preferences do not always serve to increase shareholder wealth.
221 Research shows that these adverse effects can be mitigated through corporate gov-
222 ernance practices. Given both the monitoring and the conformance roles of boards,
223 the directors aim to reduce agency conflicts and to provide strategic oversight of a
224 company. The empirical evidence shows that the more efficient the mechanism of
225 corporate governance, the more the company pays out to investors (Jiraporn et al.
226 2011; Sharma 2011; Ambardnishvili et al. 2017). CEOs may be forced to pay out
227 more due to better protection of shareholders' rights in such companies.

228 In the next subsection, we discuss the existing approaches to measuring the qual-
229 ity of corporate governance.

230 **2.3 The quality of corporate governance**

231 Several approaches have been developed to define the quality of corporate govern-
232 ance. The first approach is to use an index that is based on several measures cho-
233 sen by the authors. The elements of the index may include gender and age diver-
234 sity (Bernile et al. 2018; Cosma et al. 2018); the size of the board of directors and
235 its committees (Chan et al. 2014; Nguyen et al. 2016; Ararat et al. 2017); the level
236 of the company's transparency (Braga-Alves and Shastri 2011; Hwang et al. 2013);
237 the presence of independent directors on the board and in committees (Mande et al.
238 2012). These researchers conclude that high-quality corporate governance increases
239 the company's value, shareholder payouts, and reduces the agency problem. The
240 second approach is to use commercial indexes, which are provided by professional
241 agencies, for example, RiskMetrics (Zagorchev and Gao 2015), G-Index (Chang
242 et al. 2014), ISS (Jiraporn et al. 2011; Zhu 2014), and Globe&Mail (Adjaoud and
243 Ben-Amar 2010). These authors conclude that high-quality corporate governance

244 increases operational efficiency, increases shareholder payouts, and reduces the cost
245 of capital.

246 In this study, to assess the quality of corporate governance, we have developed an
247 index. As a huge number of elements with equal weights may increase measurement
248 errors (Bozec and Bozec 2012), we limit our index to 5 components. We also focus
249 only on the quality of the board of directors as the main corporate governance body
250 to capture its effects on the relationship between payout policy and the CEO risk
251 preferences. We discuss the index more thoroughly in the next section.

252 The evidence on the ability of the board of directors to offset the negative effects
253 of the CEO's risk preferences on payout policy is rather limited. To deeper under-
254 stand the role of the strategic direction of the board in payout decisions, it is very
255 important to fill the gaps in studies on the impact of CEO risk preferences. The lit-
256 erature still demonstrates contradictory results on the effects of CEO risk prefer-
257 ences on both the level of payouts and the choice of payout channel. There is limited
258 evidence for the effect of CEO risk preferences on the decision to initiate payments
259 to shareholders (repurchases or cash dividends).

260 To address these issues, this paper provides new empirical evidence on the role of
261 the board of directors in protecting shareholder interests against the adverse effects
262 of the CEO's risk preferences.

263 3 Hypotheses development, model and data

264 Research findings suggest that the most conservative policy is to pay dividends.
265 Risky CEOs are more likely to stick to a policy of increasing investments in pro-
266 jects that are associated with higher than average risks (relative to his or her spe-
267 cific company). This approach implies higher levels of volatility in expected future
268 cash flows. This increase in volatility may result in a decrease in the amount of cash
269 available for distribution among shareholders, and consequently lower payouts. To
270 investigate the relationship between CEO risk preferences and payout policy, we
271 study the variation in the levels of payouts, the decisions to start paying out, and the
272 changes in the repurchase-dividend mix.

273 We use several compensation-based proxies to measure CEO risk preferences.
274 Based on previous results, we assume that the compensation scheme aligns the
275 CEO's risk preferences with those of the board of directors and shareholders. Fol-
276 lowing the literature, we apply the fraction of the total cash amount of the CEO's
277 compensation, the fraction of company shares owned by the CEO (Burns et al.
278 2015) and the fraction of compensation in the form of restricted stocks (Minnick and
279 Rosenthal 2014). We also control for executive option-based compensation schemes
280 by the ratio of exercisable options to the total executive options. This measure may
281 reflect the level of CEO overconfidence—another characteristic of CEO behavior
282 (Fenn and Liang 2001; Deshmukh et al. 2013). Equity-based compensation, due to
283 the capital gains of the CEO, may involve him or her gambling on the high marginal
284 cost of investing in projects which forego cash dividends, thus yielding different
285 utility (Kahneman and Tversky 1979).

286 We also assume that risky CEOs may prefer repurchases rather than cash divi-
 287 dends. Such managers may consider the company's stocks undervalued and be
 288 willing to repurchase them at what they think is a low price (Sundaram and Yer-
 289 mack 2007; Geiler and Renneboog 2016).

290 Finally, the age of the CEO may be a proxy for a type of CEO risk preferences.
 291 There is evidence that younger CEOs pursue risky investment policies, seeking
 292 riskier (and more lucrative) components in their compensation plans (Kempf
 293 et al. 2009; Serfling 2014).

294 CEOs who are risk-takers will search for funds to initiate additional risky
 295 investment projects. Additional capital expenditure will lead to a decrease in the
 296 level of payout (net income being constant) (Minnick and Rosenthal 2014) and to
 297 postpone or even avoid initiating payouts altogether (Burns et al. 2015).

298 Therefore, we test the following hypotheses:

299 **Hypothesis 1** The higher the risk preferences of the CEO, the lower the level of
 300 both cash dividends and repurchases.

301 **Hypothesis 2** The higher the risk preferences of the CEO, the lower the probability
 302 of initiating both cash dividends and repurchases.

303 **Hypothesis 3** The higher the risk preferences of the CEO, the more the company
 304 switches to repurchases.

