Capital Allocation and Timely Accounting Recognition of Economic Losses

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Last version: July 2005
This version: July 2006

* Corresponding author. We appreciate the comments of Ray Ball, Ryan Ball, Phil Berger, Christian Leuz, Andrew Stark, an anonymous referee, and seminar participants at Chinese University of Hong Kong, Cornell University, New York University's Accounting Summer Camp, The Global Issues in Accounting Conference at UNC Chapel Hill, Wharton, and the *Journal of Accounting Research* 2005 London Conference. We also appreciate the financial support of the Kenan-Flagler Business School, University of North Carolina at Chapel Hill, the Graduate School of Business at the University of Chicago, and the William Ladany Faculty Research Fund at the Graduate School of Business, the University of Chicago.

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Abstract:
We investigate the relation between firms' investment decisions and timely accounting recognition of economic losses (TLR). We build on extant theory which predicts that TLR curbs over-investment by managers faced with declining investment opportunities. We test whether managers in countries with relatively high TLR reduce investment spending more in response to a decline in investment opportunities than managers in countries with low TLR. We introduce TLR into a regression model based on Q-theory of optimal investment, extended to allow for differential investment responses to increasing versus decreasing investment opportunities. Using firm-level investment decisions spanning twenty five countries, we find that the total and incremental investment response to declining opportunities increases with TLR. Our results are robust to alternative estimates of TLR, alternative estimates of investment responses to changing investment opportunities, and to controls for important country-level, industry-level, and firm-level variables that may impact firms' investment decisions.

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1. Introduction

Economic theories posit that formal financial markets and associated institutions improve the capital allocation process.[1] Recent empirical research documents substantial cross-country variation in the efficiency with which firms allocate capital to investment opportunities and has begun to examine the influence of a country's institutions on the efficiency of capital allocation decisions.[2] An important, unexplored issue is how corporate investment decisions vary with accounting (i.e. measurement) methods.[3]

In this paper, we take a first step toward filling this gap. We investigate the relation between the timeliness of accounting recognition of economic losses (TLR) and corporate investment behavior. We use firm-level investment decisions spanning twenty five countries to test whether managers in countries with high TLR cut investment spending more heavily in response to a decline in investment opportunities than managers in countries with low TLR.[4]

Our focus on the relation between corporate investment behavior and TLR is motivated by extant accounting theory concerning the governance role of TLR. Specifically, arguments articulated in Ball (2001) and Ball and Shivakumar (2005) lead to the hypothesis that TLR curbs

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[1] Theories include, among others, that efficient market prices help investors distinguish good investments from bad ones (Durnev, Morck, and Yeung (2003)), that lenders and intermediaries screen out bad projects (e.g., Diamond (1984)), that pressures from external investors, as well as managerial ownership, encourage managers to pursue value-maximizing investment policies (Jensen (1986)), and that effective laws protecting minority investors facilitate the flow of finance to good projects (La Porta et al. (1997)) See also review papers by Levine (1997), Shleifer and Vishny (1997) and Bushman and Smith (2001).

[2] For example, see Love (2003), Himmelberg, Hubbard and Love (2001), Wurgler (2000), and Rajan and Zingales (1998).

[3] Wurgler (2000) and Rajan and Zingales (1998) investigate how capital allocation around the world varies with disclosure intensity as measured by the CIFAR index. However, we are not aware of any prior research into how capital allocation around the world varies with accounting (i.e. measurement) practices. See Bushman and Smith (2001) for a discussion of the governance and other channels through which accounting and disclosure practices may affect the efficiency of capital allocation decisions around the world and related research opportunities.

[4] In this paper, we examine timely loss recognition, not conservatism per se. Specifically, we investigate the absolute timeliness with which bad news is recognized into net income, not the *incremental* speed of recognizing bad news relative to good news (i.e., conditional conservatism). Given the strong empirical relation between these two measures, all of the results in the paper are robust to using measures of conditional conservatism.

over-investment by managers confronted with deteriorating investment opportunities.[5] TLR tightens debt covenants and/or triggers covenant violations sooner, facilitating timely transfers of decision rights from loss-making managers to lenders. The prospect of early intervention by lenders may discipline managers to avoid *ex ante* negative NPV investments and to more quickly abandon investments determined *ex post* to be negative NPV.[6,7]

TLR may constrain over-investment even in the absence of debt contracts if managers are penalized for reporting losses, for example, by adverse reputation effects, adverse compensation effects, increased threat of dismissal by the board, or increased threat of takeover. If managers know *ex ante* that economic losses will be required to be recognized during their tenure, they may be less likely to make negative-NPV investments. Furthermore, managers may be more inclined to abandon bad investments quickly due to the smaller incremental penalties from actual abandonment of losing projects, and the benefits of avoiding future losses.

A testable implication of the theory is that the impact of a decline in investment opportunities on investment spending increases with TLR. We test this implication of the theory using a cross-country specification, allowing us to exploit both documented evidence of substantial cross-country variation in TLR (e.g., Ball, Kothari and Robin (2000); Ball, Robin and Wu (2003), Bushman and Piotroski (2006)), and evidence suggesting that there is substantial cross-country variation in investment behavior to be explained (e.g., see Wurgler (2000)).

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[5] See also Watts and Zimmerman (1986), Basu (1997), Watts and Holthausen (2001) and Watts (2003).

[6] Several papers empirically examine the efficiency gains from accounting conservatism and/or timely loss recognition in the debt contracting process (e.g., Ahmed et al. (2002), Zhang (2004), Ball, Robin and Sadka (2005), Moerman (2006) and Vasvari (2006)). For example, Moerman (2006) finds no relation between timely gain recognition and bid-ask spreads of syndicated loans trading in the secondary market. Also, Asquith, Beatty and Weber (2005) report that performance pricing, under which interest rates vary as a function of accounting performance measures, is a recent feature of US debt contracts.

[7] In our main specifications, we measure investment as new investment flow only, implying a focus on the *ex-ante* disciplining effects of TLR. For robustness, we also employ an investment measure comprised of new investment flow net of sales of old assets. In this later case, the *ex-ante* and *ex-post* effects are aggregated in the measure of investment.

Our empirical specification builds on Q-theory, pioneered by Tobin (1969) and further developed by Hayashi (1982). This theory derives the optimal relation between investment decisions and investment opportunities as represented by marginal Q. We employ a variant of Q-theory that relates investment growth to changes in marginal Q, and allows the sensitivity of investment growth to changes in marginal Q to differ for positive changes in Q (increased investment opportunities) and negative changes in Q (decreased investment opportunities).[8] We measure investment growth at the firm level, use lagged industry stock returns to proxy for changes in marginal Q, and estimate TLR at the country level.

As predicted, we find a significant positive relation between the sensitivity of corporate investment to decreased investment opportunities and TLR. In addition, the incremental sensitivity of firms' capital investment decisions to decreased investment opportunities, over and above the sensitivity to increased investment opportunities, is higher in countries with accounting practices characterized by higher TLR. The latter analysis controls for omitted variables that symmetrically affect investment sensitivities to increased and decreased investment opportunities, and provides evidence consistent with the expected asymmetric effect of TLR.

Our results are robust to two different measures of TLR and to controls for important firm-level, industry-level and country-level factors that prior research suggests impact firms' responses to changes in investment opportunities. Our results based on capital expenditures are also robust to alternative investment sensitivity measures based on capital expenditures net of

[8] Specifications that regress changes in investment (logged growth) on changes in investment opportunities are commonly used in the investment literature. For example, see Abel and Eberly (2002) and Eberly (1997).

asset sales from Wurgler (2000). Wurgler's investment sensitivity measures are estimated out of sample, reducing concerns that our results are simply mechanistic or spurious in nature.[9]

Our results provide the first evidence of which we are aware of how accounting methods impact capital allocation decisions around the world. The significant association documented here between investment sensitivities and TLR is consistent with existing theory that TLR disciplines over-investment by managers confronted with declining investment opportunities. Our main results based on gross capital spending are consistent with the predicted *ex-ante* disciplinary effects of TLR (i.e. curbing investments in ex-ante negative NPV projects), while our robustness tests based on Wurgler's sensitivity measures capture disciplinary effects that are both the *ex-ante* and *ex-post* (i.e. exiting or downsizing projects determined to be losers).

Finally, we caution that the interpretation of our results is subject to two limitations. First, although the theory motivating our investigation predicts a causal effect of TLR on investment behavior, we cannot infer causality from our analysis. However, *ex ante*, our research design had the potential to cast meaningful doubt on the hypothesized governance role of TLR. In addition, a cross-country research design possesses the advantage that economically material variation in both investment and reporting behavior enhances our ability to find relations that would be difficult to detect in single country setting.

Second, care must be taken in drawing inferences from our results about the relation between TLR and investment *efficiency.* The positive observed relation between TLR and investment sensitivities is consistent with the predicted disciplinary effect of TLR on over-investment. However, this does not necessarily imply a relation between TLR and investment

[9] Specifically, Wurgler uses the United Nations' *General Industrial Statistics* panel data to estimate investment elasticities at the country level, while our measures of both TLR and investment behavior are estimated using recent accounting and returns data from Global Vantage.

efficiency as we cannot quantify precisely the optimal response to changing investment opportunities.

The remainder of the paper is organized as follows. Section 2 develops our main hypotheses and lays out the conceptual framework underlying the empirical specification. Section 3 describes the data, sample, and research design. Section 4 presents our main empirical analysis, and Section 5 demonstrates the robustness of our result by considering alternative measures of TLR and investment responses to changing opportunities. Section 6 presents conclusions, limitations and directions for future research.

2. Hypothesis development and conceptual framework

Section 2.1 develops our main hypotheses. Section 2.2 lays out essential aspects of the Q-theory of investment and the idea of asymmetric adjustment costs underlying our empirical analysis. Section 2.3 discusses our approach to controlling for institutions other than TLR that may impact investment behavior.

