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Do Able Bank Managers Exhibit Specific Attributes? An Empirical Analysis of Their Investment Efficiency

Isabel-María García-Sánchez ^{1,*}  and Emma García-Meca ²

¹ Instituto Multidisciplinar de Empresa-IME, Campus Miguel de Unamuno, Universidad de Salamanca, 37008 Salamanca, Spain

² Accounting and Finance Department, Business Faculty, Technical University of Cartagena, Calle Real 3, 30201 Cartagena, Spain; emma.garcia@upct.es

* Correspondence: lajefa@usal.es

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Abstract: We analyze the association between managerial ability in banks and three different typologies of investments that demand significant resources: capital, research and development (R&D), and acquisition expenditures. We also analyze whether managerial ability is related to increased (reduced) investment in banks prone to underinvestment (overinvestment). The sample for analysis is composed of 877 observations of banks in nine countries over the period 2004–2010. We find evidence that more able bank managers select and implement investment projects more efficiently and confirm the upper echelon theory and resource-based view, which suggests that managers' characteristics affect financial decisions. The findings are robust to alternative measures of investment efficiency. The evidence confirms that, after controlling for bank and country-specific institutional factors, managers' abilities influence investment efficiency in banks in a significant way. This paper is a response to the calls for a further exploration of the roles that individual managers play in financial decisions and is the first empirical study to investigate this association in the international financial industry.

Keywords: investment efficiency; banks; managerial ability

1. Introduction

Despite extensive empirical research on investment efficiency, the existing literature usually considers that variations in capital structure are mainly justified by firm, industry, and market-level characteristics (Myers and Majluf 1984). From the perspective of the agency theory, prior research in this field has largely ignored managerial effects on corporate decisions, assuming that managers follow the same objectives (Andreou et al. 2015). However, according to the upper echelon theory, managers are not homogeneous (Hambrick and Mason 1984), and individual differences in personal managerial styles can lead them to make dissimilar corporate decisions. In this regard, a recent body of literature has shown the consequences of managerial ability on firm performance (Bertrand and Schoar 2003), earning quality (Demerjian et al. 2013), accounting conservatism (Ahmed and Duellman 2013), accruals (Dejong and Ling 2013), and voluntary disclosure (Bamber et al. 2010).

Investment decisions are among the most important corporate decisions that managers can make due to the efficiency in the allocation of capital affects the growth and productive capacity in the economy. Despite the growing research on investment efficiency determinants, the relevant role of individual managerial behavior in corporate investment practices has largely been ignored. Therefore, in this paper we hypothesize an association between managerial ability and investment efficiency. We argue that managerial ability is behind firms' financial policies and suggest that able managers play a significant role in explaining efficient investment behavior.

Managerial abilities and their influence on investment decisions are even more relevant in the banking industry due to the large informational asymmetries, opaqueness, and complexities existing in the financial sector (Levine 2004). Bank managers face many types of risk (Nichols et al. 2009). According to the upper echelon theory, in complex situations, managers' decisions can be greatly affected by their personal experiences and values. Therefore, in financial firms, more able managers may make better decisions by having improved techniques for evaluating both existing and potential business, and they may better take strategic plans, available resources, bank industry characteristics, and the macroeconomic environment into consideration (Gan 2015). In this respect, Andreou et al. (2015) show that more talented managers create greater liquidity and therefore attain better performance. Hence, we assume that more able bank managers will select better investment projects and will implement them more ably, with the objective of gaining greater investment efficiency.

Using a large bank sample from nine countries, we hypothesize a relationship between managerial ability and investment efficiency. We also expect that this association will be negative (positive) in those banks operating in settings predisposed to overinvestment (underinvestment). We build our hypotheses based on the upper echelon theory and the resource-based view, which suggest that managers' characteristics affect how they interpret corporate situations, and therefore have an impact on their financial decisions (Holcomb et al. 2009).

The interest of the analysis period resides in the time frame that we analyzed, which is closely linked to the previous economic recession on which information is available. In relation to the geographic distribution of the sample, this represents the reality of large banks at the international level, a bias that must be present in any analysis. Their joint consideration allows the study to control the diversity of managerial ability and the favorable or unfavorable predisposition to investment linked to different institutional contexts, enriching the results that would be obtained with a sample from a single country.

Our paper is inspired by Bertrand and Schoar's (2003) work, who noted the influence of managers on corporate behavior and performance, as well as the work by Demerjian et al. (2013), who studied the significant consequences of managerial ability on efficiency. Given the specificity of financial firms, we cannot infer from these studies whether managerial abilities affect investment decisions in banks. In addition, although most researchers in this field traditionally focus on specific managerial characteristics, such as tenure or education, to measure managerial ability, we follow Demerjian et al. (2012). In accordance with previous research, the model used for testing investment efficiency is based on Biddle et al. (2009). We examine the relationship between managerial ability and three different types of investments that demand significant resources: capital expenditure, R&D expenditure, and acquisition expenditure. In the second step, we analyze whether managerial ability is related to increased (reduced) investment in banks prone to underinvesting (overinvesting).

Our evidence indicates that, after controlling for bank and country-specific institutional factors, managers' abilities are an economically relevant determinant of investment efficiency in banks. Overall, the results indicate that when firms have a predisposition towards underinvestment, higher managerial ability is shown to increase levels of R&D, acquisition expenditures, and total investments. In contrast, when firms have an increasing tendency towards overinvestment, managerial ability tends to reduce the levels of R&D and acquisition expenditures, as well as total capital investments. We obtain similar evidence by using other investment measures.

We make several contributions. First, we extend previous research on managerial ability (Bertrand and Schoar 2003; Demerjian et al. 2013; García-Sánchez and García-Meca 2018) by showing that able managers in financial firms contribute to better investment efficiency. This paper also covers the gap in the literature that calls for a further exploration of the individual roles played in financial firm decisions, and it is the first empirical study to investigate this association in the international financial industry. Second, we provide better knowledge about the role played by individual managerial characteristics in financial decisions. Therefore, we contribute to the growing literature showing that individual able managers affect corporate decisions beyond firm, industry, and market determinants.

Third, this paper has relevant macroeconomic and firm implications given that investment is highly relevant in the growth of countries and the return on investment capital (Biddle et al. 2009). It also highlights the limitations of governance mechanisms in terms of aligning managers' and shareholders' preferences (Malmendier et al. 2010). Finally, there are relevant policy-related implications in this paper for bank supervision regulators and policymakers, as we show managerial ability to be a performance indicator.

2. Background and Hypotheses

2.1. Managerial Ability Framework

Studies in management fields provide evidence that managers' backgrounds, personalities, and experiences affect how they face different situations and, in turn, the choices they make (Hambrick and Mason 1984; Barton et al. 1992). This literature (upper echelon theory) highlights that managers' individual attributes affect their understanding of firm situations and therefore have an impact on how they make decisions (Hambrick 2007). From the resource-based view, managerial ability is also a valuable resource with potential to enhance a firm's competitive advantage (Holcomb et al. 2009). Based on these theories, recent literature on economics and finance has explored whether managers have an idiosyncratic effect on firm decisions. One of the first works in this area is Bertrand and Schoar's (2003) paper, which showed that managers develop unique styles of financial decision-making. One of the main contributions of this paper is the measurement of idiosyncratic managerial styles which are not necessarily related to any observable characteristic, such as their level of education.