305 To test these hypotheses, we used the following models:

306

$$\begin{aligned}
 Payout_{i,t} = & \alpha + \beta_1 \cdot Payout_{i,t-1} + \beta_2 \cdot RiskPref_{i,t} + \beta_3 \cdot Age_{i,t} \\
 & + \beta_4 \cdot Ex_Opt_{i,t} + \sum_{k=5}^{12} \beta_k \cdot Control_{i,t,k} + \theta_i + \delta_t + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

307

$$\begin{aligned}
 pr(DTP_{i,t} = 1) = & \varphi \left\{ \mu + \gamma_1 \cdot DTP_{i,t-1} + \gamma_2 \cdot RiskPref_{i,t} + \gamma_3 \cdot Age_{i,t} + \gamma_4 \cdot Ex_Opt_{i,t} \right. \\
 & \left. + \sum_{k=5}^{12} \gamma_k \cdot Control_{i,t,k} + \theta_i + \delta_t \right\},
 \end{aligned} \tag{2}$$

308 where $Payout_{i,t}$ is one of the three "Payout" variables; $pr(DTP_{i,t} = 1)$ is the probabil-
 309 ity that $DTP_{i,t} = 1$; $DTP_{i,t}$ is one of the two "Decision to pay" variables; $\varphi\{x\}$ is the
 310 standard normal cumulative distribution function; $RiskPref_{i,t}$ is the set of "Risk pref-
 311 erences" variables; $Age_{i,t}$ is the age of the CEO; $Ex_Opt_{i,t}$ is the ratio of the value of
 312 exercisable options to the value of all executive options; $Control_{i,t,k}$ is the set of con-
 313 trol variables; $\alpha, \beta_k, \mu, \gamma_k$ are coefficients for regressions; $\varepsilon_{i,t}$, are normally distributed
 314 error terms; θ_i are industry effects; δ_t are the year's effects; i is the company index; t
 315 is the year index.

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Table 1 The variables

Variable type	Variable name	Definition
Payout	Repurchase ratio	Repurchases to total assets
	Dividend ratio	Cash dividends on common and preferred to total assets
	Fraction of repurchases	Repurchases to total payout
Decision to pay	Decision to repurchase	1 if repurchases took place, 0 otherwise
	Decision to pay dividends	1 if cash dividends took place, 0 otherwise
Risk preferences	CEO Cash compensation	Total cash compensation to total compensation
	CEO Restricted stocks	Restricted stocks to total compensation
	CEO Ownership	Percentage of stocks owned by the CEO
Age	Age	Age of the CEO
Overconfidence	Exercisable options	Value of exercisable options to the value of all executive options
Control variables	Cash	Cash holdings to total assets
	Tobin's Q	Market value of equity to book value of equity
	Debt to equity	Book value of debt to equity
	Capital expenditures	Capital expenditures to total assets
	Research and development	R&D expenses to total assets
	Long-term debt	Long-term debt to total debt
	Return on assets	Net income to total assets
	Size	Natural logarithm of total assets

316 The definitions of the variables for the Models (1) and (2) are presented in
317 Table 1.

318 Table 1 summarizes four specifications to measure the risk preferences of the
319 CEO. We assume that the use of cash compensation and RSU both tend to lower
320 the risk preferences of CEOs. As the CEO has no incentives to boost capitalization
321 in the short-run or volatility, he or she might choose less risky projects with more
322 certain outcomes and therefore a CEO is more likely to distribute cash. In contrast,
323 stock compensation may encourage CEOs to bear additional risks to increase stock
324 return in the short-run. This is why we think that CEO ownership should have a
325 negative effect on payouts.

326 As shown, it is assumed that older people are more cautious and less willing to
327 take certain risks. Given these previous results, we use the CEO's age to capture the
328 attitude towards risk.

329 We assume that the value of exercisable options which have not yet been exer-
330 cised may reflect CEO overconfidence, as he or she is confident of a stock price
331 increase and postpones the decision to exercise the options. Exercisable options are
332 those for which the vesting period has already expired and that can be exercised at
333 any time from now until the expiration date and are already "in the money". Such
334 CEOs may be more willing to repurchase stocks if they consider them undervalued.
335 However these CEOs may be reluctant to pay dividends as he or she does not want
336 dividend payouts to negatively affect the value of the stock options. As a result, the
337 impact on the total payout may be mixed. We summarize our predictions in Table 2.

Table 2 Predicted signs of the impact of risk preferences, age and overconfidence on the payout ratios

Variables	Predicted impact on the payout ratios
CEO cash compensation	+
CEO restricted stocks	+
CEO ownership	-
Age	+
CEO exercisable options	±

338 Given the monitoring and conformance roles of corporate governance mecha-
 339 nisms, we study not only how the board aligns the risk preferences of the CEO with the
 340 required risk levels of the corporate strategy by the induced compensation scheme, but
 341 also its capability to overcome the negative effects of the CEO's risk preferences. We
 342 construct the corporate governance quality index (CGQI) based on the following board
 343 characteristics which were studied in prior research:

- 344 1. The gender diversity of the board (Green and Homroy 2018).
- 345 2. The percentage of independent directors (Black et al. 2012; Zagorchev and Gao
 346 2015).
- 347 3. CEO duality (Yarram and Dollery 2015).
- 348 4. The frequency of board meetings (Black et al. 2012).
- 349 5. The size of the board (Mande et al. 2012).

350 We then apply the principal components analysis with the use of a correlation
 351 matrix to derive the value of the index. To construct the index, we use two compo-
 352 nents with the highest values. Once the index is standardized, we use the dummy
 353 variable to distinguish between governance of good quality (dummy=1, provided
 354 the value of the index is greater than the sample's average) and governance of poor
 355 quality (dummy=0, provided the value of the index is less than the sample's aver-
 356 age). In the next section, we discuss the variability of the index in our sample.

357 Finally, we test the impact of governance with the following hypothesis:

358 **Hypothesis 4** The high quality of the board of directors reduces the negative
 359 effects of the CEO's behavior on payout policy.

360 To test Hypothesis 4, we add a dummy variable for high-quality corporate gov-
 361 ernance. We then extend Models (1) and (2) and assess Models (3) and (4):

$$\begin{aligned}
 362 \quad Payout_{i,t} = & \alpha + \beta_1 \cdot Payout_{i,t-1} + \beta_2 \cdot RiskPref_{i,t} \\
 & + \beta_{13} \cdot RiskPref_{i,t} \cdot D_{i,t} + \beta_3 \cdot Age_{i,t} + \beta_{14} \cdot Age_{i,t} \cdot D_{i,t} \\
 & + \beta_4 \cdot Ex_Opt_{i,t} + \beta_{15} \cdot Ex_Opt_{i,t} \cdot D_{i,t} \\
 & + \sum_{k=5}^{12} \beta_k \cdot Control_{i,t,k} + \beta_{16} \cdot D_{i,t} + \theta_i + \delta_t + \varepsilon_{i,t}
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 363 \quad pr(DTP_{i,t} = 1) = \varphi \left\{ \mu + \gamma_1 \cdot DTP_{i,t-1} + \gamma_2 \cdot RiskPref_{i,t} + \gamma_{13} \cdot RiskPref_{i,t} \cdot D_{i,t} \right. \\
 + \gamma_3 \cdot Age_{i,t} + \gamma_{14} \cdot Age_{i,t} \cdot D_{i,t} + \gamma_4 \cdot Ex_Opt_{i,t} + \gamma_{15} \cdot Ex_Opt_{i,t} \cdot D_{i,t} \quad (4) \\
 \left. + \sum_{k=5}^{12} \gamma_k \cdot Control_{i,t,k} + \gamma_{16} \cdot D_{i,t} + \theta_i + \delta_t \right\},
 \end{aligned}$$

364 where $D_{i,t}$ is the dummy variable for high-quality corporate governance; β_{13} , β_{14} , β_{15}
 365 and γ_{13} , γ_{14} , γ_{15} are the coefficients for companies with high-quality governance.