2.1 Hypothesis development

Extant theories posit that managers may have incentives to over-invest by pursuing ex-ante negative NPV projects, by resisting exit from losing projects, and by escalating financial commitment to losing projects. Such theories of over-investment include perquisite consumption and empire building (Jensen and Meckling (1976)), free cash flow problems (Jensen (1986)), pain avoidance (Jensen (1994)), signaling (Spence (1974)), and escalation of commitment (e.g.,

Staw (1981), Kanodia, Bushman and Dickhaut (1989), Heath (1995), Prendergast and Stole (1996), and Camerer and Weber (1999)), among others.[10,11]

Jensen (2000) emphasizes the importance of control systems to deal with over-investment via exit and downsizing. And prior accounting literature argues that TLR, in particular, may curb over-investment by opportunistic managers. (e.g., Watts and Zimmerman (1986), Basu (1997), Ball (2001) and Watts (2003)).[12,13] The literature develops roles for TLR related to both debt and equity markets.

The use of financial statement information in debt agreements is argued to create a demand for recognizing and reporting economic losses in a timely fashion (see recent empirical tests of this conjecture by Ball, Robin and Sadka (2005), Zhang (2005), Vasvari (2006) and Moerman (2006)). Specifically, TLR provides lenders with timely signals of deteriorating performance, tightening covenants and triggering covenant violations. As such, TLR practices accelerate transfers of decision rights to debt holders, allowing their early intervention to mitigate further destruction of wealth. The prospects of timely, intrusive intervention by lenders

[10] The importance of efficient exit for productivity and economic vitality in an economy has long been recognized (e.g., Schumpeter's (1942) notion of creative destruction).

[11] Our hypotheses do not rely on any *specific* theory of managers' incentives to over-invest.

[12] There is a literature that studies disciplining roles for conservatism within formal principal-agent settings (e.g., Antle and Lambert (1988), Kwon et al. (2001), Reichelstein (1997), Gigler and Hemmer (2001) and Dutta and Reichelstein (2005)).

[13] The persistent influence of conservatism on accounting practice suggests that it confers benefits to economic agents who use, prepare or regulate financial reports. For example, Basu (1997) notes that conditional conservatism has influenced accounting practice for at least six hundred years, and Sterling (1970, p. 256) stresses the highly influential impact of conservatism on the principles of valuation in accounting. Unconditional conservatism is defined as an accounting bias toward reporting low book values of stockholders equity (and hence, if clean surplus accounting is being followed, low average net income). Conditional conservatism is an equivalent bias conditional on firms experiencing contemporaneous economic losses, expressed in Basu (1997) as the "tendency to require a higher degree of verification for recognizing good news than bad news in financial statements." It is the conditional form of conservatism (i.e., timely loss recognition) that is the focus of our paper and that has the potential to improve contracting efficiency, as bias associated with unconditional conservatism can be unwound by market participants. See Ball and Shivakumar (2005) for a further discussion of this issue.

disciplines managers to *ex-ante* avoid negative net present value projects and to quickly shut down projects determined to be losers after project initiation.

It also is posited that incentive issues deriving from separation of ownership and control gives rise to demand for TLR (e.g., Ball (2001)). To the extent that managers have incentives to pursue negative NPV investments (from the shareholders' perspective) or are reluctant to exit losing projects, accounting rules that quickly identify and charge economic losses against reported income can play an important governance role. Charging economic losses against income reveals the situation to other stakeholders in a timely fashion. Such timely revelation of losses reduces incremental penalties to managers from actual abandonment of losing projects and constrains attempts to push realization of losses onto future generations of managers. Also, as in the case of debt contracts, the knowledge that failing projects will be revealed early creates *ex-ante* incentives for managers to avoid poor projects in the first place.

A testable implication of the governance theory of TLR described above is that investment sensitivity to a decline in investment opportunities increases with TLR. We test this implication in an international setting, focusing on variation in TLR practices by country. Hence, we test the following economic hypothesis:

Hypothesis: The sensitivity of corporate investment to a decrease in investment opportunities is higher in countries with relatively high TLR practices.

Our hypothesis focuses on variation in firms' TLR practices by country. This is motivated by evidence of material cross-country variation in TLR practices (e.g., Ball, Kothari and Robin (2000); Ball, Robin and Wu (2003), Bushman and Piotroski (2006)). Furthermore, Bushman and Piotroski's (2006) results suggest that TLR arises in countries where it can serve an important governance role, as evidenced by higher incremental timeliness of bad news recognition in countries characterized by high usage of public bonds, more diffuse equity

ownership structures, and strong public enforcement of securities law.[14] Similarly, Ball (2004) argues that by listing its stock on the New York Stock Exchange, Daimler bonded itself to publicly report its economic losses in a timely fashion. Following this listing, Daimler drastically reduced its workforce, closed several plants, and discarded several loss-making businesses, consistent with TLR practices improving corporate governance.

Section 2.2 Q-theory as a basis for estimating investment efficiency

Our analysis is based on a theory of optimal investment behavior in the absence of incentive problems. Following Tobin (1969) and Hayashi (1982), a large investment literature has been built on the foundation of Q-theory (see Hubbard (1998) for a well regarded review of the literature). Our paper builds on and extends this literature.

Q-theory is derived from the first order condition with respect to maximizing investment choice in a firm's dynamic optimization problem (see Hayashi (1982) or Hubbard (1998) for details). This first order condition equates the marginal adjustment cost of investment to the shadow price of capital, denoted by Q. That is, the first order condition is

$$Q_t = \Phi_I(I_t, K_t), \qquad (1)$$

where I_t is investment for period t, K_t is total capital in place at the beginning of period t, and Φ_I is the partial derivative of the adjustment cost function with respect to investment.[15] The adjustment cost function embeds purchase costs incurred when the firm buys capital or the price received when the firm sells capital, as well as nonnegative costs of physical adjustment which

[14] Although Bushman and Piotroski (2006) focus on the *incremental* timeliness of bad news recognition rather than TLR, per se, cross-country variation in TLR is driven by variation in incremental timeliness of bad news recognition.

[15] More precisely, Q_t is the Lagrange multiplier on the capital evolution constraint, $K_{t+1} = I_t + (1-\delta)K_t$, where δ is depreciation. The notation Q often refers to average Q, or market value of assets scaled by replacement cost. In (1), Q is marginal Q, or the present value of expected future marginal returns to an additional unit of capital. Hayashi (1982), Abel and Eberly (1994) and others show conditions where average Q = marginal Q.

may include a fixed cost of investment that is independent of the level of investment (see e.g., Abel and Eberly (1994)). A common assumption is that of quadratic adjustment costs, or:

$$\Phi(I_t, K_t) = I_t + \frac{\alpha}{2}\left(\frac{I_t}{K_t} - a\right)^2 K_t \quad , \quad \alpha > 0 \quad , \tag{2}$$

where a and α are exogenous parameters. Taking the derivative of (2) with respect to I_t and substituting into (1) yields

$$\frac{I_t}{K_t} = a + \frac{1}{\alpha}(Q - 1) \ . \tag{3}$$

We follow Fama (1981), Barro (1990) and Lamont (2000) and employ a variant of equation (3) expressed in changes rather than in levels. The change specification serves to remove firm fixed-effects and allows us to use lagged stock returns to proxy for changes in Q.[16] This specification, which we extend in our setting, is written as:

$$\ln(I_t / I_{t-1}) = A + \lambda \ln(Q_t / Q_{t-1}) \, . \tag{4}$$

Note from equation (4) that logged investment growth is a linear function of logged change in Q, implying that the investment response is symmetric to increases or decreases in investment opportunities. However, our hypothesis that TLR only influences investment response to decreases in investment opportunities presumes non-linearity in the relation between investment and change in investment opportunities depending on the sign of the change..

A number of empirical papers question the hypothesis of a linear relation between investment behavior and investment opportunities (see Abel and Eberly (2002), Doms and Dunne (1998), and Eberly (1997), among others). Extant theory considers a range of adjustment cost specifications that allow for the existence of fixed costs of investment (Abel and Eberly

[16] Some papers use changes in *I*/K rather than changes in *I* (see e.g. Abel and Eberly (2002) and Eberly (1997)). Also, a number of papers use stock returns to proxy for change in marginal Q ((see for example Fama (1989), Barro (1990), Morck, Shleifer and Vishny (1990), and Lamont (2000)).

(1994)), irreversibility of investment (Dixit and Pindyck (1994)), or simply costly reversibility of investment (Abel and Eberly (1994, 1996)).[17] While such alternative specifications lead to complex functional relations between investment and investment opportunities, the precise functional form has yet to be determined in the literature, and is beyond the scope of this paper. However, any study of investment behavior needs to be cognizant of the effect of non-linearity on their estimations.

We assume that the true relation between investment and changes in investment opportunities can be approximated with a piecewise linear function that allows slopes on expanding and contracting opportunities to differ.[18] In particular, we modify equation (4) to yield our baseline model,

$$\ln(I_t / I_{t-1}) = A + \beta NEG + \lambda_1 \ln(Q_t / Q_{t-1}) + \lambda_2 NEG * \ln(Q_t / Q_{t-1}), \quad (5)$$

where NEG is a dummy variable = 1 when investment opportunities are shrinking and zero otherwise. Thus, λ_1 captures the investment response to an expansion of investment opportunities, λ_2 captures the incremental response to decreased investment opportunities relative to increased opportunities, and $\lambda_1+\lambda_2$ captures the overall investment response to decreased opportunities.

Finally, in this framework, the influence of TLR practices is introduced by extending equation (5) to yield:

$$\ln(I_t / I_{t-1}) = A + \beta_1 NEG + \beta_2 TLR + \lambda_1 \ln(Q_t / Q_{t-1}) + \lambda_2 \ln(Q_t / Q_{t-1}) * TLR + \lambda_3 NEG * \ln(Q_t / Q_{t-1}) + \lambda_4 NEG * \ln(Q_t / Q_{t-1}) * TLR, \quad (6)$$

[17] Irreversibility and costly reversibility of investment are often attributed to asset specificity restricting the market for used capital or adverse selection in the market for used capital.