After the seminal work by Bertrand and Schoar (2003), recent papers have tried to isolate idiosyncratic managerial contributions to many performance outcomes, such as firm innovation and growth (Holbrook et al. 2000), credit ratings (Bonsall et al. 2015), accruals (Dejong and Ling 2013; Ge et al. 2011), and internationalization (Hitt et al. 2005). In this respect, Choi et al. (2015) noted that a CEO with higher operating ability will implement more efficient operating decisions, which generates future cash flows. Previously, Aier et al. (2005) showed that CFOs with greater expertise have fewer restatements, and Leverty and Grace (2012) provided evidence of a negative association between able CEOs and firm insolvency. Managerial ability is also beginning to be explored in financial firms. In this respect, Andreou et al. (2013) showed that banks with greater management experience had lower negative stock return performance and more positive operating performance. They also showed that more able managers increase bank liquidity and bank risk (Andreou et al. 2015).

2.2. CEO Ability and Investment

Traditional papers emphasize that firm, industry, and market determinants explain a high percentage of the variation in capital structure (Myers and Majluf 1984). In this respect, Biddle et al. (2009) noted that investment efficiency can be increased by improving financial reporting quality and reducing information asymmetries. Similar results were found by Chen et al. (2011) in emerging markets. García Lara et al. (2015) also found that conservative firms issue more debt and invest in less risky projects when they are in settings predisposed to underinvestment. In this line, Chen et al. (2013) noted the influence of ownership on investment efficiency, and recently, Bravo and Reguera (2017) found that busy directors influence R&D strategies. The above papers are based on the assumption that there are control mechanisms that reduce information asymmetries, improve the supervision of managerial activity, and reduce managers' opportunistic behavior. Nevertheless, despite the growing research on investment efficiency determinants, the relevant role of individual managerial behavior in corporate investment practices has largely been ignored.

The evidence regarding managerial ability and investment efficiency is still scarce. Considering that firms pay a higher compensation premium to attract and retain better managers (Custodio and Metzge 2014), it is relevant to study whether managerial ability implies improved

investment efficiency in financial firms. We expect that capable managers will avoid actions that result in inefficient investments for their banks and consider the possibility that they move away from optimal investment levels depending on their degree of managerial ability.

Regarding the individual types of investments, we expect that due to their better knowledge, skills, and abilities, more able managers can provide more efficient capital, R&D, and acquisition expenditures. Capital and R&D investments are related to existing operations, and acquisition investments support operating efficiency. All these investments require knowledge about key drivers of future growth and accurate valuation work to estimate future payoffs (Gan 2015). Bertrand and Schoar (2003) noted greater incremental effects for individual managers in some firm decisions, such as acquisitions. According to Chemmanur et al. (2009), better managers may also select better projects for their firms, which leads to higher levels of capital expenditures as well as in investments in R&D. Similarly, according to Malmendier and Tate (2008), inept managers tend to incorrectly value firm acquisitions due to the fact that they overvalue their expected returns. Thus, we suggest these hypotheses:

Hypothesis 1 (H1). *Managerial ability is positively associated with investment efficiency in banks.*

Hypothesis 1a (H1a). *Capital expenditures are more efficient if they are carried out by more able bank managers.*

Hypothesis 1b (H1b). *R&D expenditures are more efficient if they are carried out by more able bank managers.*

Hypothesis 1c (H1c). *Acquisition expenditures are more efficient if they are carried out by more able bank managers.*

Although, in terms of investment policy, we expect that managers look to increase shareholder returns, information asymmetries can lead managers to enhance their own private benefits when making investment decisions (Jensen 1986). According to the agency theory, moral hazard and adverse selection can explain the existence of overinvestment (greater investment than expected) and underinvestment (lower investment than expected) (Jiang and Zeng 2014). Regarding moral hazard, agency conflicts may lead management to maximize personal interests when there is free cash flow by making investments not advantageous to shareholders, with the consequence of managerial empire building and overinvestment. Managers could prefer to overinvest rather than increase payouts to shareholders to avoid lessening their power. Inept managers can also overestimate their ability to generate returns in investments. In this regard, Malmendier and Tate (2008) provided evidence that managerial overconfidence increases overinvestment.

Career concerns are also very important determinants of managerial investment decisions. Managers could choose certain investments, even when they do not enhance firm market value, if these investments increase promotion possibilities or job security (Morck et al. 1990). In this line, Kanodia et al. (1989) suggested that managers may maintain poorly performing projects in order to avoid the negative reputational consequences derived from project abandonment. Managerial compensation is another incentive that leads to overinvestment, especially in decisions related to acquisition expenditures. In this respect, Bliss and Rosen (2000) evidenced that after a bank merger, managerial wealth is enhanced, even if the stock of the bidder performs poorly.

Underinvestment is normally predicted by external financing models and is due to information asymmetries rising from adverse selection frictions (Chen et al. 2011). Career concerns can also cause underinvestment problems if managers reject high-value and high-risk projects to avoid failure (Hirshleifer and Anjan 1992). In this respect, managers promoted from accounting and finance may engage in conservative accounting and therefore underestimate future earnings (Bamber et al. 2010).

Thus, the moral hazard and adverse selection problems that arise from information asymmetries can affect investment decisions and produce overinvestment and underinvestment. We hypothesize that increased managerial ability improves investment efficiency when banks are more vulnerable to agency problems; that is, able managers decrease (increase) investment when there is a tendency

to overinvest (underinvest). We also suggest an association between capital, R&D, and acquisition investments and managerial ability, conditioned by firms' tendencies towards overinvestment or underinvestment. Thus, we test the following hypotheses:

Hypothesis 2 (H2). *Managerial ability reduces (increases) a bank's total investment level when overinvestment (underinvestment) is most likely.*

Hypothesis 2a (H2a). *Managerial ability reduces (increases) a bank's capital investment level when overinvestment (underinvestment) is most likely.*

Hypothesis 2b (H2b). *Managerial ability reduces (increases) a bank's R&D investment level when overinvestment (underinvestment) is most likely.*

Hypothesis 2c (H2c). *Managerial ability reduces (increases) a bank's acquisition investment level when overinvestment (underinvestment) is most likely.*

3. Data and Empirical Setting

3.1. Sample

The sample for analysis is composed of 877 observations, corresponding to more than 150 banks from 9 countries, and it spans the time period from 2004 to 2010. We obtained the financial data from the Compustat and EIRIS databases, and the Spencer & Stuart Board Index provided the corporate governance data.

Initially, we accessed economic and financial information from 524 listed banks through the Compustat database. Then, we eliminated from the sample 344 banks with no information on their board composition in the Spencer & Stuart Board Index. Finally, we discarded 21 more banks which had no information on their ethical commitment in the EIRIS database. After this process, we obtained a sample composed of 159 financial entities from Canada, Spain, the UK, Germany, the Netherlands, France, Italy, Sweden, and the USA. This made it possible to take the different banking sector regulations related to national characteristics into account. The time period considered is 2004–2010, although no information is available for some years, resulting in an unbalanced panel database of 877 observations.

Regarding the sample distribution (Table 1), we observe that more than 45% of companies are from the USA and more than 20% are from the UK.