366 If corporate governance eliminates completely the impact of CEO behavioral
 367 characteristics on their decisions, then the following equations should hold:

$$368 \quad \beta_2 = -\beta_{13} \quad \text{and} \quad \gamma_2 = -\gamma_{13};$$

$$369 \quad \beta_3 = -\beta_{14} \quad \text{and} \quad \gamma_3 = -\gamma_{14};$$

$$370 \quad \beta_4 = -\beta_{15} \quad \text{and} \quad \gamma_4 = -\gamma_{15}.$$

371 We use Wald statistics to check whether these equations hold.

372 In addition to these variables and based on previous research (see Table 1), we
 373 use a set of control variables (Cash holdings, Tobin's Q, Debt-to-Equity ratio, Long-
 374 term Debt ratio, Capital and R&D expenditures, ROA and Size) representing the
 375 financial position of the company. To capture possible effects, we also included
 376 industry dummies and year dummies.

377 To sum up, unlike previous studies, we include in the analysis the relationship **AQ4**
 378 between behavioral characteristics and the repurchases-dividends mix, the impact
 379 of risk preferences on the decision to initiate payouts, and the influential power of
 380 corporate governance. We also check the results for different quartiles of the levels
 381 of payout.

382 We collect a sample of non-financial and non-utility companies from the US for
 383 2007 to 2016 from the S&P 1500 Index, which represents the largest and most stable
 384 companies in the US. We further restrict the sample to companies that had a positive
 385 payout at least once during the period of observation. After adjusting for missing
 386 data and outliers, we come up with a final sample of 671 companies. The data was
 387 obtained from the S&P Capital IQ and Bloomberg databases.

388 To assess Models (1) and (3), we use the dynamic panel data method, namely the
 389 Arellano-Bond estimator. We do so because lags are included in our specifications
 390 causing endogeneity problems. We also report Arellano-Bond tests for autocorrela-
 391 tion, and the Hansen test for specification. To address the lagged dependent vari-
 392 able and the initial conditions problem, for Models (2) and (4) a panel probit model
 393 regression has been applied (Wooldridge 2005). For all models the robust standard
 394 errors at firm level and standardized variables have been used.

395 To check our predictions for companies with different levels of payout, we imple-
 396 ment quantile regressions for the 25th, 50th and 75th percentiles of the sample. **AQ5**
 397 Given the panel structure of data and endogeneity, we use Powell's estimator (Pow-
 398 ell 2016).

Table 3 The descriptive statistics

Variable	Mean	Std. dev.	Min	Max
CEO ownership	1.459	4.042	0.000	42.270
CEO age	57.729	6.187	36.000	86.000
CEO cash compensation	0.487	0.228	0.005	1.000
CEO restricted stocks	0.291	0.226	0.000	0.995
CEO exercisable options	0.479	0.413	0.000	1.000
Repurchase ratio	0.035	0.062	0.000	0.877
Dividend ratio	0.014	0.024	0.000	0.316
Repurchase to total payout	0.494	0.420	0.000	1.000
Decision to repurchase	0.692	0.462	0.000	1.000
Decision to pay dividends	0.595	0.491	0.000	1.000
Cash	0.117	0.112	0.000	0.875
Tobin's Q	1.927	1.800	0.000	53.175
Debt to equity	0.353	0.439	0.000	4.036
Capital expenditures	0.048	0.051	0.000	0.460
R&D expenses	0.022	0.043	0.000	0.579
Long-term debt	0.694	0.386	0.000	1.000
Return on assets	0.054	0.089	-1.265	0.558
Size	7.849	1.619	3.892	13.589
Standardized CGQI	0.000	1.000	-6.336	2.120
CGQI_dummy	0.610	0.488	0.000	1.000

399 4 Empirical results

400 Table 3 presents the descriptive statistics for the sample (for the purpose of this table
401 we use unstandardized variables).

402 Table 3 shows that the companies in our sample differ in various respects: from
403 companies with a high concentration of CEO ownership, to companies where no
404 stocks are owned by the CEO; from companies with high payout ratios and to those
405 with no payouts; companies with very high levels of debt, and companies with no
406 debt. There are also companies with different board quality levels, but we can see
407 that most companies in our sample have a high CGQI value. Within the sample,
408 repurchases are, on average, more common than cash dividends (the average repur-
409 chase ratio for our sample is 0.035 and the average dividend ratio is 0.014). These
410 are in line with previous findings (Fama and French 2001). Given the changes in
411 the fractional amount of repurchases relative to the total payout for the period from
412 Fig. 1, the data suggest that repurchases have been becoming increasingly popular.

413 We can see from Fig. 1 that from 2009 to 2011 and from 2012 to 2015 both the
414 mean and median fraction of repurchases in the total payout increased. The major
415 shocks that happened in 2009 (the "Great Recession") and 2012 (tax reform and the
416 tightening of monetary policy) dramatically reduced the overall fraction of repur-
417 chases, but the subsequent trends were upward and in 2014 repurchases reached pre-
418 recession levels. To consider the effects of 2009 and 2012 we use dummy variables
419 for both years in our Models.

