

Managerial Ability and Corporate Repurchase Activity

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ABSTRACT

We examine how managerial ability is associated with stock repurchase activity. Adopting the managerial efficiency score developed by Demerjian, Lev, and McVay (2012) as the proxy for managerial ability, we explore the link between managerial ability and stock repurchase based on a total number of 85,480 firm-year observations in the U.S. from 1980 to 2016. We find that firms with higher managerial ability are more likely to conduct share repurchases and spend more on repurchasing shares. Our findings are robust to using alternative measure of managerial ability, controlling for unobservable variables and the impact of dividend tax cut of 2003, and addressing potential endogeneity concerns. In addition, talented managers tend to repurchase shares instead of issuing more dividends. Firms with high-ability managers reduce overinvestment in favor of repurchases. This study contributes to the literature of managerial traits on corporate decisions.

JEL Classifications: G35, M10

Keywords: managerial ability, repurchase, talented managers, substitution effect

I. INTRODUCTION

Previous studies on corporate payout have documented a surge in stock repurchases since 1980s (Dittmar, 2000; Dittmar & Dittmar, 2002; Grullon & Ikenberry, 2000; Grullon & Michaely, 2002; Jagannathan, Stephens, & Weisbach, 2000; Skinner, 2008). Some studies explain this significant increase in repurchases as a result of dividend substitution (Grullon & Michaely, 2002; Jiang, Kim, Lie, & Yang, 2013). Others, like Jagannathan and Stephens (2003) and Brav, Graham, Harvey, and Michaely (2005), argue that the decision between dividends and repurchases depends on certain firm characteristics like the level and volatility of earnings. Recent studies find that certain manager characteristics, like CEO optimism and overconfidence, should be considered in corporate decisions like repurchases (Banerjee, Humphery-Jenner, & Nanda, 2018; Nguyen, Nguyen, Ngo, & Adhikari, 2018). We extend this strand of literature and examine the effect of managerial ability on repurchase decisions.

Prior literature has documented that managerial ability has important implications on corporate decisions, operating outcomes, and investors' wealth (Baik, Farber, & Lee, 2011; Demerjian, Lev, Lewis, & McVay, 2013; Francis, Huang, Rajgopal, & Zang, 2008; Guan, Li, & Ma, 2018; Mishra, 2014). Share repurchase, as a payout policy, is more flexible and has tax advantage compared to dividends. More able managers are more likely to conduct share repurchases to reach the target leverage ratio (Lie 2002), to fend off potential takeover threat (Denis 1990; Bagwell 1991), to offset the dilution effect of stock options on firm share value (Bens, Nagar, Skinner, & Wong, 2003), or to signal undervaluation (Brennan & Thakor, 1990; Lucas & McDonald, 1998). Therefore, we expect that firms with more able managers are associated with a higher likelihood of conducting share repurchases.

We adopt the managerial efficiency score developed by Demerjian et al. (2012) as the proxy for managerial ability, and extract information on firms' share repurchasing activity from *Compustat*. Using a firm-year panel dataset between 1980 and 2016, we find a positive relation between managerial ability and the likelihood of conducting repurchases as well as the dollar amount spent on repurchasing shares. We next examine how high-ability managers come up with resources to conduct repurchases. First, we test the substitution hypothesis proposed by Grullon and Michaely (2002) and investigate whether talented managers are more likely to substitute dividends with repurchases. Employing Lintner (1956)'s dividend model to estimate discretionary dividends, we find that managerial ability is negatively associated with discretionary dividends, suggesting that more able managers tend to cut discretionary dividends in favor of repurchasing shares. We also show that repurchases are negatively related to the level of unexpected dividends, confirming the substitution effect. We then examine whether talented managers reduce excessive capital expenditure in favor of repurchases. We estimate excessive capital expenditure (Banerjee et al., 2018) and regress it on managerial ability and a set of control variables. The results show that higher managerial ability is associated with a smaller amount of excessive capital investment, suggesting that high-ability managers may reduce excessive capital expenditure to fund share repurchases.

To ensure that our findings are driven by the construction of variables or certain model specifications, we perform several robustness tests using alternative measures of managerial ability, controlling for additional variable, using a subsample after dividend tax rate cut of 2003, and addressing potential endogeneity concerns using propensity

score matching method and difference-in-differences approach. Our main findings remain robust. In additional tests, we examine the effect of information asymmetry and corporate governance on the relationship between managerial ability and repurchases. The results indicate that transparent information environment and good corporate governance encourage managers with high ability to conduct stock repurchases.

Our findings make several contributions. First, we add to the literature of how managerial traits may impact corporate decisions by showing that higher ability managers are more likely to conduct share repurchases and spend more on repurchasing shares. Second, we provide evidence for the dividend-repurchase substitution hypothesis. Our findings suggest that firms with more able managers tend to substitute excessive dividends with repurchases. Third, our results highlight the importance of considering managerial characteristics in hiring process by showing that more able managers reduce overinvestment and make better use of firm resources.

The remaining of the paper is organized as follows. In Section II, we present a review on the related literature and develop our hypotheses. Section III discusses the sample and describes the data. We test the hypotheses and present the main findings in section IV. Additional tests are provided in section V. Section VI concludes the paper.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPEMNT

A. Related Literature Review

Prior studies argue that the human capital component, such as managerial traits, have important implications on corporate strategic financing decisions and investment decisions. In particular, using various proxies for managerial ability, studies have found that the variations of ability among corporate managers have explanatory power on corporate decisions as well as accounting and finance outcomes (Baik et al., 2011; Chemmanur & Paeglis, 2005; Demerjian et al., 2012; Francis et al., 2008; Rose & Shepard, 1997). These studies document the benefits and costs of having capable managers. For instance, Milbourn (2003) and Rajgopal, Shevlin, and Zamora (2006) find that the perceived managerial ability is positively related to managerial performance-based compensation. Francis et al. (2008) document that firms with poor accounting earnings quality and volatile operating environment are more likely to hire reputed managers and rely on their expertise. Cornaggia, Krishnan, and Wang (2017) show that the rating analysts consider the ability of the manager as an important factor when determining the credit ratings of a firm.

Several studies relate managerial efficiency to firm accounting and operating performance. Demerjian et al. (2013) find that talented managers help promote better earnings quality. Similar to their findings, Baik et al. (2011) show that managerial ability is positively associated with both frequency and accuracy of earnings forecasts, indicating that managers with high ability use earnings forecasts to convey information to investors. Chen, Podolski, and Veeraraghavan (2015) focus on firm innovation and find that market reacts more positively to patents issued by firms with more able managers. On the other hand, Mishra (2014) argue that high managerial ability increases agency problems as managers have different risk-taking motivations.

Other studies focus on the impact of managerial ability on equity market. Chemmanur and Paeglis (2005) and Chemmanur, Paeglis, and Simonyan (2009)

document that high-ability managers are able to transmit information on firm intrinsic value to the market. Demerjian et al. (2012) show that managers with high ability are able to utilize equity capitals efficiently and are related to improved firm performance. Francis, Hasan, Mani, and Ye (2016) find that firms with better peer performance is related to better subsequent stock performance and higher earnings. On the negative side, Cox (2017) find that firms with more capable managers experience more underpricing in IPOs. Cui, Chen, Zhang, and Zhu (2019) show that high-ability managers are likely to hoard bad news and hence are associated with a higher level of stock crash risk.

B. Hypothesis Development

We extend the literature on the effect of managerial ability on corporate decisions by examining the association between managerial ability and share repurchases. Previous studies have documented several reasons why firms may repurchase stocks. The excess capital hypothesis argues that firms may conduct stock repurchases to return excessive cash to shareholders (Barclay & Smith Jr, 1988; Dittmar, 2000; Grullon & Ikenberry, 2000; Ikenberry & Vermaelen, 1996). Repurchases are more flexible than dividends, as firms do not commit to make recurring repurchases. In addition, capital gain tax rate is lower than dividend tax rate. We expect that higher-ability managers are more likely to take advantage of the flexibility and lower tax rate and choose stock repurchases instead of dividends to return capitals to investors.

