Managerial Ability and Firm Performance: Evidence from the Global Financial Crisis

Panayiotis C. Andreou, Daphna Ehrlich and Christodoulos Louca

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Comments Very Welcome

Andreou and Louca are from the Cyprus University of Technology, Department of Commerce, Finance and Shipping, and Visiting Research Fellows at Durham Business School. Ehrlich is from Tel Aviv University, Faculty of Management. Emails: panayiotis.andreou@cut.ac.cy, daphnaeh@post.tau.ac.il, and christodoulos.louca@cut.ac.uk.

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Abstract

We examine the relation between managerial ability and firm performance during the 2008 global financial crisis. We find that managerial ability is positively associated with firm performance. Firms with better management ability invest more during the crisis period, generate greater profitability and issue more debt when profitability is not adequate. Finally, managerial ability is negatively associated to information asymmetry. Overall, these results are consistent with the view that managerial ability enhances firm performance, reduces underinvestment, improves profitability / borrowing capacity and reduces information asymmetry.

JEL classification*:* M10, G01, G30,

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1. Introduction

Understanding how to improve firm performance has been a major part of finance research in all times. One way that attracted the interest during the last decade is the management ability. Prior literature is elaborating on the importance of management quality and as this strand of the literature enriches the relation between management ability and firm performance becomes clearer.

In this study we investigate the relation between management ability and firm performance during the 2008 global financial crisis. The crisis is an exogenous event and therefore focusing on the relation between managerial ability prior to the crisis and firm performance during the crisis largely alleviate endogeneity concerns that can arise in a panel data setting. More specifically, we hypothesize that firms with higher managerial ability exhibit less negative crisis performance. During the financial crisis firms with limited resources may suffer from underinvestment (Campello et al. 2010) due to lower available resources for investment opportunities (Ivashina and Scharfstein, 2010). We argue that managerial ability helps firms to secure more resources during the crisis, either by generating more cash flows from operations or by issuing more debt. Greater resources could be used to relieve firms from underinvestment problems, improving in this respect firm performance.

Managerial ability and in particular, human capital are often regarded as intangible assets of a firm. Higher management ability may relate to more efficient management of day-to-day operations, especially in crisis periods where managerial decision making should have a major impact in firms' performance. Further, higher management ability is likely to relate to projects with larger net present value for a

given scale and more ably implementation (Chemanur and Paeglis, 2005). Investments, however, require appropriate funding. During a crisis period where funding is constraint, higher managerial ability would positively relate to the successful certification of firm's value to outsiders, thus reducing information asymmetry and enabling firm's to raise more debt for investment purposes.

The recent financial crisis, due to its severity represents an ideal event to investigate the role of management during a crisis period and the relation between management ability and firm performance. The financial crisis cause drying up liquidity given by financial institutions (Ivashina and Sharfstein 2010) as the uncertainty increases and the conservatism of financial institutions dictates higher internal control, highlighting in this respect the importance of managerial ability in alleviating firms' funding problems. Funding problems likely create the conditions for firms to suffer from underinvestment. In this respect, Campello et al. (2010) and Watts and Zuo (2012) argue that the global financial crisis have severe consequences on corporate investment. Accordingly, if managerial ability alleviates funding problems we would expect managerial ability to relate positively to investments.

Our sample consists of firms listed on US stock exchanges during the crisis period. We define two crisis periods: (i) from August 1, 2007 to August 31, 2009, as in Watts and Zuo (2012) and (ii) from December 1, 2007 to June 30, 2009 based on the recession periods of the National Bureeau of Economic Research (NBER). We measure pre-crisis managerial ability consistent with Demerjian, Lev and McVay (2012) that compares managers' efficiency, relative to their industry peers, regarding the transformation of corporate resources to revenues. Managerial ability increase when managers generate higher revenues for any given level of resources or, conversely, when they minimize the resources used for a given level of revenues. As

an alternative measure of managerial ability we also use industry adjusted historical returns (Fee and Hadlock, 2003). Consistent with our hypothesis, the results show that firms with better management ability experience less negative stock return performance and more positive operating performance. The results also show that managerial ability is positively related to corporate investment. In addition there is a positive association between managerial ability with firm crisis resources as captured by cash flow from operations and debt issuances. Decomposing corporate resources into its components, the results show a positive relation between managerial ability and cash flow from operation. Interestingly, there is also a positive relation between managerial ability and crisis debt when the firm generates below median cash flow from operations. Finally, since information asymmetry is an important factor of the leverage level we also investigate and find a relation between managerial ability and information asymmetry. In summary, our findings are consistent with the view that managerial ability benefits do manifest in firm performance.

In additional analysis, we investigate alternative explanations of the relation between managerial ability and firm performance. First, we consider the possibility that firms with higher managerial ability are less overvalued prior to the financial crisis. Second, we examine whether firms with higher managerial ability take less risk prior to the crisis. Finally, we also consider whether firms with higher managerial ability exhibit greater agency problems. All three explanations may rationalize why managerial ability is positively associated to firm performance. To assess the robustness of our findings we rerun the analysis after including past return performance as a measure of overvaluation, the volatility of stock returns prior to the crisis as a measure of firm risk and an agency index. Our findings remain qualitatively similar.

This study contributes in the literature by demonstrating how managerial ability translates into greater firm performance. Prior literature provides evidence of a positive relation between managerial quality and initial public offerings (IPOs) performance (Chemanur and Paeglis, 2005). Similarly, Chemanur, Paeglis and Simonyan (2009) demonstrate a relation between management quality and financial and investment policies for firms making seasoned equity offerings (SEOs). We build on and extent this literature, by validating relations between managerial ability and firm performance, underinvestment, profitability / borrowing capacity and information asymmetry. The advantage of our analysis is that our sample consist of all firms listed on US stock exchanges alleviating in this respect potential sample selection bias that arises by focusing on sub-samples such as IPOs or SEOs. In addition, our analysis provides inferences during the crisis period which is largely exogenous and thus reduces endogeneity concerns. Finally, rather than utilizing specific CEO characteristics we use a broader and more accurate measure of managerial ability (Demerjian et al. 2012).