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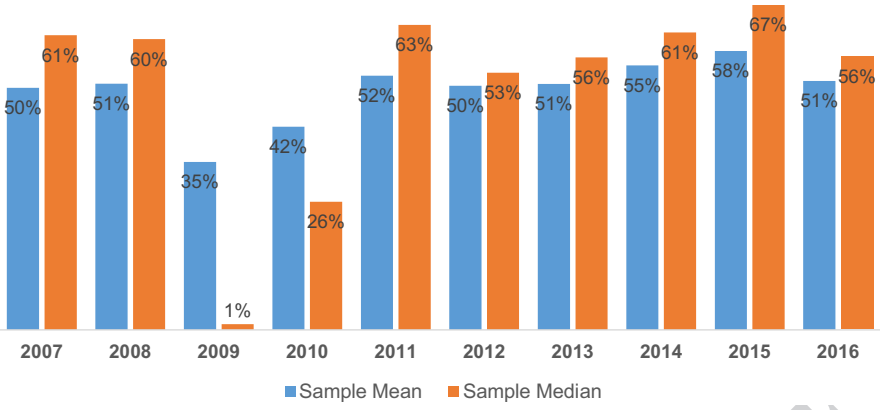


Fig. 1 The dynamics of the fractional amount of repurchases relative to the total payout

AQ6

Table 4 Mean values for the 1-st, 2-nd, 3-rd and 4-th quartiles

Variable	q1	q2	q3	q4
Total payout ratio	0.008	0.025	0.048	0.117
Repurchase ratio	0.005	0.017	0.034	0.086
Decision to pay out	0.673	0.872	0.932	0.945
Repurchase to total payout	0.364	0.467	0.531	0.616
CEO exercisable options	0.467	0.449	0.501	0.500
CEO ownership	2.094	1.567	0.873	1.300
CEO age	57.729	57.971	57.733	57.480
CEO cash compensation	0.528	0.503	0.466	0.450
CEO restricted stocks	0.289	0.287	0.295	0.295
Cash	0.107	0.102	0.113	0.151
Tobin's Q	1.447	1.352	1.682	3.232
Debt to equity	0.396	0.361	0.323	0.331
Capital expenditures	0.063	0.046	0.042	0.040
R&D expenses	0.019	0.016	0.019	0.033
Long-term debt	0.724	0.754	0.678	0.620
ROA	0.019	0.035	0.056	0.108
Size	7.469	7.792	8.161	7.974
CGQI	3.310	3.270	3.265	3.266

420 Table 4 presents the means for variables in 4 quartiles divided by the total pay-
 421 out. The fraction of repurchases increased for the companies with the highest lev-
 422 els of payout. This means that the companies that pay out more prefer repurchases
 423 rather than cash dividends. The companies that pay out less prefer cash dividends
 424 instead. This shows that companies tend to distribute some base level of funds
 425 among shareholders through cash dividends and distribute extra funds through

Table 5 Correlation matrix

	Repurchase ratio	Dividend ratio	Decision to repurchase	Decision to pay dividends	CEO exercisable options	CEO Ownership	CEO age	CEO cash compensation	CEO restricted stocks	Cash	Tobin's Q	Debt to equity	Capex	R&D expenses	LTD	ROA	Size
Repurchase ratio	1.00																
Dividend ratio	0.13	1.00															
Decision to repurchase	0.38	0.04	1.00														
Decision to pay dividends	-0.04	0.51	0.07	1.00													
CEO exercisable options	0.06	-0.03	0.09	0.05	1.00												
CEO Ownership	-0.01	-0.05	-0.06	-0.09	-0.14	1.00											
CEO age	-0.03	0.09	0.07	0.18	0.06	-0.06	1.00										
CEO cash compensation	-0.09	0.01	-0.13	-0.03	-0.22	0.25	-0.12	1.00									
CEO restricted stocks	0.03	0.02	0.10	0.03	0.13	-0.15	0.12	-0.62	1.00								
Cash	0.12	-0.01	0.00	-0.23	-0.04	0.09	-0.11	0.05	-0.05	1.00							
Tobin's Q	0.32	0.36	0.08	-0.02	-0.01	0.04	-0.01	-0.06	0.00	0.20	1.00						
Debt to equity	0.01	0.04	0.02	0.05	0.01	-0.09	0.08	-0.08	0.08	-0.26	0.19	1.00					

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Table 5 (continued)

	Repur- chase ratio	Divi- dend ratio	Deci- sion to repur- chase	Deci- sion to pay divi- dends	CEO exercis- able options	CEO Own- ship	CEO age	CEO cash com- pensa- tion	CEO restricted stocks	Cash	Tobin's Q	Debt to equity	Capex	R&D expenses	LTD	ROA	Size
Capex	-0.03	-0.03	-0.08	0.05	-0.02	0.08	-0.05	0.00	0.06	-0.18	-0.02	0.02	1.00				
R&D expenses	0.16	-0.05	0.01	-0.27	0.01	-0.02	-0.12	-0.12	0.02	0.38	0.15	-0.20	-0.16	1.00			
LTD	-0.06	-0.04	0.03	0.21	0.07	-0.14	0.16	-0.15	0.11	-0.39	-0.13	0.33	0.07	-0.24	1.00		
ROA	0.29	0.29	0.16	0.10	0.04	0.04	0.00	0.06	-0.08	0.09	0.33	-0.15	-0.01	-0.04	-0.11	1.00	
Size	0.01	0.08	0.13	0.31	0.16	-0.21	0.21	-0.38	0.23	-0.37	-0.11	0.26	0.07	-0.20	0.39	0.01	1.00

Table 6 Results of testing Hypotheses 1, 2 and 3

	Dependent variables				
	Repurchase ratio	Dividend ratio	Repurchase fraction	Decision to repurchase	Decision to pay dividends
CEO cash compensation	0.123 (1.33)	0.013 (0.31)	- 0.118*** (- 2.76)	- 0.042 (- 1.31)	0.097** (2.04)
CEO restricted stocks	0.129** (1.96)	- 0.002 (- 0.07)	- 0.005 (- 0.22)	0.035 (1.23)	0.017 (0.43)
CEO ownership	0.107* (1.75)	- 0.009 (- 0.51)	0.164 (1.18)	0.001 (0.05)	- 0.002 (- 0.06)
CEO age	- 0.042* (- 1.76)	0.015 (0.86)	- 0.010 (- 0.36)	0.005 (0.19)	0.036 (1.00)
CEO exercisable options	0.031** (2.04)	0.010 (0.99)	0.053*** (2.70)	0.055*** (2.72)	0.086** (2.50)
Dependent variable (t - 1)	0.285*** (7.99)	0.622*** (6.01)	0.386*** (14.06)	1.318*** (28.31)	3.655*** (44.90)
Cash	0.032 (0.49)	- 0.069** (- 2.12)	0.039 (0.47)	0.016 (0.60)	0.001 (0.03)
Tobin's Q	0.138* (1.69)	0.135** (2.01)	- 0.195** (- 2.06)	- 0.004 (- 0.16)	0.041 (1.28)
Debt to equity	0.006 (0.06)	- 0.097* (- 1.65)	0.003 (0.02)	- 0.035 (- 1.29)	- 0.076** (- 2.05)
Capital expenditures	- 0.062 (- 1.09)	- 0.044 (- 0.18)	- 0.066 (- 0.93)	- 0.015 (- 0.56)	0.006 (0.12)
R&D expenses	0.143** (2.08)	0.030 (0.79)	- 0.052 (- 0.59)	0.054** (2.04)	- 0.029 (- 0.74)
Long-term debt	0.184** (1.97)	- 0.018 (- 0.32)	- 0.026 (- 0.21)	0.040 (1.61)	0.051 (1.16)
ROA	0.134** (2.14)	0.007 (0.23)	0.155** (2.40)	0.166*** (6.68)	0.159*** (3.84)