[18] Moreover, as discussed below, our empirical specification includes firm-specific book-to-market ratios to control (in the spirit of average Q) for the fact that non-linear investment responses to changes in investment opportunities may depend on the level of investment opportunities (see Barnett and Sakellaris (1998)).

Our economic hypothesis from section 2.1 can now be restated in terms of estimates from model 6:

Empirical Hypotheses:

a) The sensitivity of corporate investment to a decrease in investment opportunities is higher in countries with relatively high TLR practices: $\lambda_2 + \lambda_4 > 0$

b) The *incremental* sensitivity of corporate investment to a decrease in investment opportunities (over and above the sensitivity to an increase in investment opportunities) is higher in countries with relatively high TLR practices: $\lambda_4 > 0$

Section 2.3 Institutions other than TLR that impact investment and other controls

Wurgler (2000), among others, shows that primitive legal, financial and economic institutions, other than accounting practices, impact firms' responses to changes in investment opportunities. Omission of these institutions, if correlated with TLR, could generate a spurious relation between TLR and investment decisions. We extend equation (6) to incorporate control variables, denoted as X:

$$\ln(I_t / I_{t-1}) = A + \beta_1 NEG + \beta_2 TLR + \beta_3 X + \lambda_1 \ln(Q_t / Q_{t-1}) + \lambda_2 \ln(Q_t / Q_{t-1}) * TLR + \lambda_3 \ln(Q_t / Q_{t-1}) * X + \lambda_4 NEG * \ln(Q_t / Q_{t-1}) + \lambda_5 NEG * \ln(Q_t / Q_{t-1}) * TLR + \lambda_6 NEG * \ln(Q_t / Q_{t-1}) * X. \quad (7)$$

In this equation, λ_3 captures the symmetric effect of X on investment sensitivity to changing investment opportunities, regardless of whether investment opportunities have expanded or contracted. In contrast, λ_6 captures the incremental effect of X on investment sensitivity to deteriorating investment opportunities, and $\lambda_3 + \lambda_6$ captures the total effect of X on investment sensitivity to deteriorating opportunities. For example, suppose X impacts investment sensitivities symmetrically regardless of the sign of the change in investment opportunities. In this case, $\lambda_3 = \eta \neq 0$ and $\lambda_6 = 0$. In contrast, if X impacts the sensitivity of investment to decreased opportunities, yet has no impact on the sensitivity of investment to increased opportunities, then

λ_3=0 and λ_6= η. And if X impacts the sensitivity of investment to increased opportunities while having no impact on the overall sensitivity of investment to decreased opportunities, then $\lambda_3 = \eta$ and $\lambda_6 = -\eta$ (i.e., $\lambda_3 + \lambda_6 = 0$). As such, our research design allows institutions to impact investment behavior differentially depending on whether investment opportunities are expanding or contracting.

To mitigate concerns about omitted correlated variables, we control for four country level institutions in our baseline model, including a proxy for financial development (FD_k), measured as the sum of a country's stock market capitalization, public bond market capitalization, and private bond market capitalization, as a percentage of gross domestic product as of 1992, per capita GDP in 1992 (GDP_k), investor rights ($RIGHTS_k$), measured as the product of the LaPorta et al.(1998) measures of domestic "rule of law" and the total number of shareholder and creditor rights identified in the country's legal code, and a measure of the importance of state-owned enterprises to the economy's total output (SOE_k). Based on prior studies, these country-level institutions can reasonably be expected to be correlated with TLR (e.g. Bushman and Piotroski (2006)), and to affect investment sensitivities to changes in investment opportunities. [19,20] For example, financial development and investor rights may promote investment sensitivities through channels such as lower financing frictions (more developed capital markets, less adverse selection, etc.) and stronger oversight of managers (facilitated by stronger investor rights). And state ownership of enterprise may affect investment sensitivities because the investment policies

[19] The selection of our baseline control variables is based on a significant body of cross-country research into the determinants of investment behavior. See for example, Rajan and Zingales (1998), Wurgler (2000), Himmelberg, Hubbard and Love (2002), Love (2003) and Biddle and Hilary (2006), among others, for evidence of an overall effect of these institutions on investment decisions. Per capita GDP is included as a catchall, in the sense that prior research has shown that institutional development of a country along many dimensions is positively correlated with wealth levels. Note that the Appendix describes all of our variables and their sources.

[20] For completeness, in section 4.2 we consider additional country-level institutions including legal origin and measures of the regulatory burden placed on firms.

of firms with high levels of state ownership are likely sensitive to the incentives of politicians. The survival of a political regime often depends on its ability to promote employment opportunities for its citizens. Hence, investment sensitivities to decreased investment opportunities may be dampened by state ownership to preserve employment levels.

Certain factors, such as asset specificity and production technology, are likely to differ substantially across industries regardless of country and can directly impact investment adjustment costs (e.g., Dixit and Pindyck (1994), Abel and Eberly (1994, 1996)). To control for industry, we allow both intercepts and slopes on changes in investment opportunities to differ by industry.

We also include two firm-specific controls in our baseline regressions, the firm's book-to-market ratio and market capitalization (i.e. firm size) at the end of the preceding fiscal year. The inclusion of the book-to-market ratio has several important justifications. First, to the extent that the relation between the growth in investment spending and changes in Q is non-linear, it is important to control for the *level* of investment opportunities to condition investment responses to changes in opportunities (see Barnett and Sakellaris (1998)). In this regard, the book-to-market ratio can be interpreted as a control for the level of investment opportunities in the spirit of average Q. Second, Anderson and Garcia-Feijoo (2005), Fama and French (2005), Fama and French (1995) and others document that investment growth (and profitability) are strongly related to the book-to-market ratio. Although we use a change specification to remove firm fixed-effects, the firm's book-to-market ratio can control for firm-level differences in unconditional conservatism (see discussion in Roychowdhury and Watts (2006)). Finally, firm

size is included to control for differing stages in firms' life cycles. For example, young firm respond differently than mature firms to a given change in investment opportunities.[21]

3. Data and research design

To apply the framework described above, we need to measure three key theoretical constructs: investment growth, changes in investment opportunities (i.e., changes in marginal *Q*), and timely loss recognition practices. We also need to specify an empirical analog to equation (7). The following sections address these topics.

3.1 Measuring investment growth and change in marginal Q

We measure investment growth of firm i (in industry j, country k) in year t as the log of the ratio of current to lagged additions to fixed assets (Global Vantage data item 145), denoted $\log(I_{i,t}/I_{i,t-1})$. This growth variable captures the firm's decision to increase or decrease investment spending in year t, but does not reflect the decision to withdraw capital from losing projects. The use of investment growth, absent the effects of disinvestment, is common in the investment literature using U.S. data.[22] More importantly, this formulation is the most powerful test of the *ex ante* investment benefits of timely loss recognition practices by measuring actual investment outlays in the face of changing investment opportunities.

Changes in marginal Q (i.e., changes in investment opportunities) are estimated using lagged industry stock returns. As discussed earlier, a number of papers use stock returns to

[21] In section 4.2, we expand the model by including three additional firm-level controls: lagged investment growth, change in profitability, and leverage.

[22] An exception is Abel and Eberly (2002). Global Vantage does not provide a measure of disinvestment, such as proceeds from the sale of fixed assets. Given the importance of disinvestment in the theoretical investment literature, we examine the robustness of our primary results using an alternative characterization of investment (in section 5.2) that measures new capital investment net of sales of capital.

proxy for change in marginal *Q*, including Fama (1981), Morck, Shleifer and Vishny (1990), Blanchard, Rhee, and Summers (1993), Barro (1990) and Lamont (2000). We define the change in marginal Q as the log of one plus lagged industry returns ($RET_{j,k,t-1}$) where lagged industry returns are measured as the average holding period stock return, including dividends, for firms in industry j in country k, over the firm's preceding fiscal year (i.e., year t-1). Industries are defined on the basis of Fama and French (1997) industries. A one year lag for returns is motivated by Lamont (2000) who, exploiting investment plan data, provides evidence of such a time lag between change in investment opportunities and investment response.[23] Because of this lagged response, investment and lagged stock returns positively co-vary. This positive covariance can arise because when discount rates fall, stock prices rise (i.e., the discounted sum of future cash flows rises) and firms subsequently increase investment in response to the falling hurdle rate. A similar argument holds when discount rates increase.[24] This positive covariance also can arise because when expected profitability of investment opportunities increases (decreases), both investment spending and stock prices rise (fall).

Our investment and stock price data are gathered through the Global Vantage Industrial / Commercial and Issues file, respectively. Due to the need to construct lagged returns and investment growth variables, our final sample is limited to investment activity over the nine-year period 1995 to 2003. Consistent with prior research on investment behavior, we exclude financial service firms (i.e., SIC code industries 6000 through 6999) from our analysis. In order to eliminate the influence of outliers and errors in Global Vantage's data, we exclude the top and bottom one percent of investment growth and firm-level return realizations each year.

[23] Similarly, Barro (1990) shows that lagged returns dominate changes in average Q (measured as the market value of assets divided by the replacement cost of assets) when both are included in investment models.
[24] Industry returns are used to capture changes in these discount rates. However, our primary results with respect to TLR are robust to the use of lagged firm-specific returns as our proxy for changes in marginal Q.