The remainder of this paper is organized as follows. Section 2 describes the literature review and the hypotheses. Section 3 includes the sample and data measurement, Section 4 the statistical methodology and the empirical results. Section 5 concludes**.**

2. Literature review and hypothesis development

2.1 Why management ability enhance firm value?

Chemmanur and Paeglis (2005) investigate the relation between management quality and the reputation of a firm's management and various aspects of its IPO and post-IPO performance. They identify positive relations between quality and offer volume,

offer characteristics and long term firm performance. Similarly, Chemmanur et al. (2010) find higher performance at seasoned equity offerings (SEOs) in the presence of higher quality management prior to the SEO. They highlight that though in the phase of SEO the asymmetric information problem is expected to be lower than in the phase of IPO, the SEO is typically performed by mature and more complex firms, and the effect of management quality on firm value is expected to be higher than in the IPO stage. Further, the empirical findings support the notion that firms conducting SEOs face lower level of information asymmetry compared to IPO. Regardless of the offer type, whether it is IPO or SEO, a higher level of management quality is associated with less asymmetry.

Bertrand and Schoar (2003) refer to top executives as key factors in corporate ongoing activity and especially important in acquisition or diversification decisions, dividend policy, interest coverage and level of capital expenditures.

Switzer and Bourdon (2011) find that operating performance is positively associated with management team quality. In particular, they find that operating performance is positively associated with management team quality and such are heterogeneous membership tenure, presence of dominant CEO and MBA holders on top management team.

Carmeli and Tishler (2004) tie up managerial ability with performance and present positive relations between resources, capabilities and the performance of industrial firms. They relate to the notion that top management plays a significant role in generating gains for a firm and find that superiority of an industrial enterprise can indeed explain this set of four core organizational resources and capabilities. Switzer and Huang (2007) find positive correlations between human capital characteristics and small and mid-cup mutual fund performance.

Risk management and corporate governance during financial crisis have gained attention recently. Aebi, Sabato and Schmid (2012) investigate whether the presence of chief risk officer (CRO) in executive board of financial institutions and other risk management related corporate governance mechanisms affect the performance of these institutions during financial crisis terms. They find that banks, in which the CRO reports directly to the board of directors perform significantly better in financial crisis, compared to the rest of the banks in the sample. They also relate to corporate governance rules and highlight the importance of "risk-governance" in banks.

Our first set of hypothesis refers to managerial ability and firm returns and is as follows:

H1: Crisis term firm performance is positively related to the managerial ability of its management

2.2.1 Channels through management ability increases firm value

In the light of the importance of managerial ability, we would like to connect managerial ability with the contribution of managerial ability during crisis term. The uniqueness of crisis term is the financial distress the firm is exposed to. The investment or underinvestment of a firm during crisis terms may be affected by managerial ability, and this topic is the motivation to this paper.

On the one hand, firms with higher managerial ability may raise more funds during crisis terms, as a result of management capabilities and credibility. On the other hand, firms with better management may need to raise fewer funds as they continue to generate cash flow from operations. These firms suffer less from the

financial distress consequences and therefore are associated with less underinvestment.

With respect to firm activity during crisis terms, we look at aspects of efficient activity, capital expenditures, availability of resources and ability to issue debt. We extend the analysis of Watts and Zuo (2012), who look at the 2008 financial crisis and explain crisis period returns and agency costs. They look at accounting conservatism which is measured with the incremental coefficient on negative stock returns. They show that firms with more conservative financial reporting suffer less from negative crisis period shock returns. Our empirical analysis leans on the methodology presented by Watts and Zuo (2012).

Our second set of hypothesis refers to managerial ability and firms' resources during the crisis period:

H2: Crisis term capital expenditures is positively related to the managerial ability of its management

H3: Crisis term resources of a firm are positively related to the managerial ability of its management

H4: Crisis term debt of a firm is negatively related to the managerial ability of its management

2.2.2 Management Ability and Information Asymmetry during the crisis

The quality of a firm's management is widely regarded by practitioners, including venture capitalists (VCs) and financial analysts, as an important indicator and measure of firm quality. The quality of firms' management plays a major role while making a decision about investment by practitioners, such as VCs and Institutional investors.

Higher quality managers serve to signal the firm's value more effectively and, thus, reduce information asymmetry. In addition, more skilled managers are better adept at selecting worthwhile projects for their firms to create higher net present value (NPV).

Chemmanur, Paeglis and Simmonyan (2009) investigate the determination debt level with respect to managerial ability. They refer to the asymmetry of information as a factor in determining the level of leverage. Firms with less information asymmetry tend to prefer issuance of equity, receiving its fair price. The findings of Watts and Zuo reconfirm that accounting conservatism becomes more important when there are greater agency costs and accounting conservatism is translated into enhanced firm and equity values. Better and more reputable managers are able to convey the intrinsic value of the firm more credibly to outsiders, and the expected level of leverage is lower in the presence of better management.

Erkens et al. (2012) explore the impact of the 2008 financial crisis in financial firms in 30 countries and conclude that management affects the volume of crisis impact on a firm during crisis term. They find that high level of institutional holdings and independent boards reduce stock returns during crisis, as a consequence of higher risk taken prior to the crisis and higher level of equity raised during the crisis. These two elements reduce returns and transferred wealth from existing shareholders to debt holders, affecting performance during crisis.

The third set of hypothesis refers to the relation between managerial ability and information asymmetry during the period of crisis:

H5: Crisis term information asymmetry is negatively related to the managerial ability of its management

3. Data and Variable Definitions

3.1. Data

Our aim is to understand whether management ability affects firm performance during crisis terms. Therefore we look at firms and their performance during 2008 crisis and the following years. For the empirical analysis we obtain data from 2008-2011 annual Compustat / CRSP merged database. Our independent variable is managerial ability, which is based on the measure presented by Demerjian, Lev and McVay (2012). Our sample is based on 2344 firms. The entire population of firms is approximately 4023 firms. The gap between the entire firm population to the firms with sufficient data to calculate the managerial ability measure is due to some missing variables included in the DEA efficiency estimation. Some of the tests are performed with higher number of observations that is the maximum number of observations with no missing values.

3.2 Measurement of variables

In this section, we describe the measurement of the three sets of variables used in the analysis: (i) the dependent variables i.e. firm performance, investments, resources, information asymmetry, (ii) the main independent variable i.e. management ability measures, and (iii) the control variables.

Dependent variables

As proxies for firm performance, we use both market-based measures, such as crisis returns, and accounting-based measures, such as return on assets and return on equity.

The measures we explore and explain are a group of performance measures which are divided into three groups. The first group is operational driven and refers to the returns during crisis terms. The related measures are the holding period return

from 2008 (Crisis_Ret), the earnings before interest and taxes (Compustat item: EBIT) during fiscal year 2008 deflated by lagged net assets (Crisis_Roe) and the income before extraordinary items (Compustat item: IB) during fiscal year 2008 deflated by lagged total assets (Crisis_Roa).