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Table 6 (continued)

	Dependent variables			
	Repurchase ratio	Dividend ratio	Repurchase fraction	Decision to repurchase
Size	0.050 (0.51)	0.088 (1.27)	- 0.147 (- 1.05)	0.101*** (3.32)
Year 2009	- 0.259*** (- 5.01)	- 0.033 (- 1.26)	- 0.354*** (- 2.52)	- 0.632*** (- 10.31)
Year 2012	- 0.087 (- 1.40)	0.021 (0.72)	- 0.089 (- 1.05)	- 0.064 (- 1.21)
Intercept	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Num. of observations	6039	6039	6039	6039
Method	Arellano-Bond GMM	Arellano-Bond GMM	Arellano-Bond GMM	Panel Probit regression
Wald stat (chi_sq)	255.89 (0.00)	470.24 (0.00)	470.63 (0.00)	1147.55 (0.00)
Hansen test	161.26 (0.00)	136.61 (0.07)	101.67 (0.01)	-
AB test (AR(1))	- 5.87 (0.00)	- 2.86 (0.00)	- 15.62 (0.00)	-
AB test (AR(2))	- 0.78 (0.43)	1.22 (0.22)	0.12 (0.90)	-
				Panel Probit regression 2822.53 (0.00)

This table presents results from the Arellano-Bond two-step GMM estimator and panel probit regressions for the complete sample. All regressions include intercept and dummies for industries. z-Statistics for Arellano-Bond and for probit are reported in parentheses below each coefficient estimate. P-values for Wald stat., Hansen test and the Arellano-Bond test are reported in the parentheses below each statistic

*, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively

Table 7 Determinants of the repurchase ratio per quartiles

	Repurchase ratio		
	25-th	50-th	75-th
CEO cash compensation	− 0.000 (− 0.59)	0.013** (2.02)	− 0.069*** (− 7.75)
CEO restricted stocks	0.001*** (28.35)	0.046*** (6.56)	− 0.023*** (− 8.44)
CEO ownership	0.001 (1.41)	− 0.017*** (− 11.90)	0.023*** (20.53)
CEO age	0.000 (0.62)	− 0.005*** (− 4.74)	− 0.094*** (− 29.13)
CEO exercisable options	0.001*** (24.03)	0.018*** (9.07)	0.021*** (18.89)
Cash	− 0.000 (− 0.65)	− 0.020*** (− 6.35)	0.073*** (51.58)
Tobin's Q	0.003*** (11.16)	0.190*** (88.51)	0.412*** (48.66)
Debt to equity	− 0.001* (− 1.91)	− 0.008*** (− 3.66)	0.007* (1.78)
Capital expenditures	− 0.001*** (− 7.38)	− 0.015*** (− 3.91)	− 0.039*** (− 25.05)
R&D expenses	0.001*** (6.41)	0.051*** (12.30)	0.153*** (33.19)
Long-term debt	− 0.000 (− 0.74)	− 0.016*** (− 8.07)	0.001 (0.15)
ROA	0.002*** (25.28)	0.035*** (4.12)	0.083*** (10.27)
Size	0.004 (37.16)	0.063*** (7.07)	0.099*** (18.63)
Year 2009	− 0.004*** (− 7.36)	− 0.217*** (− 8.28)	− 0.394*** (− 47.97)
Year 2012	− 0.001 (− 0.87)	− 0.105*** (− 5.06)	0.013 (.60)
Intercept	No	No	No
Industry effects	Yes	Yes	Yes
Num. of observations	6710	6710	6710
Method	Quantile regression for panel data		

This table presents results from the Powell's quantile regressions on panel data. All regressions include dummies for industries. z-Statistics are reported in parentheses below each coefficient estimate

*, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively

426 repurchases. We can also see that companies from the upper quartile use less cash
 427 and shares, but more stock options as part of their compensation policies.

428 Table 5 provides the correlation matrix for the chosen variables. All the cor-
 429 relations are below 50%, which means that there will be no multicollinearity in
 430 the Models.

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Table 8 Determinants of the dividend ratio per quartiles

	Dividend ratio		
	25-th	50-th	75-th
CEO cash compensation	0.000 (0.00)	- 0.003 (- 0.42)	0.053*** (44.53)
CEO restricted stocks	0.000 (0.00)	0.010** (2.41)	0.014*** (9.09)
CEO ownership	0.000 (0.00)	- 0.011*** (- 4.43)	- 0.044*** (- 38.87)
CEO age	0.000 (0.00)	0.065*** (51.18)	0.085*** (126.04)
CEO exercisable options	0.000 (0.00)	0.014*** (3.64)	- 0.033*** (- 50.08)
Cash	0.000 (0.00)	- 0.006 (- 1.10)	- 0.063*** (- 81.24)
Tobin's Q	0.000 (0.00)	0.216*** (33.54)	0.684*** (748.30)
Debt to equity	0.000 (0.00)	- 0.048*** (- 27.95)	- 0.097*** (- 194.43)
Capital expenditures	0.000 (0.00)	0.003 (0.42)	- 0.058*** (- 88.87)
R&D expenses	0.000 (0.00)	- 0.100*** (- 12.38)	- 0.092*** (- 107.27)
Long-term debt	0.000 (0.00)	0.010* (1.92)	- 0.031*** (- 64.37)
ROA	0.000 (0.00)	- 0.001 (- 0.10)	0.060*** (54.48)
Size	0.000 (0.00)	0.119*** (16.37)	0.194*** (369.65)
Year 2009	0.000 (0.00)	0.014 (1.43)	0.001 (0.20)
Year 2012	0.000 (0.00)	0.048*** (2.85)	- 0.035*** (- 32.07)
Intercept	No	No	No
Industry effects	Yes	Yes	Yes
Num. of observations	6710	6710	6710
Method	Quantile regression for panel data		

This table presents results from the Powell's quantile regressions on panel data. All regressions include dummies for industries. z-Statistics are reported in parentheses below each coefficient estimate

*, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively

431 Table 6 summarizes the results of the tests for Models (1) and (2). Tables 7, 8
432 and 9 summarize the results for the 25th, 50th and 75th percentiles, respectively.