The signaling hypothesis states that firms buy back undervalued shares to signal the true firm value to investors (Dann, 1981; Ikenberry & Vermaelen, 1996; Ofer & Thakor, 1987; Vermaelen, 1981). We expect that managers with higher ability are more likely to take a proactive approach in signaling undervaluation. The managerial incentive hypothesis suggests that managers conduct repurchases to offset the dilution effect of stock options when they are compensated with a large amount of stock options (Dittmar, 2000; Douglas, 2007; Fenn & Liang, 2001). More able managers are more likely to make repurchasing decision to uphold the value of their compensation package. The takeover deterrence hypothesis states that managers may use repurchases to increase the cost of acquisition and reduce the risk of becoming takeover targets (Dittmar, 2000; Sinha, 1991). More able managers are more likely to conduct share repurchases to fend off takeover threats. We also expect high-ability managers to use share repurchases to reach the target leverage ratio (Lie 2002) so that the firm is operating with optimal leverage. In summary, we expect a positive relation between a firm's managerial ability and its share repurchase activity.

Hypothesis 1: Firms with more capable managers are more likely to repurchase stocks and spend more in repurchases.

How do talented managers come up resources for share repurchases? Jagannathan et al. (2000) find that, given the flexibility, repurchases are preferred to dividends when a firm experiences poor stock performance or has volatile cash flows. Cash used for repurchases comes from temporary, non-operating activities. In the survey developed by Brav et al. (2005), managers express their preference of repurchases for its flexibility, but also indicate that repurchases are made out of residual cash flows. Grullon and Michaely (2002) proposes the substitution hypothesis that firms chose repurchases

as the preferred payout method over dividends. Following Baker and Wurgler (2004)'s dividend catering theory, Jiang et al. (2013) also document a repurchasing catering behavior, that firms cater shareholders' demand for repurchases. Liu and Mehran (2015) find that firms manipulate share repurchases to meet their dividend payout target. In a recent study, Guan et al. (2018) reveals that managerial ability increases the shareholder dividend tax sensitivity to the dividend-repurchase substitution. In summary, previous studies suggest that one way to come up with resources for repurchases is to reduce dividends. Given these findings, we expect managers with high ability to conduct share repurchases by reducing dividends, particularly discretionary dividends.

Hypothesis 2: High-ability managers tend to reduce discretionary dividends in favor of stock repurchases.

Another way for talented managers to gather resources for repurchases may be related to their better management of firm capital expenditure. Talented managers are believed to be more efficient in utilizing firm capital proceeds. For instance, Chemmanur et al. (2009) find that managerial ability is associated with high level of capital investment, as more able managers have superior ability in selecting high-NPV projects. Baghdadi, Bhatti, Nguyen, and Podolski (2018) also document that high-ability managers are more likely to cut capital expenditure and focus on firm research and development than low-ability managers. Other studies, like Gan (2019), state that high ability managers help improve investment efficiency through reducing overinvestment and improving underinvestment. Therefore, we hypothesize that another way for high-ability managers to come up with resources for repurchases is to reduce excessive capital expenditure.

Hypothesis 3: Firms with high-ability managers reduce excessive capital expenditure to fund share repurchases.

III. SAMPLE AND DESCRIPTIVE STATISTICS

We extract data from *Compustat* to determine whether a firm spent money on stock repurchases in a given year. We then generate the dependent variables of a repurchase indicator ($Repo_dummy_{i,t}$) and the dollar amount spent on repurchase ($Repo_value_{i,t}$). $Repo_dummy_{i,t}$ equals one if firm i spent a positive dollar amount on repurchases in year t , and zero otherwise. $Repo_value_{i,t}$ is the natural log of repurchase dollar amount for firm i in year t .

We adopt the managerial ability measure ($MScore_{i,t}$) developed by Demerjian et al. (2012).¹ This measure has been widely used in previous research (Baghdadi et al., 2018; Banerjee et al., 2018; Demerjian et al., 2013; Francis et al., 2016).² In addition to the level of the managerial ability score ($MScore_{i,t}$), we also use the managerial ability ranking ($MRank_{i,t}$), as an alternative independent variable. $MRank_{i,t}$ is the rescaled decile ranking of firm i 's managerial ability score within the 2-digit SIC industry in year t . $MRank_{i,t}$ has a value between 0 and 1, and it mitigates the potential impact of extreme values in $MScore_{i,t}$.

Following previous studies (Baker & Wurgler, 2004; Banerjee et al., 2018; Brockman, Howe, & Mortal, 2008; Jagannathan & Stephens, 2003; Li & Zhao, 2008), we control for factors that are shown to have an impact on share repurchase activities.

Specifically, we obtain accounting information from *Compustat* to construct a set of firm-specific control variables, including total assets, dividends, cash, firm age, R&D cost, leverage, profit, and retained earnings. We also control for annual stock performance and return volatility, calculated using the monthly stock return information from *CRSP*. Lastly, we control for the level of institutional ownership using data from *Thomson Reuters Institutional Holdings (13f) Database*. A detailed description of variables is provided in Appendix A.

Our sample period spans from year 1980 to year 2016. Year 1980 is the first year that the managerial ability measure is available. We delete firm-year observations with missing information to compute all variables and exclude firms in financial industries (SIC code between 6000 and 6999) and utility industries (SIC code between 4900 and 4999). To mitigate the impact of penny stocks, we exclude all firms with stock prices less than \$1. We winsorize all continuous variables at the top and bottom 1% percentile. The final sample contains a total of 85,480 firm-year observations.

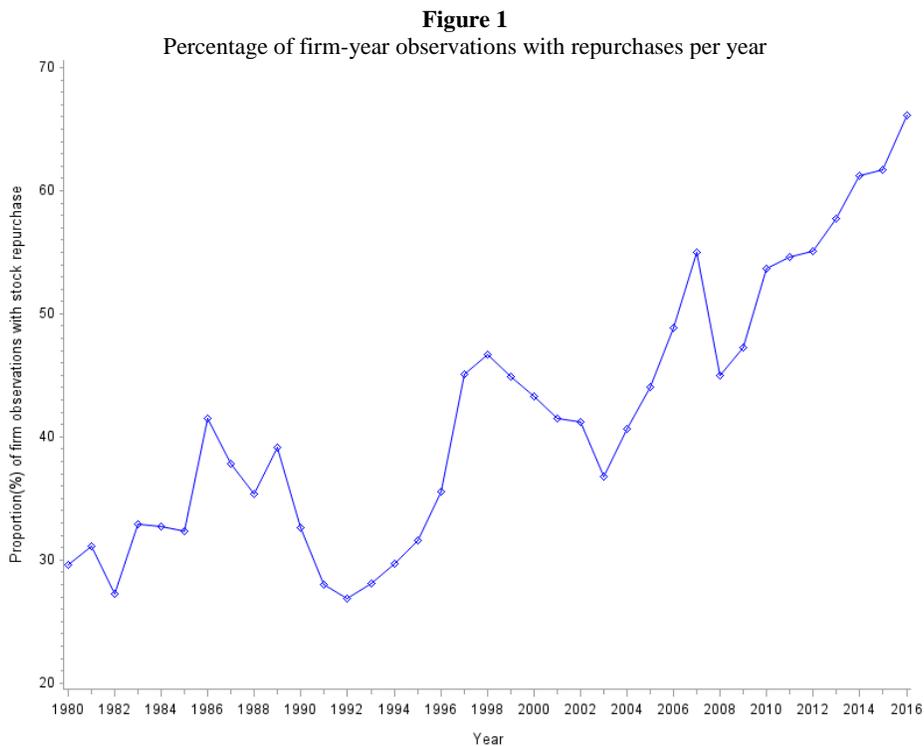
Table 1
Sample descriptive statistics

Variable	N	Mean	Median	Std Dev	25th Pctl	75th Pctl
Repo_dummy	85,480	0.405	0.000	0.491	0.000	1.000
Repo_value	85,480	0.541	0.000	2.006	0.000	0.357
MScore	85,480	0.004	-0.011	0.114	-0.060	0.041
MRank	85,480	0.564	0.600	0.277	0.300	0.800
Assets	85,480	5.122	4.961	2.043	3.619	6.506
Div	85,480	0.714	0.000	1.609	0.000	0.699
Cash	85,480	0.104	0.046	0.140	0.013	0.141
Age	85,480	3.150	3.178	0.616	2.708	3.611
Ret	85,480	0.183	0.064	0.678	-0.211	0.387
Ret St.D.	85,480	0.140	0.120	0.082	0.085	0.172
RD	85,480	0.041	0.000	0.078	0.000	0.049
Leverage	85,480	0.022	0.007	0.037	0.000	0.030
BidAsk	85,480	0.218	0.186	0.200	0.033	0.340
Profit	85,480	0.095	0.120	0.162	0.056	0.178
REBE	85,480	-0.132	0.415	3.270	-0.083	0.772
Institution%	85,480	0.259	0.091	0.313	0.000	0.501