3.2 Measurement of timely loss recognition in accounting earnings

We use cross-country estimates of TLR practices from Bushman and Piotroski (2006). Following Ball, Kothari and Robin (2000), Bushman and Piotroski create country-level estimates of TLR practices by estimating the following non-linear earnings-return (Basu (1997)) model by country using pooled, cross-sectional data over the period 1992 to 2003:

$$NI_{i,t} = \alpha + \beta_1 D_{i,t} + \beta_2 R_{i,t} + \beta_3 D_{i,t} * R_{i,t} + \varepsilon_{i,t} \quad (8)$$

where $NI_{i,t}$ is annual earnings, $R_{i,t}$ is the annual holding period stock return over the firm's fiscal year, and $D_{i,t}$ is an indicator variable equal to one if $R_{i,t}$ is less than zero, zero otherwise.[25] β_2 measures the timeliness with which economic gains are recognized in earnings in country k. Our measure of timely loss recognition, TLR_k, is defined as the sum of estimated coefficients $\beta_2 + \beta_3$ from Bushman and Piotroski's estimations for country k. Given that TLR is estimated using observable accounting realizations, these measures reflect realized accounting practices in a country, not strictly the effect of accounting standards *per se*.[26]

Our decision to measure TLR as a country level attribute reflects both pragmatic and conceptual considerations. First, Ball, Kothari and Robin (2000), among others, show that country-level institutions lead to both significant and economically material differences in average accounting practices across economies. Given the first-order role that institutions play in shaping financial reporting incentives, variation in TLR across firms or industries within a

[25] It is important to note that (8) regresses firm earnings on contemporaneous firm returns while our investment behavior specification (equation (10) below) regresses investment growth on lagged industry returns.

[26] We focus on non-linear earnings-return estimates of TLR practices in our main analysis for parsimony. As discussed in section 5, our results are robust to an alternative measure of TLR based on the non-linear accruals-cash flow model of Ball and Shivakumar (2005). Previous versions of the paper carried both measures throughout the analysis.

given country is likely to be small vis-à-vis variation across economies, making the detection of investment-related effects at the firm or industry level within a country challenging.

Conceptualize that the TLR practices of firm i, in industry j, in country k consist of three components: a systematic, country component that captures the general TLR tendency of all firms in the country; an industry-specific component driven by an industry's specific production function; and a firm-specific component driven by idiosyncratic incentives. Under these conditions, a given firm's observed TLR reporting practice can be viewed as:

$$TLR_{i,j,k} = TLR_k + TLR_j + TLR_i \quad (9)$$

If TLR_i and TLR_j in (9) are not perfectly correlated across firms and industries within a country, then these components will (at least partially) diversify away in a pooled, cross-sectional estimation, producing an estimate of only TLR_k. Prior research, including Bushman and Piotroski (2006), pools all firms and industries within a country for all available years to achieve maximum power in estimating TLR practices. What these country-level estimations capture, in the presence of diversification, is an estimate of the first-order, country component of financial reporting practices. Thus, by measuring TLR as a country-level institution, our research design examines relations between the general tendency towards timely loss recognition practices in a country and firm-level investment decisions. Equally important, given our estimates of TLR_k, our tests do not provide evidence on whether industry or firm-specific components of TLR have an incremental effect on firm-level investment behavior beyond those generated by economy-level practices. Such an analysis is beyond the scope this paper, yet represents an interesting path for future research.[27]

[27] However, as discussed earlier, we control for industry-specific variation in TLR practices by allowing for industry intercept and slope effects in our investment model and control for the firm-specific component of TLR by both removing firm fixed-effects from our measure of investment and including controls for the firm's size and book-to-market ratio.

Second, pragmatically, estimating TLR at the firm or industry level is challenging. Firm-level estimates require a fairly long time-series of data and a sufficient incidence of both positive and negative returns to reliably estimate parameter values in equation (8). Such a time series of data is fundamentally limited in a cross-country setting. Similarly, industry-level estimates also require a sufficient number of firm-years to estimate parameter values; outside of the largest economies, few countries have sufficient cross-sectional data within a given industry to reliably estimate TLR practices.

3.3 Empirical implementation of investment model

Given our proxies for investment growth, change in marginal Q, TLR, and other firm-specific and country-level attributes, our primary tests involve estimating alternative specifications of the following cross-sectional model:

$$\begin{aligned}\log(I_{i,,t} / I_{i,t-1}) = \alpha + \sum_{j=1}^{43}\alpha_j Ind_j + \beta_1 NEG_{jk,t-1} + \beta_2 TLR_k + \beta_3 \log(1+BM_{i,t-1}) + \beta_4 \log(MVE_{i,t-1}) + \beta_5 FD_k + \\ \beta_6 GDP_k + \beta_7 RIGHTS_k + \beta_8 SOE_k + \lambda_1 RET_{jk,t-1} + \sum_{j=1}^{43}\gamma_j Ind_j * RET_{j,k,t-1} + \lambda_2 TLR_k * RET_{jk,t-1} \\ + \lambda_3 \log(1+BM_{i,t-1}) * RET_{jk,t-1} + \lambda_4 \log(MVE_{i,t-1}) * RET_{jk,t-1} + \lambda_5 FD_k * RET_{jk,t-1} + \lambda_6 GDP_k * RET_{jk,t-1} \\ + {}_7 RIGHTS_k * RET_{jk,t-1} + \lambda_8 SOE_k * RET_{jk,t-1} + \lambda_9 NEG_{jk,t-1} * RET_{jk,t-1} + \lambda_{10} TLR_k * NEG_{jk,t-1} * RET_{jk,t-1} \\ + \lambda_{11} \log(1+BM_{i,t-1}) * NEG_{jk,t-1} * RET_{jk,t-1} + \sum_{j=1}^{43}\omega_j Ind_j * NEG_{j,k,t-1} * RET_{j,k,t-1} \\ + \lambda_{12} \log(MVE_{i,t-1}) * NEG_{jk,t-1} * RET_{jk,t-1} + \lambda_{13} FD_k * NEG_{jk,t-1} * RET_{jk,t-1} + \lambda_{14} GDP_k * NEG_{jk,t-1} * RET_{jk,t-1} \\ + \lambda_{15} RIGHTS_k * NEG_{jk,t-1} * RET_{jk,t-1} + \lambda_{16} SOE_k * NEG_{jk,t-1} * RET_{jk,t-1} + \varepsilon_{i,t} \qquad (10)\end{aligned}$$

This model (i.e., equation (10)) is the empirical analog of equation (7) presented earlier in section 2. In this model, $\log(I_{i,t} / I_{i,t-1})$ is the investment growth rate of firm i (in industry j in country k), $RET_{j,k,t-1}$ is the log of one plus the lagged return of industry j in country k, and $NEG_{j,k,t-1}$ is an indicator variable equal to one if $RET_{j,k,t-1}$ is less than zero, zero otherwise. Ind_j is an indicator variable equal to one when firm i is a member of industry j, zero otherwise. Finally,

TLR_k is our country-level estimate of timely loss recognition practices, FD_k is a measure of the development of country k's debt and equity markets, GDP_k is per capita gross domestic product in country k, $RIGHTS_k$ measures the level of investor protections in country k and SOE_k measures the extent of state ownership of economic enterprises in country k. All variables definitions, and their sources, are outlined are the Appendix.

As discussed in our theoretical development section, this model allows for the response to improving and deteriorating investment opportunities to vary by each of these firm-specific, industry-specific, and country-level characteristics. For example, to the extent that certain industries have frictions that slow the flow of capital to new investment opportunities, or utilize production factors that magnify the irreversibility of capital problem, the interaction of industry dummies with $RET_{j,k,t-1}$ and $NEG_{j,k,t-1}*RET_{j,k,t-1}$ in this model will capture these systematic differences. Similar arguments hold for the remaining firm-specific and institutional variables.

In order to mitigate the effects of reverse causality, our institutional variables are measured either in advance of or concurrent with firm-level investment behavior (given data constraints). For example, firm size and book-to-market ratios are measured at the end of the preceding fiscal year, per capita GDP and our measures debt market, equity market and aggregate financial development are measured in 1992, shareholder rights, creditor rights and state-owned enterprises are measured in 1995, and TLR_k is measured over an eleven year period starting two years before our investment sample period.

Our main empirical predictions are that $\lambda_2 + \lambda_{10} > 0$ (hypothesis a) and $\lambda_{10} > 0$ (hypothesis b). Our test for a positive *incremental* sensitivity ($\lambda_{10}>0$) is motivated by two issues. First, theory predicts that TLR increases investment sensitivities to declining investment opportunities, but does not predict that TLR increases investment sensitivities to increasing

investment opportunities. Hence, hypothesis b predicts that TLR will have a more dramatic positive effect on investment sensitivities to decreasing investment opportunities than on investment sensitivities to increasing opportunities. Second, a variety of unspecified country-level factors potentially correlated with TLR may influence the sensitivity of investment to both expanding and deteriorating investment opportunities in a similar fashion. In principle, taking the difference in these investment sensitivities ($\lambda_2 + \lambda_{10} - \lambda_2 = \lambda_{10}$) controls for such factors, reducing the threat of correlated omitted variables.

Our test of $\lambda_2 + \lambda_{10} > 0$ is motivated by our ultimate interest in whether the total investment sensitivity to declining opportunities increases with TLR. It is possible that $\lambda_{10} > 0$, yet $\lambda_2 + \lambda_{10} \leq 0$, because $\lambda_2 \leq -\lambda_{10}$. For example, TLR may reduce investment sensitivities to expanding investment opportunities due to managerial loss aversion, with no effect on investment sensitivity to declining opportunities. In this case, $\lambda_2 < 0$ and $\lambda_2 + \lambda_{10} = 0$, so that $\lambda_{10} = -\lambda_2 > 0$. Testing whether $\lambda_2 + \lambda_{10} > 0$ provides evidence of whether the total investment sensitivity to declining opportunities increases with TLR, consistent with the hypothesized governance role of TLR. This test, however, is more likely to suffer from omitted correlated variables than the test of $\lambda_{10} > 0$. Results that both $\lambda_{10} > 0$ and $\lambda_2 + \lambda_{10} > 0$ provide complementary evidence for the hypothesized governance role of TLR that is stronger than either test alone.

Finally, to mitigate concerns about cross-sectional dependence in our data, all of our investment models are estimated annually. Each table presents average coefficients from these nine annual estimations, and reported p-values and interpretations of statistical significance are based on the empirically-derived distribution of these annual coefficients.