Table 1. Sample Distribution.

Sample by Country									
TOTAL	Canada	France	Germany	Italy	Netherlands	Spain	Sweden	UK	USA
877	67	19	23	66	25	56	21	186	414
100%	7.64%	2.17%	2.62%	7.53%	2.85%	6.39%	2.39%	21.21%	47.21%

3.2. Dependent Variable

Investment is an extremely relevant firm activity, having the same objective as other corporate practices, namely to maximize bank value. Inefficient investment decisions affect shareholder wealth because they not only waste significant resources but also result in negative impacts in the long term.

In our paper, 'investment' is a measure of future investment in both capital and non-capital goods. Following Biddle et al. (2009), we measure total investment as the addition of capital, R&D, and acquisition expenditures, minus cash receipts from the sales of property plant, and equipment, scaled by average total assets.

Nowadays, with the advent of internet banking, the growth of channels to access online bank services has exploded. These entities undertake greater investment in R&D policies that favor the growth of these new channels rather than traditional investment in tangible goods. In addition, in order to increase their size and expand their presence in other countries, banks acquire financial entities located in their geographic objective. Thus, we have analyzed these different typologies of investment independently. In this regard, *Capital_Invest* reflects the level of capital expenditure, *R&D_Invest*, the level of R&D expenditure, and *Acqui_Invest*, the level of acquisition expenditure. By using different investment measures, we can identify the effect of managerial ability on bank decision-making. In addition, banks are currently reorienting their capital investment policies towards R&D and acquisition expenditures that allow them to operate in digital and other geographic areas.

Theoretically, investment opportunities with positive present net values are undertaken by banks. However, in the real world, financial market imperfections do exist, and underinvestment and overinvestment occur. Hence, we explore the influence of managerial ability on investment efficiency, considering that a bank may deviate from its optimal level of investment influenced by managerial ability levels. To carry out this exploration, we consider that advanced managerial ability leads to improved capital investment efficiency when banks are more vulnerable to agency problems, i.e., reducing (increasing) investment when there is a tendency to overinvest (underinvest). Consistent with [Biddle et al. \(2009\)](#), we categorized banks into deciles according to their cash and leverage levels. Leverage is multiplied by -1 before ranking, so that it can be interpreted the same way as cash balance. Deciles constructed in this way are rescaled to range from 0 to 1. We then develop a new variable, *Over_Invest*, equaling the mean of the ranked values of the two partitioning variables. This variable increases with the tendency to overinvest. The underlying rationale for using these two criteria is that the levels of free cash flow and leverage may indicate agency problems ([Jensen 1986](#); [Myers and Majluf 1984](#)).

3.3. Managerial Ability

[Demerjian et al. \(2012\)](#) define managerial ability by calculating a data envelopment analysis (DEA) score that reports whether managers use their firms' resources in an efficient way. They estimated firm efficiency (DEA score) within industries, comparing firm sales and several inputs used by firms: cost of goods sold, net property, selling and administrative expenses, plant and equipment, net R&D, net operating leases, purchased goodwill, and other intangible assets. Later, they regressed the DEA score in order to obtain the residuals, i.e., values that identify the efficiency attributable to managers. This efficiency measure can be applied to all firms but, according to [Leverty and Grace \(2012\)](#), it is necessary to use a specific measure of firm efficiency for a single industry.

We adopt this strategy and define managerial ability using a two-stage DEA approach. First, we use DEA to create an efficient borderline that determines the relative efficiency of a firm by measuring the resources (inputs) used to obtain revenues (outputs).

Outputs identify the monetary volume of deposits, loans, and other investments, as well as the interest income generated by loans and other investments (*Deposits*, *Loans*, *Investment*, and *IntIncome*). As inputs we include tangible and intangible acquired assets. The first acquired asset is represented by the net PP&E value (*PPE*). The second is measured by the net value of intangible assets that incorporates all the investments in intangibles, especially goodwill for those banks that have acquired other financial entities (*Int*). We also incorporate labor costs in order to represent the importance of personnel in the financial industry (*Labor*) and the interest expenses paid to banks for deposits (*IntExp*). In addition, we include operating rental expenses in order to incorporate those bank offices that are excluded as assets but contribute to generating revenues (*RentalExp*).

The DEA model maximizes Equation (1) for each decision-making unit in relation to the rest of decision-making units in the group by changing the weights u and v .

$$\max \theta = \frac{u1Deposits + u2Loans + u3Investment + u4IntInco}{v1PPE + v2Int + v3Labor + v4IntExp + v5RentalExp} \quad (1)$$

In Table 2, we present the mean of the DEA score for each year as well as the number of efficient banks in absolute and relative terms. It is possible to observe that efficiency is relatively stable in all the periods, at around 75%. In contrast, there is significant variance in the number of efficient banks.

Table 2. DEA score description.

Year	Mean	Number of Efficient Banks	
		Absolute	Relative (%)
2004	0.73	15	17.24
2005	0.75	15	15.46
2006	0.76	22	18.80
2007	0.79	28	20.44
2008	0.76	32	20.78
2009	0.75	21	14.19
2010	0.77	23	16.79

Second, to isolate firm effects on managerial ability, we run a tobit regression mode—Equation (2)—in which the DEA measure is determined by those firm characteristics expected to aid (size, market share, free cash flow, and firm age) or hinder (bank regulatory environment) management’s efforts. We suggest that in banks with higher market value, managers will be more effective when negotiating with customers and suppliers. Similarly, in those banks with more available cash, positive net present value projects can be easily obtained by managers. We also expect the life cycle of the bank and the start-up costs of investments to have an influence. Finally, following García-Meca et al. (2015), we consider the influence of the banking regulatory environment.

$$DEAScore_{it} = \beta_0 + \beta_1 Size_{it} + \beta_2 Market_Share_{it} + \beta_3 Cash_Flow_{it} + \beta_4 Age_{it} + \beta_5 BR_{it} + \gamma Country + Year + \varepsilon \tag{2}$$

The residuals of Equation (2) identify the level of efficiency attributable to managers and comprise the managerial ability variable (*Ability*).

3.4. Models Testing Managerial Ability and Capital Investment Efficiency

In this section, we investigate whether high managerial ability is able to improve investment efficiency when banks are more vulnerable to agency problems, i.e., reducing (increasing) investment when there is a tendency to overinvest (underinvest). Consistent with this approach, we pose a model [1] which is designed to test the association between managerial ability and investment levels:

$$Investment_{i,t+1}(or\ Capital / R\&D / Acqui_Invest_{i,t+1}) = \beta_0 + \beta_1 Ability_{i,t} + \beta_2 Size_{i,t} + \beta_3 MtB_{i,t} + \beta_4 Loss_{i,t} + \beta_5 SdSales_{i,t} + \beta_6 SdInvestment_{i,t} + \beta_7 Op_Cash_flow_{i,t} + \beta_8 Slack_{i,t} + \beta_9 Dividend_{i,t} + \beta_{10} Zscore_{i,t} + \beta_{11} Tangibility_{i,t} + \beta_{12} Kstructure_{i,t} + \beta_{13} Board_{i,t} + \beta_{14} IP_{i,t} + \beta_{12} Regulation_{i,t} + \sum_{m=16}^{22} \gamma_m Year_dummies + \mu_{it} + \eta_i \tag{model [1]}$$