The second group refers to availability of resources, as indicator to financial strength of the firm. The first measure in this group is crisis capital expenditures (Crisis_CAPEX) which is capital expenditures (Compustat item: CAPX) for fiscal year 2008 divided by lagged net assets (Compustat item: SEQ). Additional measures in this group of variables are resources and debt. The availability of resources is defined as Crisis_Resources which is measured as the issuance of long term debt (Compustat item: DLTIS) minus reduction of long term debt (Compustat item: DLTR) plus operating activities during fiscal year 2008 deflated by lagged net assets (Compustat item: SEQ). The ability to raise debt is defined as Crisis_Debt and it is calculated as long term debt issuance (Compustat item: DLTIS) minus reduction of long term debt (Compustat item: DLTR) during fiscal year 2008 deflated by lagged net assets.

Finally, the third group of variables is statistic variables which are measures of asymmetry information. The first variable in this group is standard deviation of daily returns during the period of crisis from August 1, 2007 to August 31, 2009 (Crisis_Ret_Std). The second one is the mean of daily bid-ask spread (divided by the bid-ask midpoint) during the period of crisis from August 1, 2007 to August 31, 2009 (Crisis_Mean_Ba). The third one refers to the number of analysts (Ln_Numest) following the firm and publishing related report. Ln_Numest calculated as the logarithm of 1 plus number of analysts' estimates for each firm**,** measured on December 31st 2008**.**

Main independent variables

We use two measures of management ability. Our aim is to analyze the influence of managerial ability on firm performance, namely returns, ROA and ROE. Our two main independent variables which represent managerial ability are residual efficiency and historical returns. Both of them are presented by Demerjian, Lev and McVay (Management Science, 2012). The first measure of managerial ability captures the ability of managers to use their resources in order to generate more revenues. It requires a two step procedure in order to derive the residual of efficiency (Resid_efficiency). Demerjian, Lev and McVay use data envelope analysis (DEA) and present the opportunity of using firm efficiency to assess managerial ability within industries. The first step requires the estimation of the DEA efficiency as the ratio of outputs over inputs using the following optimization problem:

$$max_v \theta = \frac{\sum_{i=1}^{s} u_i y_{ik}}{\sum_{j=1}^{m} v_j x_{jk}}, k = 1, \dots n \qquad (1)$$

In equation (1) *s* are the outputs, *m* inputs, and *n* the firms. The output variable used in (1) is *sales* whereas the input variables are: *Net property, plant and equipment, net operating leases, net research and development, purchased goodwill, other intangible assets, cost of inventory, and selling, general and administrative expenses.* The second step requires regressing DEA efficiency measure in a set of key firm-specific characteristics which contribute in manager's ability such as: *firm size, market share, positive free cash flows, foreign currency indicator, free cash flow, number of segments and firm age.* They estimate the following Tobit regression model by industry:

$$DEA_{efficiency} = a_0 + a_1 Firm\ Size + a_2 Market\ Share + a_3 Free\ Cash\ Flow +$$

$$a_4\, Firm\, Age + a_5 Number\ of\ Segments + a_6 Foreign\, Currency\, Indicator +$$

$$a_7 Year\ fixed\ effects + \varepsilon \qquad (2)$$

The rank of residual (*R_resid_efficiency)* of the equation (2) is our first measure of managerial ability. The measure is calculated and is based on the measure of Bushman et al 2004. The CEO fixed effects presented by Demerjian, Lev and McVay (2012), based on 1992-2009 data accumulated to 66.5%. We revisited this measure and checked its sustainability using 2008 data. Our tests, based on 2008 CRSP data yield CEO fixed affects of 65%. Thus, we conclude that the measure is valid and use it to analyze performance at crisis terms. Based on these results we conclude that firm efficiency could be used to assess managerial ability. As an alternative managerial ability measure we conducted the decile rank of historical returns *(R_Historical_Ret)* which is our proposed second measure of ability. Historical return is the five-year historical value-weighted industry adjusted return (from year *t-5* to year *t-1*).

Control variables

We would like to eliminate all size related affections. For this purpose we use the common control variables of leverage, size and market-to-book. Leverage (Lev) is the book value of debt (Compustat items: DLC+DLTT) divided by book value of total assets (Compustat items: DLC+DLTT+CEQ) in the year prior to the financial crisis (fiscal year 2006). Size (Size) is the natural logarithm of the firm's market value of equity (Compustat items: csho * prcc_f) in the year prior to the financial crisis (fiscal year 2006). Market-to-book is the firm's market value (Compustat items: csho * prcc_f) divided by book value of equity (Compustat item: CEQ) in the year prior to the financial crisis (fiscal year 2006).

Additional control variables are lagged variables. For the analysis of crisis returns, return on equity and return on assets we use a lagged variable of such returns, ROE and ROA, respectively. For the return standard deviation we have one lagged variable and same for the mean bid-ask spread and number of analysts following the firm. In our robustness tests (table 7) we use three lagged variables for the returns and respective three lagged variables for the return on equity and return on assets.

4. Empirical results

4.1 Descriptive Statistics and Correlation analysis

Descriptive statistics for the dependent variables, main independent variables and the control variables are in Table 1. Variable definitions can be found in the Appendix of this paper.

Our first measure of firm performance during crisis terms is crisis return. The mean of crisis return in 2008 is -0.324, with standard deviation of 0.368, while the 25th percentile is -0.581 and the 75th percentile value is -0.109. Crisis ROE has a mean of 0.113, while the 25th percentile is -0.012 and the 75th percentile is 0.275. Crisis ROA has in 2008 a mean of -0.024, with 25th and 75th percentile values of -0.084 and 0.082, respectively. Looking at the descriptive statistics emphasized the volatility of firm returns during crisis terms as well as in stable periods.

Same trends are presented with respect to the rest of the explanatory variables; See Table 1.

We have two main independent variables, Residual efficiency and Historical returns, which capture managerial ability. The residual efficiency in 2008 has a mean -0.018, with standard deviation of 0.248, while the 25th percentile is -0.202 and the 75

th percentile is 0.146. Historical returns in the same period report a mean of 0.273, while the 25th percentile is -1.059 and the 75th percentile is 0.674.

Additional measure of descriptive statistics is Pearson correlation matrix among all the variables of interest, dependent variables, main independent variables of managerial ability, residual efficiency and historical returns and the control variables (Fama-French portfolio indexes). We present the results of Pearson correlation matrix in Table 2. In general our results support our main hypothesis that better able managers perform better during the crisis term. Managerial ability is positively correlated with mostly all of the operational, and resource based firm performance measures. Correlation coefficient estimates are stronger for the historical returns managerial ability measure.