Notes: This table shows the summary statistics of the sample. The reported statistics include the number of observations, mean, median, standard deviation, the 25th percentile cutoff, and 75th percentile cutoff point, respectively. The definition of variables is provided in Appendix A.

Table 1 presents the summary statistics of the variables in the sample. Around 40.5% of firm-year observations in the sample have the repurchase indicator ($Repo_dummy_{i,t}$) equal to one, and the average dollar amount spent on stock repurchase is 0.541 in natural logarithm, or \$1.717 million. Figure 1 plots the percentage of firm-year observations with $Repo_dummy_{i,t} = 1$ in our sample period. The plot shows a dramatic increase in the proportion of firm-years with repurchases. For example, the

average proportion of firms with repurchases during the first 10 years of the sample (year 1980 to 1990) was 33.97%, and it increased to 55.69% during the last 10 years of the study period (year 2006 to 2016). This is consistent with previous studies that document a surge of repurchases in recent decades (Dittmar & Dittmar, 2002; Grullon & Ikenberry, 2000; Grullon & Michaely, 2002; Skinner, 2008). Grullon and Michaely (2002), specifically, find that repurchases were constrained by regulations before year 1983 and firms dramatically increased repurchase activities after the adoption of Rule 10b-18. For the managerial ability measure, the average ranking of ability score in the sample is 0.564.



Note: Figure 1 plots the percentage of firm-year observations with repurchases from 1980 to 2016.

IV. RESEARCH DESIGN AND EMPIRICAL RESULTS

A. Baseline Model

To test hypothesis 1, we regress the year $t+1$ share repurchase activity on year t managerial ability measure, controlling for factors that impact share repurchases. We employ a logit model with the dependent variable being the repurchase dummy that equals one if firm i repurchased stocks in year $t+1$, and a tobit model with the dependent variable being the natural log of the dollar amount that firm i spent on repurchases in year $t+1$.

$$Repo_{i,t+1} = \beta_0 + \beta_1 \times Managerial\ Efficiency_{i,t} + \beta_2 \times Control_{i,t} + Year\ Dummies + Industry\ Dummies + \varepsilon_{i,t+1} \quad (1)$$

$Repo_{i,t+1}$ is either $Repo_dummy_{i,t+1}$ or $Repo_value_{i,t+1}$. $Managerial\ Efficiency_{i,t}$ is either of the two measures of managerial efficiency, managerial efficiency score ($MScore$) or managerial ranking ($MRank$), of firm i in year t . $Control_{i,t}$ is a vector of control variables. The definitions of those control variables are described in Appendix A. To control for year and industry fixed effects, we follow Banerjee et al. (2018) and include the year dummies and industry dummies based on 2-digit SIC code. We estimate the robust standard errors based on firm-level clustering.³

The regression results are reported in Table 2. Column (1) and (2) report the results of the logit model specified in eq. (1) with $Repo_dummy_{i,t+1}$ as the dependent variable, and column (3) and (4) report the regression results of the tobit model specified in eq. (1) with $Repo_value_{i,t+1}$ as the dependent variable. Each model has two columns because we measure managerial efficiency in two ways, $MScore$ and $MRank$. Table 2 shows that managerial efficiency is significantly positive in Columns (3) and (4), positive and marginally significant in Column (1), and positive but insignificant in Column (2). Overall, the results suggest that, firms with higher managerial ability are more likely to repurchase stocks in the following year, and these firms are also associated with a higher dollar amount spent on stock repurchases.⁴

As for control variables, Table 2 reports that repurchases are positively associated with firm size (measured by total assets), cash holdings, profitability, and dividends. These findings are consistent with previous studies on stock repurchases that repurchases are typically done by firms that are large, have stable operating income, and pay more dividends (Jagannathan & Stephens, 2003). Also, our results support the signaling hypothesis that, firms are more likely to repurchase stocks to signal undervaluation after experiencing negative returns (Jagannathan et al., 2000). We also find that the level of institutional holdings is positively associated with repurchases, consistent with the findings of Banerjee et al. (2018).

Table 2
Baseline model

Model	(1)	(2)	(3)	(4)
Dependent Variable	Repo_dummy (t+1)	Repo_dummy (t+1)	Repo_value (t+1)	Repo_value (t+1)
Mscore (t)	0.217* (0.085)		1.220*** (0.000)	
MRank (t)		0.077 (0.111)		0.402*** (0.000)
Assets (t)	0.172*** (0.000)	0.174*** (0.000)	0.380*** (0.000)	0.391*** (0.000)
Div (t)	0.058*** (0.000)	0.058*** (0.000)	0.255*** (0.000)	0.257*** (0.000)
Cash (t)	0.677*** (0.000)	0.681*** (0.000)	0.358*** (0.000)	0.380*** (0.000)

Age (t)	0.203*** (0.000)	0.202*** (0.000)	-0.033* (0.075)	-0.040** (0.030)
Ret (t)	-0.061*** (0.000)	-0.061*** (0.000)	0.094*** (0.000)	0.094*** (0.000)
Ret St.D. (t)	-3.330*** (0.000)	-3.329*** (0.000)	-0.898*** (0.000)	-0.885*** (0.000)
RD (t)	-0.887*** (0.001)	-0.873*** (0.001)	0.590*** (0.000)	0.679*** (0.000)
Leverage (t)	-1.086*** (0.000)	-1.085*** (0.000)	-0.380*** (0.000)	-0.380*** (0.000)
BidAsk (t)	-0.021 (0.962)	-0.003 (0.995)	1.318*** (0.000)	1.397*** (0.000)
Profit (t)	1.864*** (0.000)	1.866*** (0.000)	0.440*** (0.000)	0.465*** (0.000)
REBE (t)	0.021*** (0.000)	0.021*** (0.000)	0.001 (0.667)	0.001 (0.676)
Institution% (t)	0.245*** (0.000)	0.244*** (0.000)	0.293*** (0.000)	0.287*** (0.000)
Constant	-2.177*** (0.000)	-2.239*** (0.000)	-1.733*** (0.000)	-2.060*** (0.000)
Observations	85,480	85,480	85,480	85,480
Year Fixed	YES	YES	YES	YES
Industry Fixed	YES	YES	YES	YES
Firm Clustered	YES	YES	YES	YES
Pseudo R-squared	0.129	0.129	0.111	0.111

Notes: This table shows the estimation results in eq. (1). The models in columns (1) and (2) are logit models with the dependent variable of repurchase indicator, and those in columns (3) and (4) are tobit regression models with the dependent variable of repurchase spending. The definitions of variables are available in Appendix A. Regressions are estimated with the year dummies and industry dummies as classified based on 2-digit SIC code, and robust standard errors based on firm clusters. P-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