3.4 Sample and descriptive statistics

Our sample consists of 43,210 firm-year observations drawn from 25 countries with sufficient investment, lagged stock price, accounting and institutional data to estimate our investment models over the period 1995 to 2003. To be included in the sample, we require that a given country must have a least 100 firm-year observations over the sample period. Table 1 presents descriptive statistics for our sample.

The average (median) firm-level investment growth rate is 32 percent (three percent) annually, while the 5th percentile and 95th percentiles are -75 percent and 230 percent, respectively.[28] The mean (median) lagged annual industry return in a specific country is 5.5% (3.7%) annually in our sample. Consistent with the arguments in Cochrane (1991) and Lamont (2000), among others, investment growth and lagged industry returns are positively correlated (pearson and spearman correlations of 0.142 and 0.165, respectively; not tabulated for parsimony). As previously documented, TLR_k is large (mean and median of 0.278 and 0.307, respectively) relative to the timeliness of gain recognition (mean and median of 0.006 and -0.005, respectively), and more variable (standard deviation of 0.085 for TLR_k versus 0.019 for TGR_k). This is consistent with the typical delay around the world in recognizing economic gains in accounting earnings, and with considerable variation in conditional conservatism. Finally, consistent with prior cross-country research, country-level institutions display considerable cross-sectional variation in this sample with the exception of TGR.

4 Empirical results

4.1 Baseline estimations

[28] Consistent with prior research, the right skewness in the distribution of firm-specific growth rates highlights the empirical need to log our investment variables.

Table 2 presents our main results. The first set of columns presents average coefficients from estimations of equation (10) using raw data. The second set of columns present average coefficients from estimations of equation (10) where country-level institutions have been fractionally ranked. For ease of coefficient interpretation, all raw independent variables are mean-adjusted annually, and all ranked institutions are centered around zero (uniform distribution of [-0.5,0.5]). Finally, given that firms domiciled in the United States account for nearly one-half of our sample firm-year observations, we also re-estimate all models after excluding U.S. firms. All estimations of equation (10) are presented for completeness.

The results in Table 2 support our two main hypotheses. Consistent with hypothesis a, the results indicate that $\lambda_2 + \lambda_{10} > 0$ (significant at the 0.01 level), suggesting that the *total* sensitivity of investment spending to a decline in investment opportunities increases with TLR. And consistent with hypothesis b, the results indicate that $\lambda_{10} > 0$ (.01 level), suggesting that the *incremental* sensitivity of investment spending to a decline in investment opportunities (over and above the sensitivity to an increase in investment opportunities) increases with TLR. These results hold across the full sample and the non-U.S. sample, regardless of whether country-level institutions are measured using raw or ranked data, after controlling for industry, firm-level book to market ratio and market cap, and country-level financial development, GDP, investor rights, and state ownership of enterprises. These results are particularly striking given that our significance tests are based on only nine annual cross-sectional estimations.

In contrast, the sensitivity of investment spending to an *increase* in investment opportunities does not vary significantly with TLR (i.e., λ_2 not significantly different from zero). Collectively these results are consistent with the hypothesized asymmetric governance role of timely loss recognition.

In terms of other institutional variables, we find that $\lambda_6 > 0$ ($p < .10$ in all models), suggesting that the sensitivity of investment spending to changes in investment opportunities increases significantly with per capita wealth (GDP). In addition, our subset of results based on ranked institutional variables indicate that $\lambda_7 > 0$ at conventional levels, providing some evidence that investment sensitivities to changing investment opportunities increase with investor rights (RIGHTS). The relations of GDP and RIGHTS with investment sensitivities appear to be symmetric for positive and negative changes in investment opportunities, as evidenced by the insignificance of λ_{14} and λ_{15}, respectively.

The results in Table 2 also indicate that $\lambda_{16} < 0$, suggesting an asymmetric relation between state ownership of enterprise (SOE) and investment sensitivities to increasing vs. decreasing investment opportunities. Specifically, SOE is significantly negatively related to the incremental sensitivity of investment to declining investment opportunities (relative to sensitivity of investment to expanding investment opportunities). One interpretation of this result is that state-owned firms are reluctant to reduce investment spending when investment opportunities contract in order to promote political agendas (e.g. full employment), as we conjectured earlier.

Finally, the results in Table 2 fail to document a significant relation between investment sensitivities to changing investment opportunities and the level of financial development in the country, firm size or firm book-to-market ratios.[29]

4.2 Refinements to our baseline estimations

4.2.1 Separate impact of debt and equity markets on investment behavior

[29] We find that when industry controls are *not* included in the estimation, investment responses are decreasing in the firm's book-to-market ratio. Together, the two sets of estimations suggest that our industry controls are effectively capturing cross-sectional variation in growth opportunities, which is reasonable given that investment opportunities are likely to be primarily an industry-level attribute.

Recent research by Bushman and Piotroski (2006) and Ball, Robin and Sadka (2006) shows that incentives for TLR practices are stronger in economies with well-developed debt markets. Given that our current measure of financial development, FD_k, is defined as the sum of the market value of the country's public debt market, private debt market, and equity market (as of 1992), scaled by the country's gross domestic product, it is possible that our measure of TLR is proxying for the development of the country's debt markets.

To mitigate this concern, we re-estimate equation (10) after splitting FD_k into its two primary components: development of equity markets (FD_EQ_k) and development of debt markets (FD_DEBT_k). Table 3 presents the results of these estimations. For parsimony, we only present average coefficients for our two financial development variables and TLR interacted with RET (lagged industry returns in the country) and NEG*RET (lagged negative industry returns in the country). These estimations reveal that separate inclusion of these financial development variables does not impact our inferences with respect to TLR. Moreover, similar to our baseline results, financial development is not significantly related to investment sensitivities after controlling for investor rights, per capita wealth and the extent of state-owned enterprises.

4.2.2 Separate impact of shareholder and creditor rights on investment behavior

Wurgler (2000) documents that investment sensitivities are increasing in the level of investor protection in a country, consistent with a wide body of literature examining the impact of corporate governance and legal protection on economic behavior. In particular, managers held accountable for their actions are less likely to squander or expropriate investor funds, resulting in greater value maximizing behavior. As discussed earlier, incentives for the timely accounting recognition of economic losses are increasing in the general level of investor

protection in an economy. As a result, it is paramount to control for investor protections in our study.

Our primary measure of investor protection, RIGHTS, is as defined in Wurgler (2000), and combines both shareholder and creditor protections. For robustness, we split RIGHTS into a measure of shareholder rights (SHR_RTS) and creditor rights (CR_RTS), and re-estimate equation (10) using these disaggregated measures. Both measures are taken from LaPorta et al. (1998), and are widely used in cross-country research. Table 4 presents select average coefficients from these estimations.

Consistent with the preceding tables, the significant positive relation between TLR and investment sensitivity to deteriorating investment opportunities continues. Moreover, splitting RIGHTS into its two primitive components reveals an interesting pattern – the measure of shareholder / anti-director rights is significantly positively related to the sensitivity with which firms respond to changing investment opportunities, while the measure of creditor rights is not. And, unlike TLR, the positive influence of shareholder rights on investment efficiency exists in the presence of both expanding and contracting investment opportunities, with the disciplining effect in the presence of deteriorating opportunities being marginally stronger in several specifications (as indicated by the marginally positive coefficient on the downside term in several of the estimations). Together, these estimations suggest that the relations of timely loss recognition and shareholder rights to investment sensitivities are distinct and incremental to each other.[30]

4.2.3 Influence of the country's general information environment on investment behavior

[30] We also controlled for the effects of general investor protections using the country's legal origin. Inferences using legal origin are similar to those gained using RIGHTS in the baseline model.

TLR represents only one aspect of a country's financial reporting regime. The same legal and political institutions that create a demand for TLR also may create a demand for more transparent financial reports along both measurement and disclosure dimensions (e.g., Leuz, Nanda and Wysocki, 2003; Bushman, Piotroski and Smith, 2004). Thus, TLR could be proxying for more general differences in the country's information environment.

Conceptually, an improvement in the transparency of corporate reporting should influence resource allocation. For example, transparent reporting holds managers confronted with declining investment opportunities accountable for over-investment. In addition, transparent reporting should also call attention to favorable investment opportunities, thus also affecting capital allocation in the presence of expanding opportunities. Table 5 investigates the relation between investment sensitivities and a proxy for corporate transparency.

Our proxy for corporate transparency in the economy is the CIFAR index of corporate disclosure intensity compiled by the Center for Financial Analysis and Research. This measure has been successfully used in cross-country studies to proxy for the quality of a country's information / accounting environment (e.g., Rajan and Zingales, (1998)). As documented in Table 5, the inclusion of CIFAR in our estimation of equation (10) does not materially alter our inferences with respect to TLR. Moreover, with the exception of a weak positive relation once we remove U.S. firms from the sample, our results fail to detect a significant relation between disclosure intensity and investment sensitivities.[31]

4.2.4 Influence of entry barriers on investment behavior

[31] We obtain similar inferences if we utilize a country-level measure of stock return synchronicity (see Morck, Yeung and Yu, 2000) in lieu of CIFAR.

An important country-level determinant of investment efficiency is likely to be the regulatory burden faced by business firms. We proxy for cross-country differences in regulatory burden using a measure of start-up entry barriers ($BARRIERS_k$) in our estimations. The variable $BARRIERS_k$ is measured as the average number of business days it takes for a start-up to obtain legal status to operate as a firm in country k (source: Djankov, LaPorta, Lopez-de-Silanes and Shleifer, 2001). This variable is a powerful proxy for regulatory constraints and government bureaucracy. As documented by Djankov, LaPorta, Lopez-de-Silanes and Shleifer, 2001, this variable is highly correlated with higher corruption, larger unofficial economies, and lower product market competition in a country. To the extent that government regulations and correlated economic attributes hinder a firm's ability to enter or exit an industry in a timely manner, a firm's sensitivity to changing investment opportunities will be attenuated. This attenuation arises either because the firm will opt not to invest due to prohibitive entry costs, or because regulation lengthens the time lag between the investment shock and the firm's response.