4.2 Multivariate analysis

In this section we draw the methodology of our multivariate tests, discuss the empirical methodology used to test the hypotheses presented in Section 2 and report the results. In Section 4.2 we discuss the measures taken to quantify the influence of managerial ability while in Section 5 we present the robustness check relating to the definition of the crisis period and the respective returns.

Our hypotheses are aimed to test the relation between managerial ability and firm performance, assuming positive relation between managerial ability and firm performance. Our results are classified into groups, upon the nature of the tests, as mentioned in section 2.2.

Table 3 relates to the first group of hypotheses, which refers to returns. The returns, by all means, are a good indicator of firm performance, either while testing raw return or looking at indicators such as Roa and Roe. The higher the returns are the

higher is the firm class in the eyes of the investors, potential investors and professionals, such as analysts. Thus, our first set of tests consists of both market-based measures, such as crisis returns (*Crisis_Ret)* and accounting-based measures, such as, return on assets (*Roa)* and return on equity *(Roe)* respectively. Table 3 reports the results of our multivariate tests of the relationship between crisis returns, in their three form- return, Roe and Roa and managerial ability. In all regression analysis we include our main control variables as described in Section 3.2, as well as industry fixed effects based on Fama-French 48 classification. Panel A of table 3 reports the coefficient estimates on the relation between managerial ability, expressed via rank of residual efficiency and panel B includes the estimates of historical return rank as main explanatory variable. We find that managerial ability has positive relation with returns, measured either via holding period return (*Crisis_Ret)*, Roe (*Crisis_Roe)* and Roa (*Crisis_Roa)*. Looking at crisis returns over the period August1, 2007 to August 31, 2009, managerial ability contributes positive significant effect. The positive value of the relation is 0.005, with t value of x (significant at 5% level). In column (2) of Table 3 we present a regression analysis with an additional control variable of lagged returns for each firm. In this test, the relation between the managerial ability and the return is slightly higher compared to the previous one. It is 0.006 (with t-value x, also significant at 5% level).

The second part of Panel A in Table 3 reports the regression results of the return on equity (*Crisis_Roe)* during crisis term. The relation between managerial ability and 2008 Roe is 0.019 with t-stat of x (significant at 1% level). Adding the additional control variable of lagged return on equity indicated by *Lag1_Roe* has a lower value, which is 0.16, between the rank of residual efficiency and crisis Roe (but it still remains significant at 1% level). We see that deflating the returns by equity,

thus, taking into consideration the equity of the firm enables us to better understand the importance of managerial ability even more clearly.

Finally in Table 3 in columns (5 & 6) we report the influence of managerial ability on returns via the *Crisis_Roa*. In this test we relate to the firm earnings deflated by total assets. Thus, when taking into account firm size, measured via total assets, the correlation of rank of residual ability with Roa is 0.012 with t-stat of x (significant at 1% level). Including lagged Roa (*Lag1_Roa),* we again report a lower estimate of relation with crisis Roa and the rank variable of residual of efficiency is 0.008 (also significant at 1% level).

Panel B of Table 3, repeats the regression analysis of Panel A by substituting historical return rank variable as the main explanatory variable. Equivalent relations between managerial ability and returns are presented in Panel B. We find that managerial ability has positive correlation with returns, measured either via holding period return, Roe and Roa. Looking at crisis returns, for the period August1, 2007 to August 31, 2009, the rank of historical returns (R_Historical_Ret) contributes positive effect with relation of 0.006, significant at 5% level. As in Panel A of Table 3 we present additional test including lagged returns for each firm as a control variable. In this test, the relation between the managerial ability and the return is a bit higher compared to the previous one, 0.007 (significant at 1% level) compared to 0.006.

In the second set of estimations of Panel B in Table 3 we report the regression results based on return on equity (*Crisis_Roe)* during crisis term. The relation between 2008 Roe and the rank of historical returns is 0.024 (significant at 1% level). Adding lagged returns in the same regression test we obtain a lower coefficient value of the relation between managerial ability and return on equity that is 0.19 (but it also remains significant at 1% level).

The last set of regression analysis of the relation between managerial ability and returns during the crisis terms includes the test of return on assets (*Crisis_Roa)* as the main dependent variable and its relation with historical returns. When taking into account firm size, measured via total assets, the correlation of rank of residual ability with Roa is 0.014,sigificant at 1% level, and by adding lagged Roa, we obtain again, a lower level of estimate with crisis Roa, which is 0.009 (also significant at 1% level).

Based on the tests presented in table 3 we conclude that managerial ability, measured either via rank of residual efficiency or rank of historical returns, is important in generating returns by all means, raw returns, returns on equity and returns on assets. The following tests are designed to increase the validity of these tests and emphasize the importance of managerial ability to firm performance during crisis terms.

Our next tests examine the relation between managerial ability and various aspects of capital expenditures and investments during crisis terms.

The second group of hypotheses relate to capital expenditures, resources and the ability to obtain debt. We test whether there is a relation between managerial ability to capital expenditures and the ability to raise debt to comply with firm activity and necessity.

Table 4 relates to the first second group of hypotheses, which refer to capital expenditures during crisis. We argue that firms with better managers, in other words, firms with higher management ability, suffer less in crisis terms and therefore continue their pattern of investments. The continuation of the investment pattern is important for the ongoing activity for the short term and enables maintaining or increasing revenue level in the long run. It is as if, firms with higher management quality invest more than the firms with lower managerial ability. Also firms with

higher management quality managers tend to invest more in projects with positive net present value projects than firms with less able managers.

The multivariate test of the relation between managerial ability expressed via residual efficiency and crisis capital expenditures for the year 2008 supports and confirms the positive relation. The multiplier of the managerial ability is 0.004 with t-statistic of x (significant at 5% level). The second measure of managerial ability, historical returns, is also positive, 0.007, with significance level of 1%. Again, the importance of managerial ability during crisis is not doubtful when looking at our results since more efficient managers tend to invest more in new projects which as a result will enhance their firms' performance and profitability.

Table 5 reports tests the relation between managerial ability and investment activity, measured via firm resources and debt raising. The intention is to understand whether firm with higher managerial ability tend to have more resources for investment and the source of these resources. The dependent variables are Crisis resources (*Crisis_Resources*) and Crisis debt (*Crisis_Debt*). Resources variable is an indication of the increase in capital expenditures during the relevant period. This variable reflects a measure of cash flow availability for operating and investment activity.

Columns (1&2) of Table 5 present the relation between managerial ability and crisis resources. Both measures of managerial ability rank of residual efficiency and rank of historical returns respectively are positively correlated with crisis resources. The relation between the first measure of managerial ability, rank of residual efficiency, and crisis resources is 0.015, with significance level of 1%. When using the alternate measure of managerial ability, the rank variable of historical returns, we get a higher positive relation, which is 0.027, which is also significant at the 1% level.