B. Do firms with high-ability managers reduce discretionary dividends in favor of repurchases?

In hypothesis 2, we posit that managers with high ability reduce the discretionary dividends in favor of share repurchases. To test the hypothesis, we expand the model in Grullon and Michaely (2002) by including managerial ability as an explanatory variable and estimating the following model:

$$\begin{aligned}
 UEDiv_{i,t+1} = & \beta_0 + \beta_1 \times \text{Managerial Efficiency}_{i,t} + \beta_2 \times \text{Managerial Efficiency}_{i,t} \times \\
 & \text{Repo_dummy}_{i,t} + \beta_3 \times \text{Repo_dummy}_{i,t} + \beta_4 \times \text{Control}_{i,t} + \text{Year Dummies} + \text{Industry} \\
 & \text{Dummies} + \varepsilon_{i,t+1}
 \end{aligned} \tag{2}$$

The dependent variable $UEDiv_{i,t+1}$ is the discretionary dividends for firm i in year $t+1$. We follow Grullon and Michaely (2002) and calculate the discretionary, or “unexpected” dividends as the dividend forecast error from Lintner (1956)’s dividend model:

$$UEDiv_{i,t} = [ADiv_{i,t} - (\lambda_{0,i} + \lambda_{1,i} \times EARN_{i,t} + \lambda_{2,i} \times Div_{i,t-1})] / MVE_{i,t-1} \quad (3)$$

$ADiv_{i,t}$ is the actual change of dividends from year $t-1$ to year t for firm i , $EARN_{i,t}$ is the earnings in year t , $Div_{i,t-1}$ is the level of dividends in year $t-1$, and $MVE_{i,t-1}$ is the market value of equity in year $t-1$. The “unexpected” level of dividends, $UEDiv_{i,t}$, is calculated as the difference between the actual level of dividends and the expected level of dividends.

The regression results of eq. (2) are presented in Table 3. In Column (1) and (3) [(2) and (4)] the managerial ability measure is $MScore_{i,t}$ [$MRank_{i,t}$], and in Column (1) and (2) [(3) and (4)] the repurchase indicator is $Repo_dummy_{i,t}$ [$Repo_dummy_{i,t+1}$]. Table 3 shows that, β_1 is negative and significant in all four columns, indicating that when there is no repurchase, managerial ability is negatively related to the unexpected dividends, suggesting that firms with high managerial ability tend to cut residual dividends. In addition, β_3 is negative and significant in all four columns, consistent with the repurchase-dividend substitution hypothesis (Grullon and Michaely (2002)). More importantly, β_2 (the coefficient of the interaction between managerial efficiency score and repurchase indicator) are significantly negative, suggesting that high-ability managers further reduce the discretionary dividends in favor of share repurchases. Overall, the results presented in Table 3 support Hypothesis 2 that one way high-ability managers come up with resources for repurchases is to reduce discretionary dividends.

Table 3
Managerial ability, repurchases, and discretionary dividends

Model	(1)	(2)	(3)	(4)
Dependent Variable	UEDiv (t+1)	UEDiv (t+1)	UEDiv (t+1)	UEDiv (t+1)
MScore (t)	-0.752*** (0.000)		-0.868*** (0.000)	
MScore (t)*Repo_dummy (t)	-0.565*** (0.001)			
MRank (t)		-0.332*** (0.000)		-0.386*** (0.000)
MRank (t)*Repo_dummy (t)		-0.100* (0.089)		
Repo_dummy (t)	-0.179*** (0.000)	-0.125*** (0.010)		
MScore (t)*Repo_dummy (t+1)			-0.330*** (0.006)	
MRank (t)*Repo_dummy (t+1)				-0.202** (0.037)
Repo_dummy (t+1)			-0.110*** (0.000)	-0.125** (0.010)
Assets (t)	0.545***	0.533***	0.543***	0.532***

	(0.000)	(0.000)	(0.000)	(0.000)
Div (t)	-0.222***	-0.223***	-0.225***	-0.226***
	(0.000)	(0.000)	(0.000)	(0.000)
Cash (t)	0.788***	0.771***	0.788***	0.769***
	(0.000)	(0.000)	(0.000)	(0.000)
Age (t)	1.118***	1.125***	1.114***	1.121***
	(0.000)	(0.000)	(0.000)	(0.000)
Ret (t)	0.265***	0.265***	0.267***	0.268***
	(0.000)	(0.000)	(0.000)	(0.000)
Ret St.D. (t)	-0.008	-0.017	0.026	0.016
	(0.962)	(0.925)	(0.881)	(0.926)
RD (t)	3.326***	3.308***	3.334***	3.313***
	(0.000)	(0.000)	(0.000)	(0.000)
Leverage (t)	-1.690***	-1.696***	-1.686***	-1.693***
	(0.000)	(0.000)	(0.000)	(0.000)
BidAsk (t)	-4.709***	-4.796***	-4.731***	-4.816***
	(0.000)	(0.000)	(0.000)	(0.000)
Profit (t)	1.755***	1.769***	1.756***	1.771***
	(0.000)	(0.000)	(0.000)	(0.000)
REBE (t)	-0.009***	-0.009***	-0.009***	-0.009***
	(0.003)	(0.004)	(0.002)	(0.002)
Institution% (t)	-0.187***	-0.181***	-0.187***	-0.182***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-9.478***	-9.208***	-9.477***	-9.174***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	83,678	83,678	83,678	83,678
Year Fixed	YES	YES	YES	YES
Industry Fixed	YES	YES	YES	YES
Firm Clustered	YES	YES	YES	YES
Adj.R-squared	0.264	0.264	0.263	0.263

Notes: This table presents the OLS regression results of eq. (2) that examine the impact of managerial ability and share repurchases on discretionary dividends. The dependent variable is the “unexpected” level of dividends that is calculated as the difference between the actual level of dividends and the expected level of dividends, as specified in eq. (3). Variable definitions are provided in Appendix A. Regressions are estimated with year dummies and industry (2-digit SIC) dummies, and robust standard errors based on firm clustering. P-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

C. Do firms with high-ability managers reduce excessive capital expenditure to repurchase stocks?

Previous studies indicate that managerial efficiency has positive impact on firm investment (Gan, 2019; Lee, Wang, Chiu, & Tien, 2018). In this section, we test Hypothesis 3 that more able managers tend to reduce excessive capital expenditure to fund share repurchases. We estimate the following model:

$$AbCapx_{i,t+1} = \beta_0 + \beta_1 \times \text{Managerial Efficiency}_{i,t} + \beta_2 \times \text{Managerial Efficiency}_{i,t} \times \text{Repo_dummy}_{i,t} + \beta_3 \times \text{Repo_dummy}_{i,t} + \beta_4 \times \text{Control}_{i,t} + \text{Year Dummies} + \text{Industry Dummies} + \varepsilon_{i,t+1} \quad (4)$$

$AbCapx_{i,t+1}$ is the abnormal capital expenditure ($CAPX$). To obtain the $AbCAPX$, we follow Banerjee et al. (2018) and regress the actual level of capital expenditure in year $t+1$, scaled by the level of sales revenue, on a set of firm characteristics in year t , with year and industry dummies and clustering standard errors by firm. The $AbCAPX$ is then calculated as the difference between the actual $CAPX$ and the predicted $CAPX$. We use an OLS regression to estimate eq. (4), controlling for year and industry dummies as well as firm-level clustering.

The results are reported in Table 4. In Column (1) and (3) [(2) and (4)] the managerial ability measure is $MScore_{i,t}$ [$MRank_{i,t}$], and in Column (1) and (2) [(3) and (4)] the repurchase indicator is $Repo_dummy_{i,t}$ [$Repo_dummy_{i,t+1}$]. Table 4 shows that, β_1 is significantly negative in all four columns, indicating that, in absence of repurchases, higher managerial ability is associated with lower excessive capital expenditure. This is consistent with the findings in previous studies that more able managers use the equity issuance proceeds effectively (Demerjian et al., 2012) and help improve investment efficiency (Gan, 2019). In addition, β_3 is negative and significant in all four columns, suggesting a negative relation between repurchases and excessive capital expenditure. More importantly, β_2 is negative and significant, suggesting that firms with high managerial ability further reduce excessive capital expenditure in favor of repurchases. The results presented in Table 4 supports our hypothesis that another way for high ability managers to fund share repurchases is to reduce excessive capital expenditure.