Table 6 presents select coefficients from estimations controlling for $BARRIERS_k$. We find that the sensitivity of a firm's investment response to changing investment opportunities is significantly decreasing in $BARRIERS_k$ (using raw data), consistent with greater regulation / bureaucracy creating frictions in the investment process. We do not detect an asymmetric relation between $BARRIERS_k$ and increasing vs. decreasing investment opportunities. After controlling for $BARRIERS_k$, TLR continues to be significantly positively related to firms' investment sensitivities to declining investment opportunities.

4.2.5 Influence of timely gain recognition on investment sensitivities

Our hypothesis, and the prevailing literature, does not posit a role for the timely accounting recognition of economic gains in the capital allocation process. However, given that TLR is mechanically defined as timely gain recognition plus the incremental timeliness of bad news recognition (as inferred from an estimation of a non-linear earnings-return model), it is possible that our TLR results are an artifact of a correlation between the general timeliness of earnings and investment sensitivities. Table 7 investigates the relation between investment sensitivities and TLR_k after controlling for timely gain recognition practices (TGR_k). The inclusion of TGR_k in our estimation of equation (10) does not materially alter our inferences with respect to TLR. Moreover, our estimations fail to detect a significant relation between the timely recognition of economic gains and investment sensitivities.

4.2.6 Inclusion of additional firm-level attributes in the investment model

Prior empirical research on investment in the U.S. has considered several additional firm-level variables to explain cross-sectional variation in investment growth rates. For example, Lamont (2000) controls for changes in the profitability of the firm and lagged investment growth rates, and Lang, Ofek and Stulz (1996) document a negative relation between investment growth and leverage. To mitigate concerns about the influence of omitted firm-level variables from our investment model, we also re-estimate equation (10) after including proxies for these three constructs. We measure change in profitability as the annual change in reported net income before extraordinary items scaled by beginning of the year total assets, leverage as the ratio of total debt to total assets at the end of the current fiscal year, and lagged investments as the preceding fiscal year's growth in additions to fixed assets. Consistent with prior research, we find a positive relation between investment growth and changes in profitability, and negative

relations between investment growth and lagged investment growth and leverage. More importantly, after controlling for these main effects, TLR continues to have a significant positive influence on firms' response to declining investment opportunities (results not tabulated for parsimony).

5 Additional robustness tests

5.1 An alternative measure of timely loss recognition: Ball and Shivakumar (2005)

Our measure of TLR relies on the implicit assumption that stock returns reflect economic gains and losses, and that the stock price formation process is equally efficient across all sample countries. Recent evidence suggests that returns in different economies reflect different levels of firm-specific information (e.g., Morck, Yeung and Yu (2000)). To the extent that the information content of annual stock returns varies across economies, our measure of TLR would be misspecified. Additionally, Dietrich, Muller and Riedl (2005) argue that results from the traditional earnings-returns asymmetric timeliness model fail to reflect accounting properties, and instead are induced by the research design.

To mitigate concerns surrounding the non-linear earnings-return technique, we also use an alternative measure of the timeliness of earnings based on the non-linear accruals-cash flow model specified in Ball and Shivakumar (2005). Specifically, they estimate the following model:

$$ACCRUALS_{i,t} = \alpha + \beta_1 NEGCFO_{i,t} + \beta_2 CFO_{i,t} + \beta_3 NEGCFO_{i,t} * CFO_{i,t} + \varepsilon_{i,t} \quad (11)$$

where $ACCRUALS_{i,t}$ is current period operating accruals, $CFO_{i,t}$ is current period operating cash flows, and $NEGCFO_{i,t}$ is an indicator variable equal to one if $CFO_{i,t}$ is less than zero. Ball and Shivakumar (2005) find that the negative relation between accruals and cash flows is attenuated when cash flows are negative (i.e., $\beta_3 > 0$) due to the timelier recognition of losses than gains. Using data from Bushman and Piotroski (2006), we implement an alternative measure of

timeliness loss recognition, BS_TLR, which is defined as the sum of estimates of $\beta_2 + \beta_3$ from pooled, country-level estimations of equation (11). The advantage of this approach is that we have a measure of timely loss recognition that is independent of securities prices and has been used in several recent papers on the incentives for and economic consequences of conservative accounting practices (e.g., Katz (2006); Moerman (2006); Ball and Shivakumar (2006)).

Table 8 presents re-estimations of equation (10) using this alternative measure of TLR. These estimations confirm the basic relations found in the preceding tables. The coefficient on TLR*NEG*RET is positive in all estimations, with the effect of BS_TLR being statistically significant after ranking these institutions. Additionally, the sum of the coefficients on TRL*RET and TLR*NEG*RET is significantly greater than zero (at the 0.05 level of significance) in all estimations. Together, the joint evidence supports our two empirical hypotheses, and alleviates concern that our previous results are simply an artifact of Ball, Kothari and Robin's non-linear earnings-return methodology.

5.2 An alternative measure of investment sensitivities: Wurgler (2000)

We consider an alternative measure of investment sensitivity drawn from Wurgler (2000). Wurgler (2000) estimates the elasticity of gross investment to value added through country-level estimations of the following model:

$$\ln(I_{jkt} / I_{jkt-1}) = \alpha_k + \eta_k \ln(V_{jkt} / V_{jkt-1}) + \varepsilon \ , \qquad (3)$$

where I_{jkt} is gross fixed capital formation in industry j, country k, year t, and V_{jkt} is value added in industry j, country k, year t.[32] The elasticity coefficient for each country k, η_k, is a measure

[32] The underlying data are drawn from the 1997 United Nations' *General Industrial Statistics* panel (the *INDSTAT-3* CD-ROM) which reports gross fixed capital formation and value added for up to 28 three-digit ISIC manufacturing industries (an international classification standard that corresponds approximately to two-digit SIC industries),

of the extent to which investment in country k is reduced in response to declining investment opportunities and increased in response to expanding opportunities. Wurgler interprets η_k as a summary measure of the efficiency of resource allocation in economy k.

Further, Wurgler disaggregates η_k by separately estimating the elasticity in country k for industry-year observations reflecting increasing value added (η_k^+) and those reflecting shrinking value added (η_k^-). That is, η_k^+ captures the intensity with which investment increases in response to improved investment opportunities, and η_k^- captures the intensity with which firms respond to a deterioration in investment opportunities by reducing the flow of capital to new investments and withdrawing capital from losing projects.

In our final robustness analysis, we focus on the difference ($\eta_k^- - \eta_k^+$). Wurgler notes that this difference can be viewed as an inverse measure of the severity of the control problems in a country, as self-serving managers are less likely to downsize investments in declining sectors than they are to increase investments in growth opportunities (e.g., Jensen (1986)). We focus on the differenced variable ($\eta_k^- - \eta_k^+$) to control for country-level aspects that impact the absolute levels of η_k^- and η_k^+, but not the asymmetry between them, and control separately for a range of country-level characteristics that could affect the two sides asymmetrically (e.g., financial development, per capita wealth, investor rights, state ownership of enterprise, and synchronicity). Given our hypothesis that countries characterized by high TLR will respond more quickly to declines in investment opportunities than firms in countries with low TLR, we predict a positive

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Value added is defined as the value of shipments of goods produced (output) minus the cost of intermediate goods and required services (but not including labor), with appropriate adjustments made for inventories of finished goods, work-in-progress, and raw materials. In other words, this value added measure reflects value added by labor as well as capital. Gross fixed capital formation is defined as the cost of new and used fixed assets *minus* the value of sales of used fixed assets, where fixed assets include land, buildings, and machinery and equipment. (The term *gross* is used to signify that the investments are not net of the replacement of expiring assets as measured by depreciation.) Wurgler also estimated (3) with additional lagged variables, finding a minimal increase in power.

relation between TLR and both η_k^- and $(\eta_k^- - \eta_k^+)$, but make no prediction about the relation between TLR and η_k^+.

Combining Wurgler's elasticity data with Bushman and Piotroski's estimates of TLR practices yields a maximum sample of 32 country-level observations. Table 9, panel A provides descriptive statistics. Wurgler's (2000) elasticity measures display considerable cross-country variation. The average country-level elasticity statistic, η, is 0.599, with a standard deviation of 0.253; country-specific differences in elasticity between declining and growing industries, $(\eta_k^- - \eta_k^+)$, range from -0.415 (Netherlands) to 0.654 (Sweden), with a sample mean of 0.005 and standard deviation of 0.269.

Table 9, panel B presents a correlation matrix. Interestingly, both of our TLR measures, BKR_TLR and BS_TLR, are significantly positively correlated with the downside elasticity measures of η_k^- and $(\eta_k^- - \eta_k^+)$. In contrast, we find that neither of our TLR variables are significantly correlated with the elasticity capturing the flow of capital to growth opportunities (η_k^+). Hence, consistent with our main analysis, TLR is associated with a more intense total and incremental response to decreased opportunities $((\eta_k^-)$ and $(\eta_k^- - \eta_k^+)$, respectively), but not significantly associated with the flow of capital to growing sectors (η_k^+). From an interpretational perspective, this pattern suggests that any documented associations between TLR and $(\eta_k^- - \eta_k^+)$ are likely to be driven by TLR's relation to investment sensitivities to declining (as opposed to expanding) investment opportunities.