This is evidence that firms with higher managerial ability have higher level of capital resources which in turn enables them to invest them in new projects.

Besides Crisis resources we also examine Debt issuance during the crisis period and report the results of our findings in columns (3-8) of Table 5. This second set of test relates the reason of debt issuance. One possible difference in the level of debt issuance can be the profitability of firms. Firms with higher profitability generate more cash resources and may not need to issue debt compared to the firms with lower level of profitability need. To examine this relation we separate the sample firms into two sub-samples, firms of high profitability and low profitability. Looking at the entire sample, the relation between managerial ability based on residual efficiency and crisis debt is negative (-0.001) and not significant. However, when splitting the sample into two, one with the firm with the higher profitability and the other one with the rest of the firms, with lower profitability, we understand the reason for the negative relation in the earlier test. The firms with the higher profitability had negative relation between managerial ability and debt, while the firms with lower profitability had positive relation between managerial ability and crisis debt**.** More profitable firms had relation of -0.006 between managerial ability and crisis debt, with t-stat of x (significant at 5% level) and the less profitable firms reported an estimate of 0.004 with t-stat of x (significant at 5% level). The reason of the negative sign of the more profitable firms is that these firms generate cash flow from operations and do not need to raise debt while the second sub-sample with the less profitable firms need to raise additional cash for operating activity and investment, thus, they turn to raise debt during crisis term. While examining managerial ability through the measure of historical returns the results are a bit different. The relations between historical returns and debt issuance are positive for the entire sample and for the two sub-samples.

Looking at the entire sample, the relation is 0.008 (significant at 1% level), for the high group the relation is 0.009 (significant at 1% level) and for the low group it is 0.006 (significant at 5% level). Though all values are positive, we see slight difference between high to low sub-samples, indicating higher level of debt at the high performance sub-sample. Based on the rank variable of historical returns there is no indication of the relation between managerial ability and generation of operating resources for investment purposes. That is a conflicting result and we assume that this is due to our alternative managerial ability measure since there must be some noise of error.

Using the tests provided in Tables 4 & 5 we conclude that managerial ability measured either via rank of residual efficiency or rank of historical returns, has a positive impact on investments since firms with more able managers tend to invest more in new projects. They also have sufficient amount of capital resources to invest in their new projects. As far as the level of debt is concerned results turn out to be conflicting. Based on the rank variable of residual efficiency more profitable firms do not need extra debt compared to less profitable firms which need to raise additional debt in order to invest as it is indicated by the positive sign. Results on the rank variable of historical returns show evidence that not only the less profitable firms but also the entire sample and the more profitable firms require the issuance of new debt in order to invest.

The third group of hypotheses relates to information asymmetry, and we use three parameters to evaluate the level of information. These variables are the standard deviation of daily returns during the period of crisis from August 1, 2007 to August 31, 2009 (Ret_Std/ Crisis_Ret_Std), the mean of daily bid-ask spread (Mean_ba / Crisis_Mean_Ba) and the number of analysts that actively follow the firm and publish

their recommendations, expressed as natural logarithm of the 1 plus the number of analysts covering the firm at December 31st, 2008 (Ln_Numest).

The regression of returns standard deviation supports the expected negative relation between managerial ability to the dispersion of the returns, with both measures, rank of residual efficiency and rank of historical returns. The relation coefficient with rank of residual returns is -0.004 with t-stat of x, significant at 10% level. The relation coefficient with rank of historical returns is -0.014 with t-stat of x, significant at 1% level, which is in favor of the second measure. When taking into account the lagged standard deviation as an additional control variable, the relation coefficient with rank of residual returns becomes insignificant with value of -0.002 whereas the relation coefficient with rank of historical returns is -0.013 which remains significant at 1% level. There is a higher relation between our second measure of managerial ability, the rank of historical returns. Results demonstrate that the higher the management ability is, the lower the value of the dispersion of returns is, which is in line with the asymmetric information literature.

The analysis of the second measure of information asymmetry supports the information asymmetry theory in a similar manner. The relation coefficient of the rank of residual returns with mean of bid-ask spread is (-0.0002), with t-stat of x significant at 10% level. The same result holds after we include in the test the additional control variable of lagged mean of bid-ask spread. As far as the coefficient estimate of the rank of historical returns is (-0.0004), with t-stat of x, significant at 1% level, and -0.0003 in the test with lagged variable (also significant at 1% level). Once again the results are stronger using the rank variable of historical returns as the main explanatory variable rather than the rank of residual efficiency. Our results confirm our hypothesis which supports that the higher the managerial ability is, the lower the

dispersion of the bid-ask spread is. The value of the one period lagged variable of mean bid-ask spread is approximately 2.1 and significant at 1% level in regressions, the one based on residual efficiency and the one based on historical returns. These results support the persistency of the bid-ask spread variable.

Finally we report the results of the association between the number of analysts and managerial ability. We expect the relation to be higher as the firm is more efficient, trustable with more reputable managers. This implies that the higher the management quality is, the higher the number of analysts covering the firm. Bart, Kasznik and McNiholas (2001) find that analyst coverage is increasing in firm size, growth, trading volume, equity issuance and perceived mispricing, and is decreasing in the size of firm's analyst' brokerage houses and the effort analysts expend to follow the firm. We do find positive relation between managerial ability and the number of analysts publishing firm forecasts.

The relation coefficient of the rank of residual efficiency with number of analysts is 0.006 but it is not significant. We repeat the same test by adding the lagged variable of the number of analysts with a coefficient of 0.001 (which still remains insignificant). The value of the one lagged variable of the number of analysts is statistical significant at 1% level with coefficient estimate of 0.703. This result reinforces the stability of analyst coverage over the years.

Panel B of table 6 is based on rank of historical returns. The relation coefficient of the rank of historical returns is -0.004, with t-stat of x, significant at 1% level, and -0.013 in the test with lagged variable (also significant at 1% level).

The overall results present higher relations between the measures of information asymmetry and managerial ability, expressed by rank of historical returns, compared to the residual efficiency. Based on the three measures of

information asymmetry tests, we conclude that managerial ability decreased the information asymmetry measures during crisis terms, and this fits the overall notion of the significant contribution of managerial ability to firm performance.