433 Hereafter the results are reported for the five dependent variables that are
434 described in Table 1: repurchase ratio, cash dividend ratio, fraction of repurchase,
435 decision to initiate repurchases, and decision to initiate cash dividends.

Table 9 Determinants of the fraction of repurchases per quartiles

	Fraction of repurchases		
	25-th	50-th	75-th
CEO cash compensation	0.001 (0.79)	- 0.020 (- 0.45)	- 0.008 (- 0.79)
CEO restricted stocks	0.016*** (24.75)	0.026** (2.50)	0.032*** (4.72)
CEO ownership	0.003*** (7.80)	- 0.077*** (- 12.82)	0.013*** (2.99)
CEO age	- 0.001* (- 1.76)	- 0.016 (- 0.46)	- 0.046*** (- 15.88)
CEO exercisable options	0.009*** (21.32)	0.091*** (5.97)	- 0.005*** (- 3.05)
Cash	- 0.009*** (- 7.04)	0.038 (1.62)	- 0.003 (- 0.82)
Tobin's Q	0.032*** (25.63)	- 0.014** (- 2.18)	- 0.050*** (- 5.23)
Debt to equity	- 0.008*** (- 7.83)	- 0.075*** (- 4.82)	0.031*** (7.41)
Capital expenditures	- 0.010*** (- 6.43)	- 0.122*** (- 29.54)	- 0.040*** (- 23.11)
R&D expenses	0.013*** (13.31)	0.182*** (16.39)	0.031*** (6.69)
Long-term debt	- 0.005*** (- 4.74)	- 0.009 (- 0.43)	- 0.000 (- 0.00)
ROA	0.024*** (39.75)	0.193*** (12.38)	0.069*** (7.60)
Size	0.048*** (23.14)	0.031** (2.52)	- 0.148*** (- 32.35)
Year 2009	- 0.053*** (- 16.58)	- 1.154*** (- 20.09)	- .164*** (- 23.27)
Year 2012	0.004*** (2.33)	- 0.236*** (- 6.87)	- 0.037** (- 2.56)
Intercept	No	No	No
Industry effects	Yes	Yes	Yes
Num. of observations	6710	6710	6710
Method	Quantile regression for panel data		

This table presents results from the Powell's quantile regressions on panel data. All regressions include dummies for industries. z-Statistics are reported in parentheses below each coefficient estimate

*, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively

436 In line with our predictions from Table 2 and previous findings (Caliskan and
 437 Doukas 2015) less risky CEOs tend to distribute more funds among the sharehold-
 438 ers. Table 6 shows that restricted stock compensation stimulates CEOs to increase
 439 the level of repurchases. We can see that a 1 standard deviation increase in restricted
 440 stock compensation leads to a 0.129 standard deviation increase in the repurchase
 441 ratio. CEO ownership and exercisable executive options also lead to an increase in

442 the repurchase ratio. We think that CEOs with large stock holdings tend to repurchase
443 stocks in order to signal to markets that a company's stocks are undervalued.
444 This should result in more demand for this stock and a price increase. The value of
445 the CEO's portfolio should increase as well. As we pointed out, more options that
446 are exercisable may be evidence of a CEO's overconfidence in the undervaluation of
447 his or her company's stocks. Again, such a CEO prefers repurchases: a 1 standard
448 deviation increase in exercisable option compensation increases the repurchase ratio
449 by 0.031 standard deviations. The impact of the CEO's age on payout policy was not
450 significant.

451 When we implement the quantile regressions (Table 7), we can see that exercisable
452 options increase the level of repurchases in companies from all quartiles.
453 The impact of exercisable options increases with quartiles. The impact of restricted
454 stocks and CEO age also increases with quartiles. It is conceivable that when the
455 level of payout through repurchases in these situations starts to increase, CEOs
456 start to be affected by their risk preferences. When the level of repurchases is low,
457 the payout policy is mostly determined by financial variables, because CEOs seek
458 opportunities to increase payout ratios with limited resources. When the level of
459 repurchases is high, the impact of risk preferences increases. This may happen if the
460 CEO, having satisfied all the demands of the shareholders, starts to look for investment
461 opportunities in accordance with his or her risk preferences.

462 The risk-preferences and overconfidence of CEOs have no impact on the cash
463 dividend ratio according to the results from Table 6. Only the control variables represented
464 by financial measures are important for the level of cash dividends: cash holdings
465 (a 1 standard deviation increase in cash holdings decreases the dividend ratio by
466 0.069 standard deviations), Tobin's Q (a 1 standard deviation increase in Tobin's
467 Q increases the dividend ratio by 0.135 standard deviations), and debt-to-equity ratio
468 (a 1 standard deviation increase in debt-to-equity ratio decreases the dividend ratio
469 by 0.097 standard deviations).

470 However, when we analyze the per quartile results from Table 8, the risk preferences
471 and the overconfidence of the CEO starts to influence the dividend ratio in companies
472 with median and high levels of dividends. When accounting for the impact of the increase
473 in RSU and stock option compensation and the age of the CEO, the level of dividends
474 also increases. It may happen because in the companies from low quartiles the dividend
475 policy should be defined by the limited financial resources. When the available funds
476 increase, the CEO's decisions may be influenced to a higher extent by CEO's risk
477 preferences. As shown in Table 8, age affects dividends positively and repurchases
478 negatively. The magnitude of this negative effect on repurchases increases as one
479 looks at the quartiles from lowest to highest. The older CEOs, being less risky,
480 prefer dividends rather than repurchases. This may be due to the fact that dividends
481 have traditionally been more popular than repurchases and have been displaced by
482 repurchases only recently.

483 What are the determining factors which influence the switching of an approach
484 based on repurchases to one based on cash dividends? The level of exercisable
485 options has a positive effect on the fraction of repurchases in the total payout. Again,
486 this is a result of the CEO's belief that the company's stocks are undervalued.
487 Another explanation is that dividends have a negative effect on the value of stock

488 options. In order to eliminate these negative effects, companies may use repurchases
 489 that do not decrease options' value. The level of cash compensation also has a sig-
 490 nificant impact on the fraction of repurchases: a 1 standard deviation increase in
 491 the level of cash compensation decreases the repurchase fraction by 0.118 standard
 492 deviations. This means that less risky CEOs prefer cash dividends rather than repur-
 493 chases. This could be explained by the absence of sound policies to induce CEOs to
 494 create share value because their compensation is not based on the equity value. As
 495 a result, shareholders are left with a base level of dividends and do not receive addi-
 496 tional cash distributions in the form of repurchases.