Finally, Table 9, panel C presents estimated regression models for $(\eta_k^- - \eta_k^+)$ which include all of Wurgler's (2000) control variables plus each of our two alternative measures of TLR. These estimations reveal that the relation between $(\eta_k^- - \eta_k^+)$ and TLR is positive and

significant (at better than 10% level, one-sided in all models, regardless of TLR measure), and produce inferences consistent with those gleaned in earlier tables.[33]

The consistency of the results in Table 9 with our main analyses mitigates several concerns. First, Wurgler's elasticity measures are estimated out of sample, reducing concerns that our results are simply mechanistic or spurious in nature. Second, Wurgler's elasticity measures do not rely on stock returns to capture changes in investment opportunities, reducing concerns that our results are distorted by differential informational efficiency of stock markets around the world. And third, Wurgler's elasticity measures capture capital expenditures net of asset sales. In contrast, our original investment sensitivity measures rely solely on capital expenditures. Hence, while our main results are consistent with the predicted *ex-ante* disciplinary effects of TLR (i.e. curbing investments in ex-ante negative NPV projects), our robustness tests based on Wurgler's more comprehensive sensitivity measures capture disciplinary effects that are both *ex-ante* and *ex-post* (i.e. exiting or downsizing projects determined to be losers).

6. Conclusions, caveats, and directions for future research

Using firm-level investment decisions spanning twenty five countries, we find that the sensitivity of corporate investment to a decrease in investment opportunities is higher in countries with relatively high TLR. We also find that the *incremental* sensitivity of corporate investment to a decrease in investment opportunities (over and above the sensitivity to an increase in investment opportunities) is higher in countries with relatively high TLR.

[33] We note that the elasticity measures included in the Wurgler data set are estimated over the thirty two year period 1964 to 1995. In contrast, our TLR measures are estimated over the time period 1992 to 2003. Given that the elasticity measures effectively pre-date our measures of reporting practices, causality is difficult to establish. However, it is comforting that table 9 documents results consistent with our main analysis in tables 2-8.

The robustness of results to using alternative measures of TLR and alternative measures of investment sensitivity mitigate concerns that are results are an artifact of our research design or a spurious correlation resulting from the use of stock returns in both the TLR and investment model. Moreover, the robustness of the results to an array of firm-level, industry-level and country-level controls, as well as the additional control achieved by our analysis of incremental investment sensitivities mitigates concerns that TLR is proxying for an omitted variable.

Our findings are consistent with the theory that TLR curbs over-investment in the face of declining investment opportunities, as posited by existing theories of the governance role of TLR. However, the interpretation of our results is subject to two caveats. First, our empirical design cannot unambiguously establish a causal empirical relation. Our study, and cross-country research in general, is limited by a lack of established models that specify the complete set of appropriate control variables, by country-level institutions that exhibit a high degree of correlation, and by variables that are potentially measured with substantial error (e.g., Levine and Renelt (1992), Levine and Zervos (1993), and Rajan and Zingales (1998)). Thus, we cannot definitively rule out the possibility of other omitted correlated variables.

Second, while we have established a relation between TLR and investment *responses* to declining investment opportunities, this does not necessarily imply a relation between TLR and investment *efficiency*. An ideal test of whether TLR improves the efficiency of managers' response to declining investment opportunities would examine whether the investment response to declining investment opportunities approaches the *optimal* response as TLR increases. Although our empirical model is based on Q-theory of optimal investment, we are unable to quantify an optimal investment response because the magnitude of adjustment costs is unknown.

In addition, other literature suggests that managers may have incentives in some settings to under-invest due, for example, to asymmetric information (e.g., Myers (1977)), bondholder-shareholder conflicts (Myers (1977)), risk aversion (e.g., Holmstrom (1979)), and differences in time horizons and discount rates (e.g., Reichelstein (1997)). It is possible, therefore, that TLR exacerbates under-investment by promoting overly cautious investment behavior by loss averse managers. Although we do not find that investment sensitivities to expanding opportunities significantly decline with TLR as might be expected if TLR generally exacerbates underinvestment, we cannot rule out the possibility that TLR causes managers to overreact to a decline in investment opportunities.

In spite of the limitations above, we think that our analysis represents a useful first step toward understanding the relation between TLR and investment behavior. In light of previous evidence of significant cross-country variation in investment sensitivities and TLR, our analysis had the potential to cast meaningful doubt on existing theory if we failed to find a relation between TLR and investment behavior.

We think that three directions for future research may provide additional insight into the "real effects" of timely loss recognition practices. First, the relation between corporate investment behavior and TLR within a country can be investigated. Complementary evidence from these two approaches would provide additional assurance that our results are not driven by omitted correlated country-level variables. A second interesting direction would be to test the relation between TLR and investment efficiency. Due to the unknown adjustment costs of investment described above, measures of investment efficiency based on corporate outputs rather than inputs (i.e. investment spending) is likely to be fruitful. Finally, research into how

efficiency effects of TLR vary with other institutional factors, such as shareholder and creditor rights, has the potential to provide interesting new evidence on the real effects of TLR.

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Appendix
Variable Definitions

Variable	Definition of variable	Data Source
$\log(I_{i,t} / I_{i,t-1})$	Investment growth of firm i (in industry j, country k) in year t, measured as the log of the ratio of current to lagged additions to fixed assets (Global Vantage data item 145).	Standard and Poor's Global Vantage Industrial / Commercial file.
$RET_{j,k,t-1}$	Lagged industry stock returns in country k, measured as the log of one plus the average holding period stock return, including dividends, for industry j, country k over the firm's preceding fiscal year (i.e., year t-1). Industries are defined as Fama and French (1997) industries.	Standard and Poor's Global Vantage Issues file.
$NEG_{j,k,t-1}$	An indicator variable equal to one if $RET_{j,k,t-1}$ is less than zero; zero otherwise.	
$BM_{i,t-1}$	The firm's book-to-market ratio at the beginning of fiscal year t, measured as the book value of common equity (Global Vantage data item 135), scaled by the market value of equity. Both variables are denominated in the home country's currency. $Log(1+BM_{i,t-1})$ is measured as the natural logarithm of one plus BM.	Standard and Poor's
$MVE_{i,t-1}$	The firm's market value of equity at the beginning of fiscal year t, defined as the number of shares outstanding times the closing price available for the last month of the preceding fiscal year, translated into U.S. dollars using the average foreign currency exchange rates for the calendar year ending closest in time to the measurement of the market value of equity. All exchange rate data is gathered through World Development Indicators.	Standard and Poor's Global Vantage Issues file.
TLR_k	A measure of the timeliness of the recognition of bad economic news into earnings in country k, based on the methodology in Ball, Kothari and Robin (2000). Defined as the sum of $\beta_2 + \beta_3$, where β_2 and β_3 are the estimated coefficients from country-level estimations of the following model over the period 1992 to 2001: $NI = \alpha + \beta_1 NEG + \beta_2 RET + \beta_3 NEG*RET$	Bushman and Piotroski (2006)
BS_TLR_k	A measure of the timeliness of the recognition of bad economic news into earnings in country k, based on the methodology in Ball and Shivakumar (2004). Defined as the sum of $\beta_2 + \beta_3$, where β_2 and β_3 are the estimated coefficients from country-level estimations of the following model over the period 1992 to 2001: $ACCRUALS = \alpha + \beta_1 NEGCFO + \beta_2 CFO + \beta_3 NEGCFO*CFO$	Bushman and Piotroski (2006)
FD_k	Financial development in country k, measured as the sum of the country's stock market capitalization, public bond market capitalization and private bond market capitalization, as a percentage of gross domestic product, as of calendar year 1992.	Financial Structure and Economic Development database (World Bank). See Beck, Demirguc-Kunt and Levine [1999] for details.
FD_EQ_k	Equity market development in country k, measured as the country's stock market capitalization as a percentage of gross domestic product, as of calendar year 1992.	Financial Structure and Economic Development database (World Bank).
FD_DEBT_k	Debt market development in country k, measured as the sum of the country's private and public debt market capitalizations, scaled by gross domestic product, as of calendar year 1992.	Financial Structure and Economic Development database (World Bank).
GDP_k	Per capita GDP in 1992 in country k.	World Development Indicators
$RIGHTS_k$	A summary measure of effective legal rights in country k. *RIGHTS* is computed by multiplying the number of important shareholder and creditor rights that exist in the country's legal code (0 to 10, integer) by a measure of the domestic `rule of law' (0 to 1 continuous). Both variables are from La Porta et al. (1998).	LaPorta, Lopez-de-Silanes, Shleifer and Vishny (1998)
SHR_RTS_k	A summary measure of shareholder rights in country k, measured as the number of important shareholder rights that exist in the country's legal code (0 to 6, integer).	LaPorta, Lopez-de-Silanes, Shleifer and Vishny (1998)
CR_RTS_k	A summary measure of creditor rights in country k, measured as the number of important creditor rights that exist in a country's legal code (0	LaPorta, Lopez-de-Silanes, Shleifer and Vishny (1998)

	to 4, integer).	
SOE_k	A rating (0 to 10) of the State's involvement in country k's economy, based on the fraction of the economy's output due to state-owned enterprises. Based on 1995 ratings of state ownership.	Economic Freedom of the World (2003)
$CIFAR_k$	Index created by examining and rating companies' 1995 annual reports on their inclusion or omission of 90 items in country k. These items fall into seven categories (general information, income statements, balance sheets, funds flow statement, accounting standards, stock data and special items). A minimum of 3 companies in each country were studied.	International Accounting and Auditing Trends, Center for Financial Analysis and Research, Inc. (CIFAR)
$BARRIERS_k$	The time it takes in country k for a start-up entity to obtain legal status to operate as a firm, in business days. A week (month) is defined as having five (twenty two) business days. Measured as the log of the number of days.	Djankov, LaPorta, Lopez-de-Silanes and Shleifer (2001)
TGR_k	A measure of the timeliness of the recognition of good economic news into earnings in country k, based on the methodology in Ball, Kothari and Robin (2000). Defined as the estimated coefficient β_2 from country-level estimations of the following model over the period 1992 to 2001: $NI = \alpha + \beta_1 NEG + \beta_2 RET + \beta_3 NEG*RET$	Bushman and Piotroski (2006)
η_k	Country-level estimates of the elasticity of gross investment to value-added over the period 1963 to 1995, as a measure of the efficiency of resource allocation. $\eta_k^+(\eta_k^-)$ is a country level estimate of the elasticity of gross investment to value-added for those industries with expanding (declining) investment opportunities.	Wurgler (2000)
FD_k	A summary measure of financial development in country k. It is the log of one plus the average sum of stock market capitalization and credit to GDP.	Wurgler (2000)
$GDP1960_k$	1960 value of per capita GDP in country k; the date is chosen to minimize the potential for endogeneity when this variable issued as a control in cross-country regressions.	Wurgler (2000)
$SYNCH_k$	A measure of stock price synchronicity in country k, equaling the average fraction of stocks moving in the same direction in a given week during 1995.	Morck, Yeung and Yu (2000)

Table 1
Descriptive Statistics

This table presents descriptive statistics for the full sample of 43,210 firm-year observations drawn from 25 countries over the period 1994 to 2003.