5. Robustness Analysis

The definition of the crisis period is challenging. A careful analysis is essential to ensure that we do capture the crisis term in a way that the entire effects are included but the period is not too long, since we wish to isolate crisis term only. As we explain in the introduction, we have chosen the year 2008 for the analysis. However, we had some doubts whether this is the accurate year of measure. Therefore, we made a robustness test with respect to the returns, return on equity and return on assets, our main characteristics of firm performance during the crisis. The basis for the entire analysis was 2008 returns, and the additional tests with Roe and Roa reinforce the results of return analysis. One may challenge the measure of the crisis term and its definition in terms of time period. In line with the entire literature on the length of 2008 crisis, we performed the tests based on the 2008 as the main year of crisis period and now we perform additional analysis in order to take into account the impact of the pre-crisis period firm specific characteristics. We expect that better management quality firms are less overvalued compared with firms with worse management quality, thus, the results could be driven by the level of firm valuation during the pre-crisis period. Also firms with more able and efficient managers operate in less risk projects during the pre-crisis period compared with firms with less able managers who invest in more risky projects. We expect that the last category of firms is more likely to underperform during the pre-crisis period with this effect to be stronger even during the crisis period that is the year of 2008. Also firms with greater agency

problems are also more likely to underperform. Thus we re-run our basic regression model of Table 3 after including control variables that capture the degree of firm misvaluation, risk and agency problem.

Table 3 reports the results of our multivariate tests of the relationship between crisis returns, in their three form- return, Roe and Roa and managerial ability. We find that managerial ability has positive relation with returns, measured either via holding period return, Roe and Roa. Table 7 reports the results of our robustness tests. Looking at crisis returns, with additional control variables, the managerial ability expressed via rank of residual efficiency contributes positive significant affect. The first set of tests in Table 7 presents the relation between holding period crisis returns and managerial ability after taking into account additional control variables which capture the impact of misvaluation, risk and information asymmetry. We have added the following control variables: the Lag1_return (lagged returns in previous period), Lag2_return and Lag3_return, of the previous years, volatility and agency index. There is a positive value of the relation which is 0.004, with t value of x (significant at 10% level). The effect of the efficiency receives higher validity since in this test we have included the additional significant control variables. Panel B of Table 7 reports the coefficient estimates of the rank of historical returns as the main explanatory variable. This test has the same control variables as the regression with the rank of residual efficiency. The relation between the rank of historical return and the crisis return is 0.007 (significant at 1% level).

Tests with respect to crisis return on equity and crisis return on assets are in the same direction and present positive relation between managerial ability and returns, by all means. Panel A of Table 7 shows that the relation between rank of residual efficiency and crisis Rpe, with same control variables described herein above

is 0.015 (significant at 1% level). In Panel B we present the relation between rank of historical returns and crisis Roe, with the same control variables, which is 0.021 (significant at 1% level). The results of the regressions with crisis return on assets present the same behavior of crisis returns. The relation between rank of residual efficiency and crisis Roa is 0.009 (significant at 1% level) and the relation between rank of historical returns and crisis Roa is 0.013 (significant at 1% level).

As a whole, table 7 presents the robustness of our tests to the definition of the crisis term. It also presents higher relations of the rank of historical returns with crisis returns (raw returns, Roe and Roa), compared to tests with rank of residual efficiency.

6. Summary and Conclusions

The quality of firm management plays a major role in investment decisions. Measuring managerial ability gained a lot of attention in the last decade, in two aspects- with respect to the measures itself and the effect of managerial ability on firm performance. It might be that managerial ability is a missing factor in determining firm value. In this paper we attempt to solve the puzzle of the impact of managerial ability of firm performance during crisis terms. Thus, we focus on partial terms in the lifecycle of business, which have exogenous initiation in the way of crisis term. The focus of this paper is the recent major financial crisis of 2008.

Our main findings support our general hypothesis of positive relation between managerial ability and firm performance. Based on the measure of Demerjian, Lev and McVay (2012), which we test and reestablish with the recent 2008 data, we find positive relations between managerial ability and firm performance in three main measures- returns, resources and asymmetric information. We find positive correlation between managerial ability to firm returns, return on assets and return on

equity during crisis terms. During crisis term, firms with higher managerial ability utilize their resources, debt and capital expenditure in a more efficient way compared to lower managerial ability firms. The measures of information asymmetry, standard deviation of the returns, mean bid-ask spread and number of analysts that publish forecasts on the firm, also indicate the effect of managerial ability on lowering information asymmetry. Aside to managerial ability, the lower level of information asymmetry as indicated in our tests may be one of the reasons for the higher returns and the more efficient utilization of capital resources, as presented in this paper.

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Table 1

This table reports descriptive statistics for the dependent variables, main independent variable and control variables. The sample contains of 2344 (based on non-missing managerial ability variables, both residual of efficiency and historical return) firm year observations during the crisis year 2008. All the variables are defined in the Appendix.

Variables	25th percentile	Mean	Median	Standard Deviation	75th percentile	N
Dependent Variables						
Crisis_Ret	-0.581	-0.324	-0.354	0.368	-0.109	2344
Crisis_Roe	-0.012	0.113	0.133	0.429	0.275	2344
Crisis_Roa	-0.084	-0.024	0.028	0.188	0.082	2344
Crisis_Capex	0.028	0.144	0.063	0.276	0.142	2339
Crisis_Resources	0.032	0.217	0.159	0.521	0.334	2236
Crisis_Debt	-0.024	0.036	0	0.268	0.043	2236
Crisis_Ret_Std	0.539	0.782	0.703	0.368	0.912	2343
Crisis_Mean_Ba	0.002	0.014	0.003	0.024	0.016	2343
Crisis_Ln_Numest	0	1.328	1.386	1.048	2.197	2344
Main Independent Variable						
Resid_Efficiency	-0.202	-0.018	-0.048	0.248	0.146	2344
Historical_Ret	-1.059	0.273	-0.343	2.435	0.674	2344
Control Variables						
Lev	0.005	0.243	0.197	0.244	0.397	2336
Size	5.022	6.513	6.446	2.075	7.877	2343
Mtb	1.604	3.212	2.414	3.462	3.693	2342