Table 4
Managerial ability, repurchases, and abnormal capital expenditure

Model	(1)	(2)	(3)	(4)
Dependent Variable	AbCapx (t+1)	AbCapx (t+1)	AbCapx (t+1)	AbCapx (t+1)
MScore (t)	-0.280*** (0.000)		-0.306*** (0.000)	
MScore (t)*Repo_dummy (t)	-0.171*** (0.001)			
MRank (t)		-0.113*** (0.000)		-0.115*** (0.000)
MRank (t)*Repo_dummy (t)		-0.072*** (0.000)		
Repo_dummy (t)	-0.010** (0.011)	-0.050*** (0.000)		
MScore (t)*Repo_dummy (t+1)			-0.219*** (0.000)	
MRank (t)*Repo_dummy (t+1)				-0.075*** (0.000)
Repo_dummy (t+1)			-0.013*** (0.000)	-0.055*** (0.000)
Assets (t)	-0.000 (0.882)	-0.002 (0.248)	-0.000 (0.874)	-0.002 (0.272)
Div (t)	0.002 (0.272)	0.002 (0.248)	0.002 (0.281)	0.002 (0.254)
Cash (t)	0.010 (0.758)	0.007 (0.826)	0.010 (0.755)	0.008 (0.813)
Age (t)	-0.000	0.001	-0.000	0.001

	(0.937)	(0.908)	(0.951)	(0.901)
Ret (t)	-0.001	-0.001	-0.000	-0.001
	(0.939)	(0.928)	(0.960)	(0.948)
Ret St.D. (t)	0.004	0.004	0.002	0.001
	(0.888)	(0.899)	(0.949)	(0.972)
RD (t)	0.086**	0.082*	0.090**	0.083*
	(0.046)	(0.058)	(0.036)	(0.056)
Leverage (t)	-0.012	-0.014	-0.013	-0.015
	(0.476)	(0.387)	(0.429)	(0.351)
BidAsk (t)	-0.007	-0.022	-0.009	-0.022
	(0.903)	(0.722)	(0.881)	(0.720)
Profit (t)	0.058***	0.066***	0.061***	0.068***
	(0.007)	(0.002)	(0.004)	(0.001)
REBE (t)	0.000	0.000	0.000	0.000
	(0.894)	(0.889)	(0.908)	(0.885)
Institution% (t)	-0.001	-0.001	-0.001	-0.001
	(0.908)	(0.931)	(0.937)	(0.953)
Constant	-0.013	0.068*	-0.013	0.070*
	(0.713)	(0.077)	(0.724)	(0.067)
Observations	85,480	85,480	85,480	85,480
Year Fixed	YES	YES	YES	YES
Industry Fixed	YES	YES	YES	YES
Firm Clustered	YES	YES	YES	YES
Adj.R-squared	0.001	0.001	0.001	0.001

Notes: This table presents the OLS regression results of eq. (4) that examine the impact of managerial ability and share repurchases on abnormal capital expenditure. The dependent variable is the abnormal level of CAPX, which is defined as the difference between the actual scaled CAPX and the predicted scaled CAPX. The definitions of variables are available in Appendix A. Regressions are estimated with the year dummies and industry dummies as classified based on 2-digit SIC code, and robust standard errors based on firm clusters. P-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

V. ADDITIONAL ANALYSIS

A. Does information environment affect the relationship between managerial efficiency and repurchase activities?

We conduct additional tests to further examine the relation between managerial ability and share repurchases. In this section, we examine if information environment affects the relation between managerial ability and repurchases. Several studies suggest that firms are more likely to repurchase stocks when the information asymmetry is high (Dittmar, 2000; Jagannathan & Stephens, 2003; Vermaelen, 1981), while Li and Zhao (2008) find no relationship between information asymmetry and repurchase activities. Bok, Brockman, Farber, and Sam (2018) find high managerial ability helps improve a firm's information environment. We use two proxies for firm's information environment, the number of analysts following and the analyst forecast error, both extracted from I/B/E/S. We estimate the following regression models:

$$Repo_{i,t+1} = \beta_0 + \beta_1 \times Managerial\ Efficiency_{i,t} + \beta_2 \times Managerial\ Efficiency_{i,t} \times ANA_dummy_{i,t}$$

$$+ \beta_3 \times ANA_dummy_{i,t} + \beta_4 \times Control_{i,t} + Year\ Dummies + Industry\ Dummies + \varepsilon_{i,t+1} \quad (5)$$

$$Repo_{i,t+1} = \beta_0 + \beta_1 \times Managerial\ Efficiency_{i,t} + \beta_2 \times Managerial\ Efficiency_{i,t} \times FError_{i,t} \\ + \beta_3 \times FError_{i,t} + \beta_4 \times Control_{i,t} + Year\ Dummies + Industry\ Dummies + \varepsilon_{i,t+1} \quad (6)$$

$Repo_{i,t+1}$ is either $Repo_dummy_{i,t+1}$ or $Repo_value_{i,t+1}$. $ANA_dummy_{i,t}$ is a dummy variable that takes the value of one if firm i has at least one analyst following in year t , and 0 otherwise. Analyst following means more transparent information environment and less information asymmetry. $FError_{i,t}$ is the analyst forecast error for firm i in year t , calculated as the absolute value of the difference between actual and median analyst forecast. $FError_{i,t}$ captures the uncertainty of information environment. A high value of $FError_{i,t}$ indicates a low level of transparency and a high level of information asymmetry. The sample size for this test is smaller because of the requirement of analyst forecast data.

Results from estimating eq. (5) [(6)] are presented in Panel A [B] of Table 5. In Column (1) and (2) [(3) and (4)] the dependent variable is $Repo_dummy_{i,t+1}$ [$Repo_value_{i,t+1}$], and in Column (1) and (3) [(2) and (4)] the managerial ability measure is $MScore_{i,t}$ [$MRank_{i,t}$]. For brevity, we report the estimation results for key variables only. In Panel A, it shows a negative relation between analyst coverage and repurchase activities. Results in model (3) and (4) indicate that firms with more able managers tend to spend significantly more money on repurchases when information asymmetry is low. Panel B shows that the results are generally weaker when using analyst forecast errors to proxy for information environment. Overall, the results suggest that low information asymmetry encourages high-ability managers to conduct more share repurchases.

B. Does external corporate governance affect the relationship between managerial efficiency and repurchase activities?

Managers may buy back shares to reduce the likelihood of takeovers (Bagnoli, Gordon, & Lipman, 1989; Sinha, 1991) or to reduce the power of shareholders who disagree with management (John & Knyazeva, 2006). In this section, we test if corporate governance affects the relation between managerial ability and repurchases.

We adopt the governance index (G-index) developed by Gompers, Ishii, and Metrick (2003) to proxy for corporate governance.⁵ A high value of G-index indicates low shareholder rights and hence low governance. We estimate the following model:

$$Repo_{i,t+1} = \beta_0 + \beta_1 \times Managerial\ Efficiency_{i,t} + \beta_2 \times Managerial\ Efficiency_{i,t} \times G_dummy_{i,t} \\ + \beta_3 \times G_dummy_{i,t} + \beta_4 \times Control_{i,t} + Year\ Dummies + Industry\ Dummies + \varepsilon_{i,t+1} \quad (7)$$

$G_dummy_{i,t}$ is the dummy variable that takes the value of 1 if a firm's G-index score is above the average value within the 2-digit SIC industry during the year, and 0 otherwise. The results are reported in Panel C of Table 5. We find no effect of governance on the relation between managerial ability and repurchases when the dependent variable is $Repo_dummy_{i,t+1}$. When the dependent variable is $Repo_value_{i,t+1}$, we find that better governance encourages high-ability managers to increase repurchase spending.