497 Table 9 shows that the impact of restricted stocks and exercisable stock options
 498 increases with the quartiles. The fraction of repurchases in total payout is stronger
 499 affected by the CEO's behavior in companies with the highest levels of payouts, and
 500 is less affected in the companies with the lowest levels of payout.

501 This argument is also supported by the significant positive impact of the level of
 502 cash compensation on the probability of initiating cash dividends. From Table 10 we
 503 can see that a 1 standard deviation increase in the level of cash compensation leads
 504 to an increase in the probability of initiating paying dividends by 0.033 standard
 505 deviations. The level of exercisable options also has a positive impact on the prob-
 506 ability of both initiating repurchases and initiating the payment of cash dividends:
 507 1 standard deviation increase in the level of exercisable options increases the prob-
 508 ability of repurchases and cash dividends by 0.018 and 0.029 standard deviations
 509 respectively.

510 Our findings show that the previous levels of both repurchases and cash dividends
 511 have a significant positive impact on the current levels of payouts. This means that
 512 dividends are "sticky", and CEOs are reluctant to change their payout policies. For

Table 10 Marginal effects for the model (2), on average

	Dependent variables	
	Decision to repurchase	Decision to pay dividends
CEO cash compensation	- 0.013 (- 1.38)	0.033** (2.04)
CEO restricted stocks	0.011 (1.23)	0.006 (0.43)
CEO ownership	0.001 (0.05)	- 0.001 (- 0.06)
CEO age	0.001 (0.19)	0.012 (1.00)
CEO exercisable options	0.018*** (2.71)	0.029** (2.48)

This table presents on-average marginal effects for the probit estimations. z-Statistics are reported in parentheses below each effect estimate

*, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively

Do boards of directors affect CEO behavior? Evidence from payout...

Author Proof

513 all specifications (except of the model with the dividend ratio), ROA affects payout
 514 policy positively and the dummy variables for 2009 affect payout levels negatively,
 515 which can also be observed in Fig. 1. R&D expenses also have positive effects on
 516 the levels and the probability of repurchases. Therefore, profitable companies do not
 517 consider investments and payouts as substitutes for each other but having a strong
 518 cash flow tend to increase both investments and payouts. We also found that the ori-
 519 gin of the industry matters only in terms of the level of repurchases and the decision
 520 to initiate repurchases. For other specifications of the payout policy, the impact of
 521 industry is not robust.

522 To verify Hypothesis 4, on the mitigating role of the boards, we assess models
 523 (3) and (4) and make linear tests on coefficient equality. We also check whether both
 524 coefficients are statistically significant. Cells in Tables 11 and 12 are highlighted
 525 in green if both coefficients are significant and the test shows that the equations
 526 $\beta_n = -\beta_m$ and $\gamma_n = -\gamma_m$ hold. If the equations do not hold, we highlight them in red.
 527 If the equations do not hold but the coefficients have different signs, we use yellow,
 528 which means that corporate governance reduces but does *not completely eliminate*
 529 the effects of the CEO's risk preferences, age, and overconfidence. We do not use
 530 any color if at least one of the coefficients is insignificant in the first place. These
 531 results are summarized in Tables 11 and 12.

532 According to the results in Tables 6 and 11, we can conclude that efficient corpo-
 533 rate governance may eliminate the negative effects of the CEO's behavioral traits,
 534 namely overconfidence, on the fraction of repurchases and decision to repurchase.
 535 The boards with better governance also reduce the influence of the personal risk
 536 preferences on the level of repurchases. The quality of corporate governance does
 537 not reduce the negative effects of the CEO's ownership, exercisable options, and

Table 11 Results of testing the ability of corporate governance quality to reduce the negative effects of CEO's risk preferences

	Dependent variables				
	Repurchase ratio	Dividend ratio	Repurchase fraction	Decision to repurchase	Decision to pay dividends
CEO cash compensation	5.90** (0.02)	0.11 (0.74)	0.38 (0.54)	1.72 (0.19)	0.62 (0.43)
CEO restricted stocks	2.97* (0.08)	1.58 (0.21)	0.41 (0.52)	0.20 (0.66)	0.11 (0.75)
CEO ownership	0.10 (0.75)	0.20 (0.65)	0.00 (0.96)	0.02 (0.89)	0.07 (0.79)
CEO age	10.31*** (0.00)	0.06 (0.81)	0.09 (0.77)	0.21 (0.65)	0.16 (0.69)
CEO exercisable options	0.79 (0.37)	0.59 (0.44)	0.57 (0.45)	0.32 (0.57)	8.84*** (0.00)

This table presents χ^2 statistics for the tests of $H_0 (\beta_2 = -\beta_{13} \text{ and } \gamma_2 = -\gamma_{13})$

P-values are reported in the parentheses

*, **, and *** represent that H_0 can be rejected at the 10%, 5% and 1% levels, respectively

Table 12 Results of testing the ability of corporate governance quality to reduce the negative effects of CEO's risk preferences per quartiles

	Repurchase ratio		
	Q1	Q2	Q3
CEO cash compensation	296.76*** (0.00)	302.15*** (0.00)	437.11*** (0.00)
CEO restricted stocks	120.14*** (0.00)	245.17*** (0.00)	130.74*** (0.00)
CEO ownership	22.43*** (0.00)	444.64*** (0.00)	602.35*** (0.00)
CEO age	0.02 (0.88)	0.49 (0.48)	1606.08*** (0.00)
CEO exercisable options	13.34*** (0.03)	600.84*** (0.00)	22.14*** (0.00)
	Dividend ratio		
CEO cash compensation	–	12.78*** (0.00)	6.33** (0.01)
CEO restricted stocks	–	8.23*** (0.00)	4.11** (0.04)
CEO ownership	–	414.24*** (0.00)	192.02*** (0.00)
CEO age	–	441.04*** (0.00)	17.15*** (0.00)
CEO exercisable options	–	20.08*** (0.00)	657.00*** (0.00)
	Fraction of repurchases		
CEO cash compensation	367.15*** (0.00)	265.54*** (0.00)	0.07 (0.14)
CEO restricted stocks	519.82*** (0.00)	348.32*** (0.00)	185.16*** (0.00)
CEO ownership	2.17 (0.14)	35.80*** (0.00)	97.56*** (0.00)
CEO age	5.82** (0.02)	6239.91*** (0.00)	1750.16*** (0.00)
CEO exercisable options	33.72*** (0.00)	750.46*** (0.00)	43.59*** (0.00)

This table presents χ^2 statistics for the tests of $H_0 (\beta_2 = -\beta_{13} \text{ and } \gamma_2 = -\gamma_{13})$

P-values are reported in the parentheses

*, **, and *** represent that H_0 can be rejected at the 10%, 5% and 1% levels, respectively

538 age on the level of repurchases and the effect of CEO's risk preferences on the frac-
 539 tion of repurchases and decisions to pay dividends. Thus, the results for the whole
 540 sample document that corporate governance has a limited ability to overcome the
 541 negative effects of CEO's behavioral characteristics on payout decisions. However,
 542 the overall picture of governance impact changes when we study these interrelations
 543 for each quartile of the sample. The results are presented in Table 12.