Table 2

This table reports Pearson correlations among dependent variables, main independent variable and control variables. The sample consists of 4023 firm observations during the year of crisis, 2008. Dependent variables are calculated during the period of crisis, 2008 and the rest of the variables the year before the crisis, 2006. All the variables are defined in the Appendix. The significance is designated by '*** 'at 1%, '**' at 5% and '*' at 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Dependent Variables														
1.Crisis_Ret	1	0.253***	0.403***	0.023	0.186***	0.014	-0.473***	-0.302***	0.241***	-0.008	0.038*	-0.060***	0.217***	0.067***
2.Crisis_Roe		1	0.669***	0.173***	0.564***	-0.038*	-0.423***	-0.327***	0.296***	0.048**	0.149***	0.204***	0.359***	0.149***
3.Crisis_Roa			1	0.083***	0.394***	-0.019	-0.545***	-0.344***	0.281***	0.105***	0.191***	0.036*	0.320***	0.076***
4.Crisis_Capex				1	0.530***	0.277***	0.024	-0.085***	0.087***	0.024	0.079***	0.392***	0.125***	0.133***
5.Crisis_Resources					1	0.519***	-0.252***	-0.214***	0.234***	0.023	0.151***	0.249***	0.276***	0.201***
6.Crisis_Debt						1	-0.256	-0.031	0.046**	-0.024	0.106***	0.032	0.065***	0.094***
7.Crisis_Ret_Std							1	0.654***	-0.427***	0.053**	-0.095***	0.084***	-0.509***	-0.082***
8.Crisis_Mean_Ba								1	-0.554***	0.058***	-0.117***	-0.057***	-0.649***	-0.099***
9.Crisis_Ln_Numest									1	-0.099***	0.079***	0.069***	0.624***	0.152***
Main Independent Variable														
10.Resid_Efficiency										1	0.144***	-0.056***	-0.144***	0.014
11.Historical_Ret											1	-0.025	0.083***	0.166***
Control Variables														
12.Lev												1	0.169***	0.055***
13.Size													1	0.161***
14.Mtb														1

Table 3

This table reports the coefficient estimates of firm performance measures on managerial ability variables. Panel A of Table 1 reports the coefficient estimates on the rank of residual efficiency (*r_resid_efficiency*) managerial ability variable and Panel B of Table 1 reports the estimates on the historical return rank (*r_historical_ret*). The dependent variables are Crisis return (*Crisis*_Ret), Crisis return on equity (*Crisis_Roe*) and Crisis return on assets (*Crisis_Roa*). All dependent variables are measured in fiscal year 2008 and all independent variables are measured in fiscal year 2006. All regressions include industry fixed effects (based on Fama-French 48 industry classification). All variables are winsorized at 1% level. The definitions of the variables are described in Appendix. T-statistics are presented below the coefficients. The significance is designated by '*** 'at 1%, '**' at 5% and '*' at 10%.

	Dependent Variables					
	Crisis_Ret		*Crisis_Roe*		*Crisis_Roa*	
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A					
Intercept	-0.691***	-0.686***	-0.547***	-0.482***	-0.287***	-0.232***
R_Resid_Efficiency	0.005**	0.006**	0.019***	0.016***	0.012***	0.008***
Lev	-0.135***	-0.141***	0.269***	0.242***	-0.016	0.003
Size	0.044***	0.045***	0.076***	0.066***	0.035***	0.027***
Mtb	-0.0001	0.0003	0.011***	0.011***	0.0003	0.002**
Lag1_Ret		-0.025**				
Lag1_Roe				0.129***		
Lag1_Roa						0.199***
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
No of firms	2823	2648	2823	2823	2823	2823
R^2	0.097	0.104	0.228	0.261	0.178	0.275
	Panel B					
Intercept	-0.670***	-0.667***	-0.503***	-0.443***	-0.264***	-0.198***
R_Historical_Ret	0.006**	0.007***	0.024***	0.019***	0.014***	0.009***
Lev	-0.102***	-0.099***	0.214***	0.186***	-0.016	0.012
Size	0.040***	0.040***	0.061***	0.054***	0.026***	0.018***
Mtb	-0.0002	0.00001	0.011***	0.010***	0.0004	0.002**
Lag1_Ret		-0.028**				
Lag1_Roe				0.139***		
Lag1_Roa						0.294***
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
No of firms	2743	2722	2743	2740	2743	2740
R^2	0.108	0.112	0.284	0.317	0.235	0.359

Table 4

This table reports the coefficient estimates of investment on rank variables of managerial ability (rank of residual efficiency and rank historical return respectively). Investment is measured using Crisis capital expenditures (*Crisis*_Capex) defined in fiscal year 2008. All the other variables used in the analysis are calculated during fiscal year 2006. All regressions include industry fixed effects (based on Fama-French 48 industry classification). All variables are winsorized at 1% level. The definitions of the variables are described in Appendix. T-statistics are presented below the coefficients. The significance is designated by '*** 'at 1%, '**' at 5% and '*' at 10%.

	Dependent Variable *Crisis_Capex*	
Intercept	-0.040	-0.042
R_resid_efficiency	0.004**	
R_Historical_Ret		0.007***
Lev	0.399***	0.402***
Size	0.0004	-0.003
Mtb	0.009***	0.007***
Industry Fixed Effects	Yes	Yes
No of firms	2816	2733
R^2	0.303	0.309

Table 5

This table reports the coefficient estimates of resources on managerial ability. The dependent variables are Crisis resources (*Crisis_Resources*) and Crisis debt (*Crisis_Debt*) measured during fiscal year 2008. All the other variables used in the analysis are measured during fiscal year 2006. All regressions include industry fixed effects (based on Fama-French 48 industry classification). Variables are winsorized at 1% level. The definitions of the variables are described in Appendix. T-statistics are presented below the coefficients. The significance is designated by '*** 'at 1%, '**' at 5% and '*' at 10%.

	Crisis_Resources		*Crisis_Debt*					
				Operating Activities			*Operating Activities*	
			All	*High*	*Low*	*All*	*High*	*Low*
	(1)	(2)	(3)	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Intercept	-0.463***	-0.462***	0.046	0.039	0.063	0.001	-0.059	0.056
R_Resid_Efficiency	0.015***		-0.001	-0.006**	0.004**			
R_Historical_Ret		0.027***				0.008***	0.009***	0.006**
Lev	0.430***	0.423***	0.017	0.002	0.036	0.022	-0.007	0.052*
Size	0.057***	0.041***	0.005*	0.005	0.003	0.002	0.003	-0.0002
Mtb	0.019***	0.017***	0.006***	0.011***	0.001	0.005***	0.009***	-0.002
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of firms	2693	2621	2693	1374	1319	2621	1368	1253
R^2	0.203	0.229	0.039	0.068	0.037	0.041	0.065	0.051

Table 6

This table reports the coefficient estimates of information Asymmetry on the rank variables of managerial ability. Panel A of Table 6 reports the coefficient estimates of the rank of residual of efficiency (*R_Resid*_Efficiency) and Panel B of Table 6 the coefficient estimates on the rank of historical return variable (*R_Historical*_Ret). We report the estimates of Return Standard deviation (*Ret_Std*), Mean Bid/Ask Spread (*Mean_ba*) and the logarithm of 1 plus the number of analysts (*Ln*_Numest). T-statistics are presented below the coefficients and all regressions include industry fixed effects (based on Fama-French 48 industry classification). All variables are winsorized at 1%. The significance is designated by '*** 'at 1%, '**' at 5% and '*' at 10%.