Table 5

Managerial ability, repurchases, information asymmetry, and corporate governance

Model	(1)	(2)	(3)	(4)
Dependent Variable	Repo_dumm y (t+1)	Repo_dumm y (t+1)	Repo_valu e (t+1)	Repo_valu e (t+1)
<i>Panel A</i>				
MScore (t)	0.073 (0.697)		0.661*** (0.000)	
MScore (t)*ANA_dummy (t)	0.209 (0.337)		0.826*** (0.000)	
MRank (t)		0.001 (0.984)		0.190*** (0.000)
MRank (t)*ANA_dummy (t)		0.121 (0.151)		0.360*** (0.000)
ANA_dummy (t)	-0.237*** (0.000)	-0.306*** (0.000)	-0.505*** (0.000)	-0.708*** (0.000)
Observations	85,480	85,480	85,480	85,480
Control Variables	YES	YES	YES	YES
Year Fixed	YES	YES	YES	YES
Industry Fixed	YES	YES	YES	YES
Firm Clustered	YES	YES	YES	YES
Pseudo R-squared	0.130	0.130	0.114	0.113
<i>Panel B</i>				
MScore (t)	0.267 (0.101)		1.018*** (0.000)	
MScore (t)*FError (t)	-0.119** (0.046)		-0.012 (0.431)	
MRank (t)		0.113* (0.079)		0.402*** (0.000)
MRank (t)*FError (t)		-0.036* (0.085)		-0.003 (0.556)
FError (t)	-0.024*** (0.001)	-0.003 (0.758)	-0.002 (0.436)	0.001 (0.544)
Observations	46,016	46,016	46,016	46,016
Control Variables	YES	YES	YES	YES
Year Fixed	YES	YES	YES	YES
Industry Fixed	YES	YES	YES	YES
Firm Clustered	YES	YES	YES	YES
Pseudo R-squared	0.140	0.140	0.126	0.126
<i>Panel C</i>				
MScore (t)	-0.451 (0.346)		-0.108 (0.803)	
MScore (t)*G_dummy (t)	0.880 (0.118)		1.230** (0.020)	
MRank (t)		0.030 (0.860)		0.149 (0.312)
MRank (t)*G_dummy (t)		0.157 (0.277)		0.078 (0.527)
G_dummy (t)	-0.031	-0.077	-0.398*	-0.437*

	(0.923)	(0.809)	(0.084)	(0.060)
Observations	4,561	4,561	4,576	4,576
Control Variables	YES	YES	YES	YES
Year Fixed	YES	YES	YES	YES
Industry Fixed	YES	YES	YES	YES
Firm Clustered	YES	YES	YES	YES
Pseudo R-squared	0.157	0.157	0.117	0.116

Notes: This table shows the regressions results that examine the impact of information asymmetry and corporate governance on the relation between managerial ability and repurchases. Panel A presents the regression results of eq. (5) with analyst coverage as a proxy for information asymmetry and Panel B for eq. (6) with analyst forecast errors as a proxy for information asymmetry. Panel C shows the regressions results that examine the impact of corporate governance on the relation between managerial ability and repurchases, as specified in eq. (7). The models in columns (1) and (2) are logit models with the dependent variable of repurchase indicator, and those in columns (3) and (4) are tobit regression models with the dependent variable of repurchase spending. The definitions of variables are available in Appendix A. Regressions are estimated with the year dummies and industry dummies as classified based on 2-digit SIC code, and robust standard errors based on firm clusters. P-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

C. Robustness tests

1. Unobservable firm effects and Fama-Macbeth regressions

To ensure that our results are not driven by time-invariant unobservable firm variables or selection of model specification, we perform additional regressions while controlling for firm fixed effect and using the method specified in Fama and MacBeth (1973), respectively. We report the regression results using $Repo_value_{i,t+1}$ as the dependent variable in Table 6. Model (1) and (2) show that, after controlling for unobservable firm attributes over time, the coefficients of managerial ability variables remain significant and positive. The results from Fama-Macbeth regressions are presented in model (3) and (4) of Table 6. After relaxing the fixed effect across time, firm, and industry, the impact of managerial ability on one-year ahead stock repurchase is still significantly positive. These findings further support our main conclusion that high managerial ability is positively associated with stock repurchases.

Table 6
Control for firm fixed effect and Fama-Macbeth regression

Model	(1)	(2)	(3)	(4)
Dependent Variable	Repo_value (t+1)	Repo_value (t+1)	Repo_value (t+1)	Repo_value (t+1)
Mscore (t)	0.357*** (0.000)		0.959*** (0.000)	
MRank (t)		0.074*** (0.006)		0.298*** (0.000)
Assets (t)	0.528*** (0.000)	0.528*** (0.000)	0.437*** (0.000)	0.444*** (0.000)
Div (t)	0.230*** (0.000)	0.231*** (0.000)	0.233*** (0.000)	0.234*** (0.000)
Cash (t)	0.331***	0.333***	0.553***	0.581***

	(0.000)	(0.000)	(0.000)	(0.000)
Age (t)	0.000	0.000	-0.005	-0.014
	(0.000)	(0.000)	(0.720)	(0.318)
Ret (t)	0.115***	0.114***	0.155***	0.156***
	(0.000)	(0.000)	(0.000)	(0.000)
Ret St.D. (t)	-1.681***	-1.681***	-1.254***	-1.213***
	(0.000)	(0.000)	(0.001)	(0.001)
RD (t)	1.012***	1.071***	1.591***	1.813***
	(0.000)	(0.000)	(0.000)	(0.000)
Leverage (t)	-0.727***	-0.727***	-0.671***	-0.700***
	(0.000)	(0.000)	(0.000)	(0.000)
BidAsk (t)	0.872***	0.880***	5.906***	5.873***
	(0.000)	(0.000)	(0.000)	(0.000)
Profit (t)	0.386***	0.428***	0.778***	0.832***
	(0.000)	(0.000)	(0.000)	(0.000)
REBE (t)	-0.002	-0.002	-0.021***	-0.021***
	(0.433)	(0.447)	(0.002)	(0.002)
Institution% (t)	0.270***	0.268***	0.150***	0.145***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-2.158***	-2.207***	-2.027***	-2.224***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	85,480	85,480	85,480	85,480
Adj.R-squared	0.127	0.127	0.331	0.330
Firm Fixed	YES	YES	-	-
Year Fixed	YES	YES	-	-

Notes: This table shows panel regression results while controlling for firm and year fixed effects in model (1) and (2), and Fama-Macbeth estimation in model (3) and (4). The dependent variable is the amount of repurchases in year $t+1$. The definitions of variables are available in Appendix A. P-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

2. Additional measure of managerial ability

In this section, we perform additional robustness tests using an alternative measure of managerial ability as specified in Custódio, Ferreira, and Matos (2013). In Custódio et al. (2013), the authors construct a managerial general ability index, $GA_{i,t}$, using principal components analysis based on five aspects in a manager's past working experience. To ensure that our findings are not caused by the selection of independent variables, we replace the managerial ability measures in the baseline model with the managerial general ability index, $GA_{i,t}$, and re-run the regression.⁶

The findings are presented in Table 7. Since the data for managerial general ability index is available for Standard and Poor's 1,500 firms over period 1993–2007 only, our sample size drops to 11,145 after deleting observations with missing value. With the alternative measure of managerial ability, the results still show a significant and positive relationship between general managerial ability ($GA_{i,t}$) and stock repurchase activities in the following year ($Repo_dummy_{i,t+1}$ and $Repo_value_{i,t+1}$). So, we conclude that our findings are robust to the choice of managerial ability measures.