where: *Investment* is the level of total capital investment equal to the sum of capital expenditure, R&D expenditure, and acquisition expenditure minus cash receipts from the sale of PP&E; *Capital/R&D/Acqui_Invest* is the level of capital, R&D, or acquisition expenditure; *Ability* measures managerial ability and is created by the residuals from the DEA score regression that identify the level of efficiency attributable to the managers; *Size* is measured by the natural log of total bank assets; *MtB* denotes the growth opportunities measured as the ratio of the market value of total assets to the book value of total assets; *Loss* takes the value of 1 if net income before extraordinary items is negative and 0 otherwise; *SdSales* is the standard deviation of the sales scaled by average total assets over the

previous five years; *SdInvestment* is the standard deviation of investment over the previous five years; *Op_Cahs_flow* denotes the operating cash flows divided by sales; *Slack* is the ratio of cash to PP&E; *Dividend* is an indicator variable equal to 1 if the firm paid dividends and 0 otherwise; $Zscore = 0.033 * \text{earnings before extraordinary item} / \text{total assets} + \text{sales} / \text{total assets} + 0.014 * \text{retained earnings} / \text{total assets} + 0.012 * (\text{working capital} / \text{total assets}) + 0.006 * (\text{market value of common stock} / \text{total liabilities})$; *Tangibility* is PP&E scaled by total assets; *Kstructure* is the debt (long-term) scaled by the addition of long-term debt and the market value of equity; *Board* denotes the level of independence, diversity, and financial expertise of the board; *IP* is the level of investor protection by country; and *Regulation* is the strength of bank industry characteristics.

Model [2] incorporates the variable *Over_Invest*, which indicates the tendency to overinvest as well as the interaction between *Over_Invest* and managerial ability. The value of this variable increases in line with the tendency to overinvest. In this model, β_1 shows the influence of managerial ability on investment levels when underinvestment is most likely, i.e., when *Over_Invest* is 0, β_3 measures the incremental effect of managerial ability on investment levels, and the sum of β_1 and β_3 measures the overall influence of managerial ability when *Over_Invest* is not 0. If more able managers make more efficient investment decisions, we will observe a positive β_1 and a negative β_3 .

$$\begin{aligned}
 & Investment_{i,t+1} \text{ (or } Capital / R\&D / Acqui_Invest_{i,t+1}) = \\
 & \beta_0 + \beta_1 Ability_{i,t} + \beta_2 Over_Invest_{i,t} + \beta_3 Over_Invest * Ability_{i,t} + \\
 & \beta_4 SizeE_{i,t} + \beta_5 MtB_{i,t} + \beta_6 Loss_{i,t} + \beta_7 SdSales_{i,t} + \beta_8 SdInvestment_{i,t} + \\
 & \beta_9 Op_Cash_flow_{i,t} + \beta_{10} Slack_{i,t} + \beta_{11} Dividend_{i,t} + \beta_{12} Zscore_{i,t} + \\
 & \beta_{13} Tangibility_{i,t} + \beta_{14} Kstructure_{i,t} + \beta_{13} Board_{i,t} + \beta_{14} IP_{i,t} + \beta_{12} Regulation_{i,t} + \\
 & \sum_{18}^{24} \gamma m Year_dummies + \mu_{it} + \eta_i
 \end{aligned}
 \tag{model [2]}$$

In this model, we control for several variables that influence investment decisions. Among these, sales volatility and return on assets and loss indicate firm performance and profitability. Both firm size and the market-to-book ratio represent growth opportunities. The cash flow to sales ratio, cash to PPE ratio, dividend, the possibility of bankruptcy, and capital structure suggest free cash availability, the degree of financial constraint, and the magnitude of agency problems, respectively. In addition, we isolate the influence of bank and country characteristics (see [García-Meca et al. 2015](#) for a description of the measures) and use fixed effects (*Year_dummies*).

In relation to firm characteristics, we have included the board of directors measure (*Board*), considering the independence, diversity, and financial expertise of board. The indicator *IP* represents the country level of investor protection. The effect of the banking regulatory system is represented by the factor *Regulation*. We have used different bank characteristics to define the strength of the banking industry: industry size, banking activity and ownership restrictiveness, prompt corrective action, power of official supervisory systems, and deposit insurance design. We expect that with higher regulation and investor protection levels, banks will carry out efficient investment, as in this environment investors have greater information available on bank transactions. Moreover, the strongest boards have greater power in monitoring managers' investment decisions.

We estimate both models by using the generalized method of moments (GMM), designed by [Arellano and Bond \(1991\)](#), which allows us to control for endogeneity problems by using instruments.

4. Results

Table 3 displays the descriptive statistics of the full sample and of low versus high ability groups. In the first two columns of Table 3, the mean (standard deviation) of total investments is 0.231 (± 0.297). Regarding the components of total investments, the mean (standard deviation) of R&D is 0.694 (± 0.335), the mean (standard deviation) of acquisition expenditure is 0.224 (± 0.118), and the mean of capital expenditures is 0.007. A mean of zero for capital expenditures indicates that less than 50 per cent of the

firm-year observations reflected capital investment during the sample period. The managerial ability score has a mean (standard deviation) of 0.798 (± 0.026).

Table 3. Descriptive statistics.

	Full Sample		Higher vs. Lower Ability Banks			
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
<i>Investment</i>	0.231	0.297	0.501	0.346	0.236	0.133
<i>Capital_Invest</i>	0.007	0.052	0.003	0.003	0.063	0.071
<i>R&D_Invest</i>	0.694	0.335	0.724	0.408	0.159	0.422
<i>Acqui_Invest</i>	0.224	0.118	0.323	0.111	0.014	0.183
<i>Ability</i>	0.798	0.026	0.783	0.025	0.611	0.048
<i>Over_Invest</i>	0.826	0.300	0.846	0.200	0.995	0.400
<i>Size</i>	9.318	3.266	9.349	3.148	9.292	3.366
<i>Mtb</i>	1.278	4.470	0.925	7.142	3.151	-22.624
<i>Loss</i>	0.148	0.356	0.167	0.373	0.133	0.340
<i>SdSales</i>	0.135	0.272	0.129	0.172	0.141	0.334
<i>SdInvestment</i>	0.185	0.205	0.141	0.301	0.167	0.427
<i>Op_Cash_flow</i>	0.331	-2.393	0.411	3.121	0.264	-1.540
<i>Slack</i>	13.054	15.151	5.659	9.857	19.055	22.030
<i>Dividend</i>	0.440	0.497	0.448	0.498	0.434	0.496
<i>Zscore</i>	-1.960	32.525	-1.628	35.644	-2.239	29.685
<i>Tanbigility</i>	0.169	0.246	0.137	0.194	0.107	0.142
<i>Kstructure</i>	0.312	0.286	0.314	0.286	0.310	0.287

Investment is the level of total capital investment; *Capital/R&D/Acqui_Invest* is the level of capital or R&D or acquisition expenditure; *Ability* measures managerial ability; *Size* identifies the bank's size; *Mtb* denotes the growth opportunities; *Loss* is a dummy indicator variable; *SdSales* is the standard deviation of the sales; *SdInvestment* is the standard deviation of investment; *Op_Cash_flow* denotes the operating cash flows; *Slack* is the ratio of cash to PP&E; *Dividend* is a dummy variable; $Zscore = 0.033 * \text{earnings before extraordinary item} / \text{total assets} + \text{sales} / \text{total assets} + 0.014 * \text{retained earnings} / \text{total assets} + 0.012 * (\text{working capital} / \text{total assets}) + 0.006 * (\text{market value of common stock} / \text{total liabilities})$; *Tanbigility* is PP&E/total assets; *Kstructure* is the long-term debt divided by the sum of long-term debt and the market value of equity; *Board* denotes the level of independence, diversity and financial expertise of the board of directors; *IP* is the level of investor protection by country; *Regulation* is the strength of bank industry characteristics.