	Dependent Variables					
	Ret_Std		*Mean_ba*		*Ln_Numest*	
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A			
Intercept	1.365***	0.841***	0.069***	0.023***	-1.193***	-0.372***
R_Resid_Efficiency	-0.004*	-0.002	-0.0002*	-0.0002*	0.006	0.001
Lev	0.242***	0.252***	0.005***	0.002	-0.025	-0.024
Size	-0.102***	-0.065***	-0.008***	-0.002***	0.325***	0.101***
Mtb	0.001	-0.004***	-0.0001	-0.0001**	0.014***	0.011***
Lag1_Ret_Std		0.689***				
Lag1_Mean_ba				2.142***		
Lag1_Ln_Numest						0.703***
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
No of firms	2822	2791	2822	2791	2823	2823
R^2	0.321	0.393	0.426	0.668	0.418	0.748
			Panel B			
Intercept	1.388***	0.869***	0.069***	0.023***	-1.251***	-0.390***
R_Historical_Ret	-0.014***	-0.013***	-0.0004***	-0.0003***	-0.004	0.013***
Lev	0.193***	0.199***	0.005***	0.001	-0.016	-0.032
Size	-0.095***	-0.059***	-0.007***	-0.002***	0.311***	0.084***
Mtb	0.001	-0.003*	0.00001	-0.0001	0.012***	0.008***
Lag1_Ret_Std		0.691***				
Lag1_Mean_ba				2.111***		
Lag1_Ln_Numest						0.729***
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
No of firms	2742	2739	2742	2739	2743	2743
R^2	0.355	0.420	0.438	0.681	0.399	0.763

Table 7

This table reports the coefficient estimates of robustness analysis on firm performance measures on managerial ability variables where you include lag values of return, volatility of return and agency index variable. Panel A of Table 1 reports the coefficient estimates on the rank of residual efficiency (*r_resid_efficiency*) managerial ability variable and Panel B of Table 1 reports the estimates on the historical return rank (*r_historical_ret*). The dependent variables are Crisis return (*Crisis*_Ret), Crisis return on equity (*Crisis_Roe*) and Crisis return on assets (*Crisis_Roa*). All dependent variables are measured in fiscal year 2008 and all independent variables are measured in fiscal year 2006. All regressions include industry fixed effects (based on Fama-French 48 industry classification). All variables are winsorized at 1% level. The definitions of the variables are described in Appendix. T-statistics are presented below the coefficients. The significance is designated by '*** 'at 1%, '**' at 5% and '*' at 10%.

	Dependent Variables		
	Crisis_Ret	*Crisis_Roe*	*Crisis_Roa*
	Panel A		
Intercept	-0.569***	-0.433***	-0.229***
R_Resid_Efficiency	0.004*	0.015***	0.009***
Lev	-0.139***	0.149***	-0.046***
Size	0.031***	0.036***	0.017***
Mtb	0.002	0.017***	0.004***
Lag1_Ret	-0.027***	0.005	0.009*
Lag2_Ret	-0.023***	-0.001	-0.003
Lag3_Ret	-0.005	0.001	-0.001
Volatility	-41.225***	-104.03***	-46.149***
Agecny_Index	0.068	0.502***	0.206***
Industry Fixed Effects	Yes	Yes	Yes
No of firms	2502	2502	2502
R^2	0.117	0.255	0.212
	Panel B		
Intercept	-0.529***	-0.422***	-0.219***
R_Historical_Ret	0.007***	0.021***	0.013***
Lev	-0.098***	0.167***	-0.036**
Size	0.029***	0.028***	0.011***
Mtb	0.002	0.017***	0.003***
Lag1_Ret	-0.028**	0.009	0.012**
Lag2_Ret	-0.029***	0.009	0.001
Lag3_Ret	-0.008*	-0.006	-0.004**
Volatility	-40.774***	-99.927***	-43.847***
Agecny_Index	-0.0004	0.416***	0.167***
Industry Fixed Effects	Yes	Yes	Yes
No of firms	2708	2708	2708
R^2	0.122	0.317	0.269

Appendix: Definitions of the Variables

Variables	Definitions
Dependent Variables:	
Crisis_Ret	The holding period return from August 1, 2007 to August 31, 2009
Crisis_Roe	Earnings before interest and taxes (Compustat item: EBIT) during fiscal year 2008 deflated by lagged net assets
Crisis_Roa	Income before extraordinary items (Compustat item: IB) during fiscal year 2008 deflated by lagged total assets
CRISIS_CAPEX	Capital expenditures (Compustat item: CAPX) in the fiscal year 2008 divided by lagged net assets (Compustat item: SEQ)
CRISIS_RESOURCES	Issuance of long term debt (Compustat item: DLTIS) minus reduction of long term debt (Compustat item: DLTR) plus operating activities during fiscal year 2008 deflated by lagged net assets (Compustat item: SEQ)
Crisis_Debt	Long term debt issuance (Compustat item: DLTIS) minus reduction of long term debt (Compustat item: DLTR) during fiscal year 2008 deflated by lagged net assets
Crisis_Ret_Std	Standard deviation of daily raw returns over the period of crisis from August 1, 2007 to August 31, 2009
Crisis_Mean_Ba	The mean of daily bid-ask spread (divided by the bid-ask midpoint) over the period of crisis from August 1, 2007 to August 31, 2009
Main Independent Variable:	
R_Resid_Efficiency	Rank residual based-measure using firm efficiency Tobit regression

$$Efficiency = \alpha_0+\alpha_1 SIZE+\alpha_2 MrktShare+\alpha_3 FreeCashFlow+\alpha_4 ln(age)+\alpha_5 \#Segments+\alpha_6 FCA+year$$

effects+ ε

R_Historical_Ret	Rank of the five-year historical value-weighted industry adjusted return (from year *t-5* to year *t-1*)
Control Variables:	
Lev	Book value of debt (Compustat items: DLC+DLTT) divided by book value of total assets (Compustat items: DLC+DLTT+CEQ) in the year prior to the financial crisis (fiscal year 2006)
Size	Natural logarithm of the firm's market value of equity (Compustat items: csho * prcc_f) in the year prior to the financial crisis (fiscal year 2006)
Mtb	The firm's market value (Compustat items: csho * prcc_f) divided by book value of equity (Compustat item: CEQ) in the year prior to the financial crisis (fiscal year 2006)