544 We can now also differentiate the impact of corporate governance quality on the
545 effects of risk preferences, age, and overconfidence between the companies with low
546 and high levels of dividends and repurchases. Table 12 shows that corporate govern-
547 ance has limited power to completely eliminate the negative effects of a CEO's risk
548 preference. However, it has an ability to significantly reduce these effects in com-
549 panies with the lowest levels of payouts, but not in the companies with the highest
550 levels of payout. We can see that with the increase in quartile, with the exception
551 of cash compensation level, the number of green and yellow cells decreases while
552 the number of red cells increases. This is especially clear for the repurchase ratio
553 and the fraction of repurchases. The shareholders in these companies might still be
554 satisfied with the level of payout, even though they do not get the maximum payout,
555 i.e. what the level of payout would have been if the CEO's risk preferences had not
556 influenced payout decisions. However, corporate governance still has enough power
557 to decrease the negative effects of CEO behavior.

558 Comparing these results with Tables 7, 9 and 11 we can see that the impact of age
559 becomes significant for the repurchase ratio (Q1) and the level of cash compensation
560 becomes significant for the repurchase ratio (Q1), dividend ratio (Q2), and the frac-
561 tion of repurchases (Q1, Q2 and Q3). These effects, though, are eliminated by effi-
562 cient corporate governance mechanisms. We assume that in such companies there
563 might be some additional tools to cope with CEO behavior that are not considered in
564 our CGQI.

565 5 Discussion and conclusions

566 In this study we explore whether the boards of directors are able to overcome nega-
567 tive influences of CEO behavior in terms of his or her preferences to risk. Our first
568 set of findings fills the gap in the research on the relationship between CEO risk
569 preferences and various aspects of payout policies. We show that CEOs that bear
570 more risk tend to set lower levels of payout than their less risky colleagues do, which
571 means that Hypothesis 1 cannot be rejected. It is also shown that repurchases are the
572 more preferred method of payout in companies with higher levels of executive stock
573 options. This is due to CEOs' overconfidence in these types of companies, and their
574 awareness regarding the undervaluation of stocks. Moreover, they may avoid divi-
575 dends due to their negative impact on the options' value. On the contrary, less risky
576 CEOs tend to maintain higher levels of payout: the compensation policy that stimu-
577 lates a CEO to bear less risk is associated with higher levels of payout.

578 As for the decisions to start paying to shareholders, we found that less risky CEOs
579 were more likely to initiate dividend payments. More risky CEOs, on the contrary,
580 have a lower probability of initiating either repurchases or cash dividends, which
581 means that Hypothesis 2 cannot be rejected.

582 We also document the effects of CEO risk preferences on the choice of the payout
583 channel itself. We show that more risky CEOs choose to distribute profits among
584 shareholders through repurchases rather than through dividends, which means that
585 Hypothesis 3 cannot be rejected. Risky CEOs consider the company stocks to be

586 undervalued and tend to repurchase them at what they think is a good price. Less
587 risky CEOs prefer to distribute cash through the dividends instead.

588 Our second set of findings is related to the role of boards of directors in offset-**AQ7**
589 ting the negative effects of CEO behavior on payout policies. Our study provides
590 new empirical evidence on the role of compensation schemes set up by the boards
591 to align CEO risk preferences with the strategic vision of the boards. We document
592 that efficient boards are able to eliminate or to reduce the negative influence of CEO
593 behavioral characteristics. We show that the impact of a CEO's risk preferences is
594 lower in the companies with higher quality of corporate governance. This means
595 that Hypothesis 4 cannot be rejected.

596 However, we found that this ability decreased with the increase in payout lev-
597 els. High quality corporate governance has an ability to significantly reduce negative
598 effects in companies with the lowest levels of payouts, but not in the companies with
599 the highest levels of payout. In the latter case the CEO's risk preferences still affect
600 both the level of repurchase ratio and the choice of payout channel. One of the rea-
601 sons for this is that in companies with the highest payout levels, shareholders may be
602 satisfied with these high levels in spite of opportunities to get increase payouts if the
603 negative effects of the CEO's behavior are overcome.

604 Based on the results of this study we strongly believe that remuneration policy
605 and the pay for performance mix should be considered as a tool for influencing CEO
606 behavior within the company. Moreover, major shareholders should force the devel-
607 opment of highly efficient governance processes, especially in those companies with
608 low levels of payout, to protect themselves against the negative effects of the CEO's
609 behavior. The appropriate CG efficiency should be set in accordance with the share-
610 holders' interests and the peculiarities of the CEO's behavior.

611 The aspects of CEO risk aversion studied here are only a part of the behavioral
612 traits that predetermine different styles in developing corporate policies. We believe
613 that further research should focus on a deeper understanding of the influence of the
614 overall set of behavioral characteristics of CEOs, which could be assigned to the
615 bounded rationality of decision-making by top executives. It seems important to
616 understand better how CEO overconfidence, which is based on an underestimation
617 of future risks, and CEO optimism, which is an overvaluation of future outcomes
618 and of favorable trends, interact in corporate payout policies. Future research on
619 the interaction of CEO behavioral biases, along with the biases of members of the
620 board, might be a productive angle for understanding the future of corporate payout
621 policies.

622 In addition to the above, it would be beneficial to gain a deeper understanding of
623 the board's ability to eliminate the negative effects of other behavioral biases. It may
624 be the case that to treat overconfidence and optimism appropriately, or to gain the
625 most benefit from hindsight, boards of directors need to develop approaches that dif-
626 fer from those used to deal with CEO risk preferences. Such a research agenda may
627 indeed help shareholders to protect their interests more effectively from the adverse
628 effects of CEO behavior.

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