The other columns of Table 3 report the descriptive statistics by low versus high managerial ability groups, using the industry median of the managerial ability score as a benchmark. They show that the high-ability group has higher values for total investment, R&D, and acquisition expenditures, and lower values for capital expenditures, compared to the low-ability group.

Table 4 presents the Pearson correlations among selected variables. While capital expenditures are negatively correlated with managerial ability, the other types of investment and total investment are shown to be positively correlated with the ability variable.

Here, we reflect on the results for model [1] (Table 5, Panel A), in which we investigate the association between managerial ability and actual investments without conditioning firms' tendencies towards overinvestment or underinvestment. Managerial ability is positively associated with total investments and the three components of total investments (capital expenditures, R&D, and acquisition expenditures). It is not significant, however, for capital investment. More concretely, managerial ability has a significant statistical impact on total and R&D investment with a confidence level of 99% and on acquisition expenditures at 95%. These results are in line with Chemmanur et al. (2009), who find that better managers may select better firm projects, achieving higher levels of capital expenditures as well as investments in R&D. Results are related with García-Sánchez and García-Meca (2018), who also noted that managerial abilities play a significant role in the quality of financial reporting in banks, and that capable bank managers are less likely to manage earnings opportunistically. Similar studies also found that superior operating ability leads to implementing operating decisions more effectively (Demerjian et al. 2013; Choi et al. 2015).

Table 4. Pearson correlation matrix.

	Investment	Inv_Capital	Inv_R&D	Inv_Acqui	Ability	Size	Mtb	Loss	SdSales
Inv_Capital	−0.003								
Inv_R&D	0.988 ^a	−0.003							
Inv_Acqui	0.684 ^a	−0.004	0.583 ^a						
Ability	0.026	−0.018	0.026	0.031					
Size	−0.140 ^a	−0.118 ^a	−0.140 ^a	−0.159 ^a	0.004				
Mtb	0.000	0.001	0.000	0.000	0.014	−0.051 ^c			
Loss	−0.018	0.130 ^a	−0.018	−0.022	0.017	−0.216 ^a	0.035		
SdSales	0.034	0.048	0.034	0.030	−0.037	−0.448 ^a	0.019	0.079 ^b	
SdInvestment	−0.015	−0.026	−0.016	0.007	0.041	0.293 ^a	0.003	0.109 ^a	−0.140 ^a
Op_Cash_flow	−0.002	0.571 ^a	−0.002	−0.003	0.022	−0.153 ^a	0.003	0.132 ^a	0.057 ^c
Slack	−0.003	0.005	−0.003	−0.004	0.016	−0.045	0.001	−0.005	−0.008
Dividend	−0.039	−0.040	−0.039	−0.037	−0.003	0.057 ^c	0.024	−0.378 ^a	−0.015
Zscore	0.576 ^a	−0.021	0.574 ^a	0.634 ^a	0.010	0.006	0.000	−0.130 ^a	−0.023
Tanbigility	0.810 ^a	−0.004	0.808 ^a	0.876 ^a	−0.060 ^c	−0.177 ^a	0.000	−0.026	0.017
Kstructure	0.029	−0.080 ^b	0.029	0.033	0.058 ^c	0.355 ^a	−0.061 ^c	0.078 ^b	−0.223 ^a
IP	0.025	−0.054 ^c	0.025	0.007	0.027	−0.063	−0.005	0.037	0.105 ^a
Regulation	0.045	−0.014	0.045	0.039	−0.039	−0.013	−0.027	0.056 ^c	−0.030
Board	0.006	0.033	0.006	0.002	0.040	0.040	−0.020	−0.009	−0.009
	SdInvestment	Op_Cash_flow	Slack	Dividend	Zscore	Tanbigility	Kstructure	IP	Regulation
Op_Cash_flow	−0.060 ^c								
Slack	−0.030	0.129 ^a							
Dividend	−0.070 ^b	−0.049	0.035						
Zscore	−0.053 ^c	0.000	−0.008	0.003					
Tanbigility	0.004	−0.006	−0.005	−0.053 ^c	0.789 ^a				
Kstructure	0.122 ^a	−0.099 ^b	−0.071 ^b	−0.063 ^c	0.049	0.025			
IP	−0.106 ^a	−0.094 ^b	0.012	−0.008	0.019	−0.008	0.119 ^a		
fac1_1	−0.055 ^c	0.002	0.044	0.007	0.063 ^c	0.028	0.171 ^a	0.436 ^a	
Board	−0.035	−0.019	0.008	−0.003	0.031	0.001	−0.012	0.091 ^b	−0.039

a, b and c denote statistical significance at 1, 5 and 10%, respectively. *Investment* is the level of total capital investment; *Capital/R&D/Acqui_Invest* is the level of capital or R&D or acquisition expenditure; *Ability* measures managerial ability; *Size* identifies the bank's size; *MtB* denotes the growth opportunities; *Loss* is a dummy indicator variable; *SdSales* is the standard deviation of the sales; *SdInvestment* is the standard deviation of investment; *Op_Cash_flow* denotes the operating cash flows; *Slack* is the ratio of cash to PP&E; *Dividend* is a dummy variable; $Zscore = 0.033 * \text{earnings before extraordinary item} / \text{total assets} + \text{sales} / \text{total assets} + 0.014 * \text{retained earnings} / \text{total assets} + 0.012 * (\text{working capital} / \text{total assets}) + 0.006 * (\text{market value of common stock} / \text{total liabilities})$; *Tanbigility* is PP&E/total assets; *Kstructure* is the long-term debt divided by the sum of long-term debt and the market value of equity; *Board* denotes the level of independence, diversity and financial expertise of the board of directors; *IP* is the level of investor protection by country; *Regulation* is the strength of bank industry characteristics.

Table 5. Regression results for managerial ability and investments.