Table 7
Using managerial general ability index as alternative proxy for managerial ability

Model	(1)	(2)
Dependent Variable	Repo_dummy (t+1)	Repo_value (t+1)
GA (t)	0.088** (0.022)	0.063** (0.050)
Assets (t)	0.230*** (0.000)	0.768*** (0.000)
Div (t)	0.120*** (0.000)	0.146*** (0.000)
Cash (t)	1.324*** (0.000)	1.445*** (0.000)
Age (t)	-0.146 (0.101)	-0.211*** (0.004)
Ret (t)	-0.038 (0.331)	0.077** (0.022)
Ret St.D. (t)	-5.511*** (0.000)	-3.379*** (0.000)
RD (t)	2.067** (0.015)	5.339*** (0.000)
Leverage (t)	-2.071*** (0.000)	-1.913*** (0.000)
BidAsk (t)	5.848* (0.074)	4.484* (0.091)
Profit (t)	3.889*** (0.000)	4.403*** (0.000)
REBE (t)	0.033*** (0.006)	0.023* (0.074)
Institution% (t)	0.114 (0.268)	0.142 (0.119)
Constant	-2.292*** (0.001)	-4.510*** (0.000)
Observations	11,145	11,145
Year Fixed	YES	YES
Industry Fixed	YES	YES
Firm Clustered	YES	YES
Pseudo R-squared	0.148	0.111

Notes: This table shows the estimation results in eq. (1) using managerial general ability index, *GA*, as alternative independent variable. The results in model (1) are those from the logit regression with the dependent variable of repurchase indicator, and model (2) shows the tobit regression results with the dependent variable of repurchase spending. The definitions of variables are available in Appendix A. Regressions are estimated

with the year dummies and industry dummies as classified based on 2-digit SIC code, and robust standard errors based on firm clusters. P-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

3. Control for CEO overconfidence

Banerjee et al. (2018) suggest that overconfident CEOs tend to over-estimate their own firm value and affect non-financial decisions, and thereby they are more likely to conduct stock repurchases. In this section, we further control for the influence of CEO overconfidence. To do so, we follow Malmendier and Tate (2008) and Banerjee et al. (2018) to construct an option-based measure of CEO overconfidence using the data from *Execucomp*. Since overconfident CEOs are more likely to retain in-the-money options that have been vested, CEO overconfidence is measured as the number of unexercised but vested options held by a CEO at year t divided by the value of these options, scaled by the year-end stock price. For brevity, we report selected results only in Panel A of Table 8. Our main conclusion that high managerial ability is associated with high likelihood and high value of stock repurchases still hold.

4. The dividend tax cut of year 2003

The dividend tax rate cut of May 2003 lowered the tax rate on cash dividends, and hence reduces the tax disadvantage of dividend payout. Several studies find that there was a surge in dividend initiation and increased dividends in response to the tax cut. Brown, Liang, and Weisbenner (2007) document that some firms issue increased dividends by reducing repurchases. Brav, Graham, Harvey, and Michaely (2008), however, find that repurchases grow much more than dividends after the tax cut. In this section, we examine whether our results are robust to the 2003 dividend tax rate cut by estimating our baseline models using a sample that is restricted to the post 2003 period.

We report the results in Panel B of Table 8. It indicates that, except for model (1), all other three models still show a positive and significant relation between managerial ability and repurchases. The results suggest that after the dividend tax rate cut managerial ability is still positively associated with repurchases.

Table 8
Control for CEO overconfidence and the impact of dividend tax cut of 2003

Model	(1)	(2)	(3)	(4)
Dependent Variable	Repo_dummy (t+1)	Repo_dummy (t+1)	Repo_value (t+1)	Repo_value (t+1)
<i>Panel A: Control for CEO Overconfidence</i>				
Mscore (t)	0.305* (0.070)		1.123*** (0.000)	
MRank (t)		0.099 (0.161)		0.407*** (0.000)
CEO Overconfidence(t)	-0.001 (0.221)	-0.001 (0.221)	-0.000*** (0.004)	-0.000*** (0.005)
Observations	15,472	15,472	15,472	15,472
Control Variables	YES	YES	YES	YES
Year Fixed	YES	YES	YES	YES

Industry Fixed	YES	YES	YES	YES
Firm Clustered	YES	YES	YES	YES
Pseudo R-squared	0.155	0.155	0.127	0.127
<i>Panel B: Dividend Tax Cut of 2003</i>				
Mscore (t)	0.310 (0.114)		1.336*** (0.000)	
MRank (t)		0.204** (0.020)		0.629*** (0.000)
Observations	24,577	24,577	24,577	24,577
Control Variables	YES	YES	YES	YES
Year Fixed	YES	YES	YES	YES
Industry Fixed	YES	YES	YES	YES
Firm Clustered	YES	YES	YES	YES
Pseudo R-squared	0.168	0.168	0.140	0.140

Notes: This table shows the regressions results that examine the impact of managerial ability on stock repurchases while controlling for CEO overconfidence in Panel A and dividend tax cut of 2003 in Panel B, respectively. The models in columns (1) and (2) are logit models with the dependent variable of repurchase indicator, and those in columns (3) and (4) are tobit regression models with the dependent variable of repurchase spending. For brevity, we present the coefficients of main variables only. The definitions of variables are available in Appendix A. Regressions are estimated with the year dummies and industry dummies as classified based on 2-digit SIC code, and robust standard errors based on firm clusters. P-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

5. Propensity score matching

One concern is that our results of managerial efficiency measures on repurchases might be caused by the systematic difference between the repurchasing firms and non-repurchasing firms in the pool. To ensure that the results are robust, we follow Banerjee et al. (2018) and adopt a propensity score procedure where we first estimate the propensity of repurchasing next year based on the firm specific variables specified as in the baseline model, by year and 2-digit SIC code. Then for the repurchasing sample, we identify the 10th percentile based on the predicted likelihood and use it as the cutoff for the non-repurchasing sample. Any observations with a propensity score below the cutoff are excluded from the regression in the next step. We suppress the results of all models and only report selected results in Panel A of Table 9. The main findings using the propensity matching procedure are similar to our original results in Table 2. So, we ensure that our results are robust and are not caused by the systematic difference between repurchasing and non-repurchasing firms.

6. Difference-in-Difference test

In our main regression, we regress stock repurchases in the following year on managerial ability measures in current year to mitigate the issue of endogeneity. While, there is still possibility that firms engaging in active stock repurchases tend to attract managers with high ability. To further address the endogeneity concern, we use the CEO turnover as exogenous shock to the firm and perform an additional difference-in-differences (DID) test to re-examine the impact of managerial ability on following stock repurchase activities. Specifically, we identify firm-year observations with a change of CEO at year T . To be included in the sample, the firm must not have another CEO replacement in the

following three years after year T to ensure that the new CEO has enough time to exercise new financial and non-financial policies.⁷ After gathering the data on control variables, we estimate the following regression model while controlling for year and industry dummies.

$$Repo_{i,t+1,t+3} = \beta_0 + \beta_1 \times CEOTurnOver_{i,t} + \beta_2 \times CEOTurnOver_{i,t} * MIncrease_{i,t} + \beta_3 \times MIncrease_{i,t} + \beta_4 \times Control_{i,t} + Year\ Dummies + Industry\ Dummies + \varepsilon_{i,t+1} \quad (8)$$

where $Repo_{i,t+1,t+3}$ represents the stock repurchase in the following three years, and is measured by either $Repo_dummy_{i,t+1,t+3}$ or $Repo_value_{i,t+1,t+3}$. $Repo_dummy_{i,t+1,t+3}$ is a dummy variable that takes a value of one if a firm repurchases in the following three years and zero otherwise. $Repo_value_{i,t+1,t+3}$ is measured as the average size of stock repurchases in the following three years. $CEOTurnOver_{i,t}$ is a dummy variable that takes a value of one if a firm experiences a CEO turnover in the year. $MIncrease_{i,t}$ is a dummy indicator that equals one if the managerial ability score increases from previous year and zero otherwise.⁸ If managerial ability has a positive impact on firm stock repurchases in the future, we expect β_3 to be significantly positive. If the CEO turnover leads to an increase in overall managerial ability, then β_2 should be positive and statistically significant.