Panel A. Results for Model [1]: Association between Managerial Ability and Actual Investments						
			<i>Investment</i> Coef. (std.error)	<i>Capital_Invest</i> Coef. (std.error)	<i>R&D_Invest</i> Coef. (std.error)	<i>Acqui_Invest</i> Coef. (std.error)
Ability	β_1	+	4.747 ^a (0.982)	0.579 (1.093)	0.004 ^a (0.000)	0.033 ^b (0.017)
Size	β_2	+	0.008 (0.687)	0.328 (0.686)	0.004 ^a (0.000)	-0.075 ^a (0.008)
Mtb	β_3	+	0.894 ^a (0.128)	0.261 ^b (0.129)	0.000 ^a (0.000)	0.048 ^a (0.002)
Loss	β_4	-	-0.645 ^a (0.066)	-0.142 ^b (0.069)	0.000 ^a (0.000)	0.045 ^a (0.002)
SdSales	β_5	-	-2.940 ^a (0.529)	-1.813 ^a (0.531)	-0.001 ^a (0.000)	-2.848 ^a (0.015)
SdInvestment	β_6	+	0.001 ^a (0.000)	0.000 (0.000)	0.000 ^a (0.000)	0.000 ^a (0.000)
Op_Cash_flow	β_7	+	0.094 ^a (0.019)	0.010 (0.019)	0.002 ^a (0.000)	0.049 ^a (0.000)
Slack	β_8	+	0.001 ^a (0.000)	0.000 (0.000)	0.000 ^a (0.000)	0.000 ^a (0.000)
Dividend	β_9	-	-0.002 (0.447)	-0.256 (0.451)	0.000 ^a (0.000)	-0.142 ^a (0.006)
Zscore	β_{10}	-	-0.003 ^a (0.000)	-0.001 (0.000)	0.000 ^a (0.000)	-0.001 ^a (0.000)
Tanbigility	β_{11}	+	0.167 ^a (0.012)	0.031 ^b (0.013)	0.000 ^a (0.000)	0.061 ^a (0.000)
Kstructure	β_{12}	-	-0.012 (0.692)	-0.403 (0.685)	-0.003 ^a (0.000)	-1.701 ^a (0.007)
Regulation	β_{13}	+	0.353 (0.393)	0.428 (0.371)	0.000 ^a (0.000)	0.174 ^a (0.008)
IP	β_{14}	+	2.694 ^a (0.305)	0.782 ^b (0.311)	0.000 ^a (0.000)	0.596 ^a (0.006)
Board	β_{15}	+	0.179 (0.129)	0.000 (0.132)	0.001 ^a (0.000)	0.036 ^a (0.001)
z			7.29×10^7 (14)	9.52×10^6 (14)	2.38×10^7 (14)	1.57×10^{12} (14)
m1			-1.36	-1.29	0.15	0.11
m2			-0.86	-0.78	-0.97	-0.90
Hansen			38.53 (171)	18.92 (171)	2838.52 (171)	32636.60 (171)

Panel B. Results for Model [2]: Association between Managerial Ability and Actual Investments Conditioning Firms' Tendencies towards Overinvestment						
			<i>Investment</i> Coef. (std.error)	<i>Capital_Invest</i> Coef. (std.error)	<i>R&D_Invest</i> Coef. (std.error)	<i>Acqui_Invest</i> Coef. (std.error)
Ability	β_1	+	20.711 ^a (6.803)	9.268 (7.298)	0.001 ^a (0.000)	1.955 ^a (0.011)
Over_Invest	β_2	-	-0.012 (0.692)	0.423 (0.685)	-0.003 ^a (0.000)	-1.701 ^a (0.007)
Ability*Over_Invest	β_3	-	-25.627 ^a (8.656)	-11.670 (9.258)	-0.001 ^a (0.000)	-2.221 ^a (0.012)
Size	β_4	+	7.300 ^a (2.685)	3.452 (2.852)	0.000 ^a (0.000)	0.432 ^a (0.003)
Mtb	β_5	+	0.021 ^a (0.008)	0.010 (0.009)	0.000 ^a (0.000)	0.002 ^a (0.000)
Loss	β_6	-	-0.010 ^a (0.004)	-0.005 (0.004)	0.000 ^a (0.000)	0.000 ^a (0.000)
SdSales	β_7	-	-34.048 ^a (12.505)	-14.967 (13.322)	0.000 ^a (0.000)	-2.633 ^a (0.034)
SdInvestment	β_8	+	6.387 ^a (2.262)	3.300 (2.455)	0.004 ^a (0.000)	-0.362 ^a (0.008)

Table 5. Cont.

Op_Cash_flow	β_9	+	1.394 ^a (0.503)	0.659 (0.531)	0.002 ^a (0.000)	0.125 ^a (0.001)
Slack	β_{10}	+	5.895 ^a (2.041)	2.887 (2.136)	0.000 ^a (0.000)	0.805 ^a (0.008)
Dividend	β_{11}	−	−0.004 ^b (0.001)	−0.002 (0.002)	0.000 ^a (0.000)	0.000 ^a (0.000)
Zscore	β_{12}	−	−10.624 ^a (3.892)	−4.916 (4.109)	0.000 ^a (0.000)	−1.039 ^a (0.006)
Tanbigility	β_{13}	+	1.217 ^a (0.355)	0.520 (0.388)	0.000 ^a (0.000)	0.117 ^a (0.000)
Kstructure	β_{14}	−	−3.255 ^b (1.303)	−1.668 (1.215)	−0.002 ^a (0.000)	−1.979 ^a (0.022)
Regulation	β_{15}	+	12.579 ^a (4.148)	6.014 (4.447)	0.000 ^a (0.000)	0.802 ^a (0.010)
IP	β_{16}	+	19.827 ^a (7.613)	9.329 (8.027)	0.000 ^a (0.000)	1.481 ^a (0.008)
Board	β_{17}	+	2.881 ^a (1.042)	1.383 (1.104)	0.001 ^a (0.000)	0.209 ^a (0.002)
z			1.61×10^7 (15)	3.00×10^6 (15)	1.49×10^7 (15)	7.27×10^{11} (15)
m1			−1.05	−0.83	0.16	1.24
m2			−0.08	0.14	−1.23	−0.71
Hansen			48.85 (171)	22.06 (171)	307.58 (171)	139.28 (171)

Notes: (i) a, b and c denote statistical significance at 1, 5 and 10%, respectively. (ii) m_i is a serial correlation test of order i in the first difference residuals under the null of no serial correlation. (iii) Hansen is a test of over-identifying restrictions under the null hypothesis of no correlation between the instruments and the error term. The degrees of freedom are in parentheses. *Investment* is the level of total capital investment; *Capital/R&D/Acqui_Invest* is the level of capital or R&D or acquisition expenditure; *Ability* measures managerial ability; *Size* identifies the bank's size; *MtB* denotes the growth opportunities; *Loss* is a dummy indicator variable; *SdSales* is the standard deviation of the sales; *SdInvestment* is the standard deviation of investment; *Op_Cahs_flow* denotes the operating cash flows; *Slack* is the ratio of cash to PP&E; *Dividend* is a dummy variable; *Zscore* = 0.033 *earnings before extraordinary item/total assets + sales/total assets + 0.014*retained earnings/total assets + 0.012 *(working capital/total assets) + 0.006 *(market value of common stock/total liabilities); *Tangibility* is PP&E/total assets; *Kstructure* is the long-term debt divided by the sum of long-term debt and the market value of equity; *Board* denotes the level of independence, diversity and financial expertise of the board of directors; *IP* is the level of investor protection by country; *Regulation* is the strength of bank industry characteristics.

We tabulate the results for model (Ahmed and Duellman) (Table 5, Panel B), analyzing the association between investment and managerial ability conditioned by firms' tendencies towards overinvestment or underinvestment. We find evidence that managerial ability influences total, R&D, and acquisition investments when firms are most likely to underinvest (β_1). Again, we do not find the same effect on capital expenditures when firms are predicted to underinvest. Using total investments as an example, an increase of one standard deviation in managerial ability results in an increase of 3.040 in total investments among firms that are likely to underinvest. Furthermore, the results show that as the tendency to overinvest increases, higher managerial ability tends to reduce total investments, R&D, and acquisition expenditures (β_3). The result is not statistically significant for capital expenditures.

Overall, the results indicate that when firms have a predisposition towards underinvestment, higher managerial ability is shown to increase the levels of R&D, acquisition expenditures, and total investments. When firms have an increased tendency towards overinvestment, managerial ability tends to reduce the levels of R&D and acquisition expenditures as well as total capital investments. However, neither result can be generalized with regard to capital expenditures.

The estimated coefficients of the control variables are consistent with prior research, and thus, larger (*Size*) and growing firms (*MtB*) with more operating cash flow are more likely to increase investment levels, while distributing dividends (*Dividend*) negatively affects investment levels. The likelihood of bankruptcy (*Zscore*), a capital structure with a higher ratio of leverage (*Kstructure*), and higher volatility in sales (*SdSales*), or negative results (*Loss*), are negatively associated with investment levels. In relation to control factors, firms located in countries with the strongest bank regulations (*Regulation*) and investor protection rules (*IP*) carry out more efficient investment. Independence, diversity, and board expertise (*Board*) are relevant in monitoring investment decisions.

Robustness of Results

In our robustness tests, we measure investment as abnormal investment. We refer to this proxy as *abn_Investment*, and it is calculated as the residuals from a one-year regression of annual bank future capital investment on annual current sales growth. Thus, banks with large positive (negative) residuals will demonstrate overinvestment (underinvestment) practices. This regression is estimated in time-series fashion, as follows in Equation (3):

$$Investment_{t+1} = \beta_0 + \beta_1 SalesGrowth_t + \mu_{t+1} \quad (3)$$

In addition, we have considered the following: *abn_Capital_Invest*, the abnormal level of total capital expenditure, proxied by the residuals from the regression of a firm's total capital investment on lagged sales growth; *abn_R&D_Invest*, the abnormal level of R&D expenditure, proxied by the residuals from the regression of a firm's R&D expenditure on lagged sales growth; and *abn_Acqui_Invest*, the abnormal level of acquisition expenditure, proxied by the residuals from the regression of a firm's acquisition expenditure on lagged sales growth.

We reflect the results of model [1] (Table 6, Panel A), in which we investigate the association between managerial ability and abnormal investments without conditioning firms' tendencies towards overinvestment or underinvestment. We observe a positive influence of managerial ability on total investments and on the three components of total investments (capital expenditures, R&D, and acquisition expenditures).

Table 6. Robust results for managerial ability and abnormal investments.

Panel A. Results for Model [1]: Association between Managerial Ability and Abnormal Investments						
			<i>Abn_Investment</i> Coef. (std.error)	<i>Abn_Capital_Invest</i> Coef. (std.error)	<i>Abn_R&D_Invest</i> Coef. (std.error)	<i>Abn_Acqui_Invest</i> Coef. (std.error)
Ability	β_1	+	230.079 ^a (18.022)	57.520 ^a (4.506)	115.040 ^a (9.011)	76.693 ^a (6.007)
Size	β_2	+	80.965 ^a (0.398)	20.241 ^a (0.100)	40.483 ^a (0.199)	26.988 ^a (0.133)
Mtb	β_3	+	0.213 ^a (0.002)	0.053 ^a (0.001)	0.107 ^a (0.001)	0.071 ^a (0.001)
Loss	β_4	−	−754.777 ^a (4.186)	−188.694 ^a (1.047)	−377.389 ^a (2.093)	−251.592 ^a (1.395)
SdSales	β_5	−	−324.349 ^a (1.798)	−81.087 ^a (0.450)	−162.175 ^a (0.899)	−108.116 ^a (0.599)
SdInvestment	β_6	+	0.039 ^a (0.000)	0.010 ^a (0.000)	0.020 ^a (0.000)	0.013 ^a (0.000)
Op_Cash_flow	β_7	+	8.852 ^a (0.160)	2.213 ^a (0.040)	4.426 ^a (0.080)	2.951 ^a (0.053)
Slack	β_8	+	0.087 ^a (0.001)	0.022 ^a (0.000)	0.044 ^a (0.001)	0.029 ^a (0.000)
Dividend	β_9	−	−93.938 ^a (0.798)	−23.485 ^a (0.200)	−46.969 ^a (0.399)	−31.313 ^a (0.266)
Zscore	β_{10}	−	−7.727 ^a (0.111)	−1.932 ^a (0.028)	−3.864 ^a (0.056)	−2.576 ^a (0.037)
Tanbigility	β_{11}	+	0.119 ^a (0.003)	0.030 ^a (0.001)	0.060 ^a (0.002)	0.040 ^a (0.001)
Kstructure	β_{12}	−	−2.834 (2.573)	−0.709 ^c (0.643)	−1.417 (1.287)	−0.945 ^c (0.858)
Regulation	β_{13}	+	453.250 ^a (2.216)	113.313 ^a (0.554)	226.625 ^a (1.108)	151.083 ^a (0.739)
IP	β_{14}	+	29.396 ^a (1.250)	7.349 ^a (0.313)	14.698 ^a (0.625)	9.799 ^a (0.417)
Board	β_{15}	+	13.873 ^a (0.657)	3.468 ^a (0.164)	6.937 ^a (0.329)	4.624 ^a (0.219)
z			5.20×10^7 (14)	1.70×10^7 (14)	1.99×10^7 (14)	1.62×10^7 (14)
m1			−1.88	−1.88	−1.88	−1.88
m2			0.76	0.76	0.76	0.76
Hansen			140.10 (171)	140.10 (171)	140.10 (171)	140.10 (171)

Table 6. Cont.