For brevity, we report the results in Panel B of Table 9. Model (1) and (2) under Panel B show that an improvement in managerial ability score is positively associated with the likelihood and the size of future stock repurchases in general. The coefficient of the interaction term, $CEOTurnOver_{i,t} * MIncrease_{i,t}$, is also significantly positive, indicating that an increase in managerial ability due to CEO turnover has a positive and statistically significant impact on future stock repurchases. In model (3) and (4), we define $CEOTurnOver_{i,t}$ using forced CEO replacement using the classification in *Execucomp*. The regression results are very similar. Based on the results in the DID test, we ensure our findings are robust.

Table 9
Addressing endogeneity issue using propensity
score matching and difference-in-differences approach

	(1)	(2)	(3)	(4)
<i>Panel A: Propensity Score Matching</i>				
Dependent Variable	Repo_dummy (t+1)	Repo_dummy (t+1)	Repo_value (t+1)	Repo_value (t+1)
Mscore (t)	0.485* (0.059)		1.012*** (0.000)	
MRank (t)		0.250** (0.036)		0.387*** (0.000)
Observations	34,609	34,609	34,609	34,609
Control Variables	YES	YES	YES	YES
Year Fixed	YES	YES	YES	YES
Industry Fixed	YES	YES	YES	YES
Firm Clustered	YES	YES	YES	YES

Pseudo R-squared	0.0892	0.0892	0.140	0.139
<i>Panel B: Difference-in-Differences Approach</i>				
Dependent Variable	Repo_dummy (t+1, t+3)	Repo_value (t+1, t+3)	Repo_dummy (t+1, t+3)	Repo_value (t+1, t+3)
	Full CEO Turnover sample		Forced CEO Turnover sample	
CEOTurnOver	0.455***	0.235**	0.459***	0.232**
(t)*MIncrease (t)	(0.001)	(0.028)	(0.001)	(0.029)
CEOTurnOver (t)	0.006	-0.068	0.077	-0.097
	(0.958)	(0.377)	(0.721)	(0.555)
MIncrease (t)	0.217***	0.255***	0.227***	0.258***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	15,376	15,472	15,376	15,472
Control Variables	YES	YES	YES	YES
Year Fixed	YES	YES	YES	YES
Industry Fixed	YES	YES	YES	YES
Firm Clustered	YES	YES	YES	YES
Pseudo R-squared	0.138	0.145	0.138	0.145

Notes: This table shows the estimation results using the propensity score matching approach in Panel A and difference-in-differences approach in Panel B, respectively. The models in columns (1) and (2) are logit models with the dependent variable of repurchase indicator, and those in columns (3) and (4) are tobit regression models with the dependent variable of repurchase spending. For brevity, we present the coefficients of main variables only. The definitions of variables are available in Appendix A. Regressions are estimated with the year dummies and industry dummies as classified based on 2-digit SIC code, and robust standard errors based on firm clusters. P-values are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

VI. CONCLUSION

In this paper, we examine the association between managerial ability and corporate share repurchase activities. Adopting the managerial ability measure developed by Demerjian et al. (2012), we find that more able managers are more likely to conduct stock repurchases and are associated with a larger amount of spending in repurchases. The findings are robust to several robustness tests, including alternative measures of managerial ability, additional control variable, subsample after dividend tax rate cut of 2003, propensity score matching method, and difference-in-differences approach. In addition, we find that managers with high ability tend to reduce discretionary dividends and excessive capital expenditure in favor of share repurchases. We also examine the effect of information environment and corporate governance on the relationship between managerial ability and repurchases. The results show that lower information asymmetry and better corporate governance tend to encourage repurchases when managers have high ability.

Overall, our findings contribute to the literature of share repurchases by showing that managerial ability is associated with share repurchasing decision. We also add to the managerial ability literature by demonstrating that talented managers manage and allocate resources efficiently by reducing discretionary dividends and excessive capital expenditure in favor of share repurchases.

ENDNOTES

¹The managerial ability measures are obtained from <http://faculty.washington.edu/pdemerj/data.html>

²Demerjian et al. (2012) have shown that this managerial ability measure outperforms a number of previously used ability measures, including industry-adjusted stock returns, industry-adjusted ROA, and CEO media visibility.

³To ensure that our results are not driven by the unobservable firm attributes, we also re-estimate the models using a cross-sectional Fama-Macbeth procedure, and with panel firm-fixed effects, respectively. The results are reported in robustness tests.

⁴Studies have found that share repurchase is preferred to dividend payout for large distributions (Brennan & Thakor, 1990). To exclude the effect of small repurchases, we test our model by limiting the sample to the top 25 percentile repurchases based on dollar value of spending. The results are not reported here. The findings are similar to those using the full sample.

⁵This G-index is created by the Investor Responsibility Research Center (IRRC) based on 24 shareholder rights provisions. The values of G-index are available from year 1996 to year 2006. We also used the entrenchment index created by Bebchuk, Cohen, and Ferrell (2008) as an alternative to the governance index. The results are similar to those reported here.

⁶The general ability index data are obtained from *Journal of Financial Economics* at <http://jfe.rochester.edu/data.htm>

⁷We also use alternative periods like five years. The conclusions are very similar.

⁸We also use alternative periods including two and three years to calculate the change in managerial ability score. The results are statistically similar.

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Appendix A

Variable descriptions

Repo_dummy	A dummy indicator that equals 1 if the firm repurchases common or preferred stocks (RSTKC, from <i>Compustat</i>).
Repo_value	The natural log of amount a firm spends in stock repurchases (RSTKC, from <i>Compustat</i>).
MScore	Managerial ability score as developed by Demerjian et al. (2012).
MRank	Managerial ability scores ranked in deciles as developed by Demerjian et al. (2012), rescaled from 0 to 1.
Assets	The natural log of firm assets (AT, from <i>Compustat</i>).
Div	The natural log of total dividends (DVPSP_F*CSHO, from <i>Compustat</i>).
Cash	Cash holdings divided by the total assets (CH/AT, from <i>Compustat</i>).
Age	The natural log of firm age since its first fiscal year of appearance in <i>Compustat</i> (from <i>Compustat</i>).
Ret	The annual compounded return, calculated based on monthly returns (from <i>CRSP</i>).
Ret St.D.	The annual standard deviation of returns (from <i>CRSP</i>).
RD	The R&D expenditure divided by the book value of total assets (XRD/AT, from <i>Compustat</i>).
Leverage	The total amount of debt, calculated as the sum of debt in current liabilities and long term debt, scaled by the total assets ((DLC + DLTT)/AT, from <i>Compustat</i>).
BidAsk	The annual average of monthly bid-ask spread divided by the midpoint between bid and ask prices (from <i>CRSP</i>).

Profit	Operating income before depreciation divided by total assets (OIBDP/AT, from <i>Compustat</i>).
REBE	The amount of retained earnings divided by the book value of common equity (RE/CEQ, from <i>Compustat</i>).
Institution%	The percentage of shares held by institutional shareholders (from <i>Thomson Reuters Institutional Holdings (13f) filings</i>).
ANA_dummy	A dummy indicator that equals 1 if the firm is followed by at least one analyst (from <i>I/B/E/S</i>).
FError	The average of the absolute difference between the actual and median forecast, scaled by the median forecast value (from <i>I/B/E/S</i>).
G_dummy	A dummy variable that takes the value of one if the G-index score is above the average, by year and industry. The G-Index is the governance index developed by Gompers et al. (2003) (from <i>IRRC</i>).
CEO Overconfidence	The total number of unexercised but vested options held by a CEO in one year over the total value of these options, scaled by annual stock price ((OPT_UNEX_EXER_NUM/OPT_UNEX_EXER_EST_VAL)/PRCC_F, from <i>Execucomp</i> and <i>Compustat</i>).
GA	The general ability index developed by Custodio et al. (2013).
CEOTurnOver	A dummy variable that takes a value of one if a firm experiences a CEO turnover in the year (from <i>Execucomp</i>).
MIncrease	A dummy indicator that equals one if the managerial ability score increases from previous year and zero otherwise