Panel B. Results for Model [2]: Association between Managerial Ability and Abnormal Investments Conditioning Firms' Tendencies towards Overinvestment				<i>Abn_Investment</i>	<i>Abn_Capital_Invest</i>	<i>Abn_R&D_Invest</i>	<i>Abn_Acqui_Invest</i>
				Coef. (std.error)	Coef. (std.error)	Coef. (std.error)	Coef. (std.error)
Ability	β_1	+		27.870 ^a (2.183)	6.968 ^a (0.546)	13.935 ^a (1.092)	9.290 ^a (0.728)
Over_Invest	β_2	-		-5.59 ^a (0.871)	-1.398 ^a (0.218)	-2.795 ^a (0.436)	-1.863 ^a (0.290)
Ability*Over_Invest	β_3	-		-50.690 ^a (1.871)	-12.673 ^a (0.468)	-25.345 ^a (0.936)	-16.897 ^a (0.624)
Size	β_4	+		80.965 ^a (0.398)	20.241 ^a (0.100)	40.483 ^a (0.199)	26.988 ^a (0.133)
Mtb	β_5	+		0.213 ^a (0.002)	0.053 ^a (0.001)	0.107 ^a (0.001)	0.071 ^a (0.001)
Loss	β_6	-		-754.777 ^a (4.186)	-188.694 ^a (1.047)	-377.389 ^a (2.093)	-251.592 ^a (1.395)
SdSales	β_7	-		-324.349 ^a (1.798)	-81.087 ^a (0.450)	-162.175 ^a (0.899)	-108.116 ^a (0.599)
SdInvestment	β_8	+		0.039 ^a (0.000)	0.010 ^a (0.000)	0.020 ^a (0.000)	0.013 ^a (0.000)
Op_Cash_flow	β_9	+		8.852 ^a (0.160)	2.213 ^a (0.040)	4.426 ^a (0.080)	2.951 ^a (0.053)
Slack	β_{10}	+		0.087 ^a (0.001)	0.022 ^a (0.000)	0.044 ^a (0.001)	0.029 ^a (0.000)
Dividend	β_{11}	-		-93.938 ^a (0.798)	-23.485 ^a (0.200)	-46.969 ^a (0.399)	-31.313 ^a (0.266)
Zscore	β_{12}	-		-7.727 ^a (0.111)	-1.932 ^a (0.028)	-3.864 ^a (0.056)	-2.576 ^a (0.037)
Tanbigility	β_{13}	+		0.119 ^a (0.003)	0.030 ^a (0.001)	0.060 ^a (0.002)	0.040 ^a (0.001)
Kstructure	β_{14}	-		-2.834 (2.573)	-0.709 ^c (0.643)	-1.417 (1.287)	-0.945 ^c (0.858)
Regulation	β_{15}	+		453.250 ^a (2.216)	113.313 ^a (0.554)	226.625 ^a (1.108)	151.083 ^a (0.739)
IP	β_{16}	+		29.396 ^a (1.250)	7.349 ^a (0.313)	14.698 ^a (0.625)	9.799 ^a (0.417)
Board	β_{17}	+		13.873 ^a (0.657)	3.468 ^a (0.164)	6.937 ^a (0.329)	4.624 ^a (0.219)
z				6.30×10^7 (15)	2.40×10^7 (15)	1.70×10^7 (15)	4.40×10^7 (15)
m1				-1.88	-1.88	-1.88	-1.88
m2				0.76	0.76	0.76	0.76
Hansen				140.10 (171)	140.10 (171)	140.10 (171)	140.10 (171)

Notes: (i) a, b and c denote statistical significance at 1, 5 and 10%, respectively. (ii) m_i is a serial correlation test of order i in the first difference residuals under the null of no serial correlation. (iii) Hansen is a test of over-identifying restrictions under the null hypothesis of no correlation between the instruments and the error term. The degrees of freedom are in parentheses. *Abn_Investment* is defined as the residuals from a one-year regression of annual bank future capital investment on annual current sales growth; *Abn_Capital/ Abn_R&D/ Abn_Acqui_Invest* is the residuals from on-year regression of capital or R&D or acquisition expenditure on annual current sales growth; *Ability* measures managerial ability and is created by the residuals from the DEA score regression that identify the level of efficiency attributable to the managers; *Over_Invest*, which indicates the tendency to overinvest; *Size* identifies the bank's size; *MtB* denotes the growth opportunities; *Loss* is a dummy indicator variable; *SdSales* is the standard deviation of the sales; *SdInvestment* is the standard deviation of investment; *Op_Cash_flow* denotes the operating cash flows; *Slack* is the ratio of cash to PP&E; *Dividend* is a dummy variable; *Zscore* = 0.033 *earnings before extraordinary item/total assets + sales/total assets + 0.014 *retained earnings/total assets + 0.012 *(working capital/total assets) + 0.006 *(market value of common stock/total liabilities); *Tanbigility* is PP&E/total assets; *Kstructure* is the long-term debt divided by the sum of long-term debt and the market value of equity; *Board* denotes the level of independence, diversity and financial expertise of the board of directors; *IP* is the level of investor protection by country; *Regulation* is the strength of bank industry characteristics.

We also test the association between managerial ability and abnormal investment levels conditioned by firms' tendencies to overinvest and underinvest. Panel B of Table 6 displays the results. Specifically, when firms are most likely to underinvest (β_1), abnormal R&D, abnormal acquisition expenditures, and abnormal total capital investments increase with higher managerial ability. Managerial ability tends to reduce the abnormal levels of total investments, R&D, and acquisition expenditures as firms' tendencies to overinvest increase.

Taken together, the earlier association tests, without conditioning firms' tendencies towards overinvestment or underinvestment, show that higher managerial ability generally leads to greater

investment. More importantly, the conditional association tests reveal that when firms are very likely to underinvest, higher managerial ability has a tendency to increase R&D and acquisition expenditures but not capital expenditures. Managerial ability also tends to increase abnormal R&D, abnormal acquisition expenditures, and abnormal capital investments when firms have a higher tendency to underinvest.

When firms' tendencies to overinvest increase, higher managerial ability reduces R&D and acquisition expenditures but not capital expenditures. However, higher managerial ability is also shown to reduce abnormal R&D, abnormal acquisition expenditures, and abnormal capital expenditures when firms' tendencies to overinvest are high. The above results provide evidence in line with the prediction that managerial ability can improve capital investment efficiency and alleviate agency problems.

5. Concluding Remarks

The relevant role of individual managerial behavior in corporate investment practices has largely been ignored. Our objective is to analyze the association between managerial ability in banks and three different types of investments that demand significant resources: capital expenditure, research and development (R&D) expenditure, and acquisition expenditure. We also analyze whether managerial ability is related to increased (reduced) investment in banks prone to underinvestment (overinvestment).

Using data on banks from nine countries over the period 2004–2010, we quantify managerial ability following [Demerjian et al. \(2012\)](#) and calculate a data envelopment analysis (DEA) score to estimate how efficiently managers use their firms' resources.

The results indicate that when firms have a predisposition towards underinvestment, higher managerial ability is shown to increase the levels of R&D, acquisition expenditures, and total investments. In contrast, when banks have an increasing tendency towards overinvestment, managerial ability tends to reduce the levels of R&D and acquisition expenditures as well as total capital investments. Thus, our findings evidence that more able bank managers select and implement investment projects more efficiently and confirm the upper echelon theory and resource-based view, which suggest that managers' characteristics affect financial decisions. Results are in line with previous papers that show that managerial ability increases investment efficiency ([Demerjian et al. 2013](#); [García-Sánchez and García-Meca 2018](#)).

Investigating the effects of managerial ability on firm policies, including investment policies, is highly relevant because managers can make decisions that reduce bank value, thereby affecting the economy of countries. Thus, the evidence from this study can help standard-setters and regulators to better understand bank business practices and investment behavior in light of managerial abilities. Given that research on managerial ability in banks is still in its early stages, it might be worth studying the effect of specific managerial characteristics, such as education, risk aversion, social connections, or financial experience, on bank financial and reporting choices in greater depth. In addition, from a practical point of view, our results suggest that manager selection processes are especially relevant in order to quantify managerial ability since this attribute is essential to avoid agency problems associated with managers' individual preferences.

However, this study is subject to several limitations, especially the time period and sample distribution that have been taken into account to interpret our results. Therefore, future research could focus on specific countries in order to accept or reject our research hypotheses in specific countries like Islamic countries or those with emerging economies or geographic locations where the institutional environments are quite different in terms of cultural or religious values, among others. In addition, the economic recession associated with the consequences of COVID-19 could be an interesting framework for future analysis in pre and post economic recession periods.

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