Variable	Mean	Std. Dev.	5th Pctl.	25th Pctl.	Median	75th Pctl.	95th Pctl.
$I_{i,t} / I_{i,t-1}$	1.320	1.333	0.246	0.691	1.026	1.468	3.296
$\log(I_{i,t} / I_{i,t-1})$	-0.024	0.796	-1.401	-0.370	0.025	0.384	1.193
$RET_{j,k,t-1}$	0.055	0.309	-0.391	-0.118	0.037	0.198	0.559
$\log(1+RET_{j,k,t-1})$	0.009	0.313	-0.496	-0.126	0.037	0.181	0.444
$MVE_{i,t-1}$	3,035.69	93,212.77	9.3030	55.495	216.774	829.399	722,691.0
$\log(MVE_{i,t-1})$	5.422	2.029	2.230	4.016	5.379	6.721	8.886
$BM_{i,t-1}$	0.955	2.157	0.065	0.299	0.554	0.960	2.371
$\log(1+BM_{i,t-1})$	0.517	0.433	0.082	0.268	0.445	0.677	1.220
Country-level financial, political and legal institutions							
FD_k	1.022	0.233	0.527	0.923	1.163	1.163	1.404
FD_EQ_k	0.859	0.465	0.214	0.645	0.808	0.808	2.068
FD_DEBT_k	0.989	0.448	0.189	0.587	1.3909	1.391	1.519
$Log(GDP_k)$	2.906	0.583	1.705	2.824	3.167	3.222	3.222
$RIGHTS_k$	5.701	1.352	2.694	5.424	6.000	6.000	7.713
SHR_RTS_k	4.405	1.193	1.000	4.000	5.000	5.000	5.000
CR_RTS_k	1.895	1.336	1.000	1.000	1.000	4.000	4.000
SOE_k	2.686	1.643	2.000	2.000	2.000	2.000	6.000
CIFAR	76.486	4.969	67.000	76.000	76.000	78.000	85.000
BARRIERS	1.991	1.117	0.693	1.386	1.386	2.890	4.127
TGR	0.006	0.019	-0.006	-0.005	-0.005	0.009	0.046
Timely loss recognition measures (source: Bushman and Piotroski, 2005)							
TLR	0.278	0.085	0.086	0.278	0.307	0.307	0.373
BS_TLR	-0.139	0.200	-0.487	-0.228	-0.022	-0.022	0.054

Table 2
Influence of TLR practices on the responsiveness of firm-level investment to lagged returns after controlling for industry effects

This table presents select average coefficients and p-values from nine annual estimations (fiscal years 1995 to 2003) of the following cross-sectional model:

$$\log(I_{i,t} / I_{i,t-1}) = \alpha + \sum_{j=1}^{43}\alpha_j Ind_j + \beta_1 NEG_{j,k,t-1} + \beta_2 TLR_k + \beta_3 \log(1+BM_{i,t-1}) + \beta_4 \log(MVE_{i,t-1}) + \beta_5 FD_k + \beta_6 GDP_k$$
$$+ \beta_7 RIGHTS_k + \beta_8 SOE_k + \lambda_1 RET_{j,k,t-1} + \sum_{j=1}^{43}\gamma_j Ind_j * RET_{j,k,t-1} + \lambda_2 TLR_k * RET_{j,k,t-1} + \lambda_3 \log(1+BM_{i,t-1}) * RET_{j,k,t-1}$$
$$+ \lambda_4 \log(MVE_{i,t-1}) * RET_{j,k,t-1} + \lambda_5 FD_k * RET_{j,k,t-1} + \lambda_6 GDP_k * RET_{j,k,t-1} + \lambda_7 RIGHTS_k * RET_{j,k,t-1} + \lambda_8 SOE_k * RET_{j,k,t-1}$$
$$+ \lambda_9 NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{10} TLR_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{11} \log(1+BM_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \sum_{j=1}^{43}\omega_j Ind_j * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{12} \log(MVE_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{13} FD_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \lambda_{14} GDP_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{15} RIGHTS_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{16} SOE_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \varepsilon_{i,t}$$

	Raw, mean-adjusted varibles			Ranked institutional data		
	Baseline	All Countries	Exclude U.S.	Baseline	All Countries	Exclude U.S.
Response to increasing investment opportunities						
$RET_{j,k,t-1}$	0.288	0.273	0.394	0.115	0.135	0.305
	(0.210)	(0.221)	(0.131)	(0.672)	(0.611)	(0.325)
$TLR_k*RET_{j,k,t-1}$	-	-0.621	-0.610	-	-0.346	-0.348
	-	(0.137)	(0.184)	-	(0.163)	(0.191)
$\log(BM_{i,t-1})*RET_{j,k,t-1}$	0.001	0.003	0.072	-0.014	-0.017	0.069
	(0.995)	(0.988)	(0.732)	(0.941)	(0.931)	(0.742)
$\log(MVE_{i,t-1})*RET_{j,k,t-1}$	-0.034	-0.033	-0.031	-0.037	-0.039	-0.036
	(0.430)	(0.438)	(0.577)	(0.386)	(0.378)	(0.512)
$FD_k*RET_{j,k,t-1}$	0.104	0.055	-0.146	0.129	-0.007	-0.189
	(0.747)	(0.842)	(0.701)	(0.709)	(0.984)	(0.621)
$GDP_k*RET_{j,k,t-1}$	0.124	0.127	0.164	0.186	0.277	0.367
	(0.035)	(0.035)	(0.046)	(0.060)	(0.028)	(0.051)
$RIGHTS_k*RET_{j,k,t-1}$	0.022	0.032	0.031	0.247	0.425	0.374
	(0.218)	(0.123)	(0.138)	(0.110)	(0.036)	(0.038)
$SOE_k*RET_{j,k,t-1}$	0.045	0.042	0.049	0.531	0.547	0.527
	(0.122)	(0.167)	(0.192)	(0.118)	(0.123)	(0.220)
Incremental response to deteriorating investment opportunities						
$NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.207	0.282	0.030	0.259	0.266	0.039
	(0.501)	(0.399)	(0.910)	(0.390)	(0.370)	(0.901)
$TLR_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-	2.124[a]	2.033[a]	-	1.005[a]	1.041[a]
	-	(0.001)	(0.005)	-	(0.002)	(0.003)
$\log(BM_{i,t-1})*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.259	-0.258	-0.187	-0.236	-0.228	-0.195
	(0.273)	(0.282)	(0.538)	(0.311)	(0.342)	(0.512)
$\log(MVE_{i,t-1})*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.014	-0.015	-0.021	-0.004	-0.003	-0.007
	(0.823)	(0.811)	(0.787)	(0.953)	(0.967)	(0.931)
$FD_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.493	-0.523	-0.679	-0.801	-0.706	-0.777
	(0.376)	(0.256)	(0.287)	(0.198)	(0.214)	(0.271)
$GDP_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.111	0.062	0.041	0.449	0.205	0.052

	(0.502)	(0.652)	(0.766)	(0.354)	(0.647)	(0.909)
$RIGHTS_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.046	0.023	0.049	0.239	-0.078	0.013
	(0.259)	(0.659)	(0.533)	(0.595)	(0.886)	(0.981)
$SOE_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.083	-0.073	-0.094[c]	-1.123[c]	-1.092[c]	-1.217[c]
	(0.056)	(0.082)	(0.059)	(0.063)	(0.069)	(0.069)
Industry Interactions	Included	Included	Included	Included	Included	Included
Average Adj. R^2	0.0479	0.0485	0.0391	0.0482	0.0485	0.0390

Investment growth of firm i (in industry j) in year t is measured as the log of the ratio of current to lagged additions to fixed assets (Global Vantage data item 145). $RET_{j,k,t-1}$ is the average twelve-month return to firms in industry j in country k in year t-1. $NEG_{j,k,t-1}$ is an indicator variable equal to one if $RET_{j,k,t-1}$ is less than zero in year t-1, zero otherwise. TLR is measured using coefficients from country-level estimations of non-linear earnings-returns model. All remaining variables are defined in Appendix 1. The first three columns ("raw data") present coefficients from estimations where all firm-level and country-level independent variables have been mean-adjusted annually; the second set of columns ("ranked data") present coefficients from estimations where country-level institutions have been ranked between -0.5 and 0.5. The "all countries" sample consists of 43,210 firm-year observations from 25 countries. The sample excluding U.S. domiciled firms consists of 21,539 firm-year observations. T-statistics and the related standard errors are based on the empirically derived distribution of nine annual coefficients. P-values are presented in parentheses (one-sided for predicted TLR, FD, GDP, RIGHTS and SOE relations; two-sided otherwise). The superscripts a, b and c denote that the sum of the coefficients on RET and NEG*RET, interacted with either TLR or SOE, is significantly positive at the one, five and ten percent level, respectively, using a one-tailed t-test.

Table 3
The influence of TLR practices on the responsiveness of firm-level investment after separately controlling for the development of equity and debt markets

This table presents select average coefficients from nine annual estimations (fiscal years 1995 to 2003) of the following cross-sectional model:

$$\log(I_{i,t} / I_{i,t-1}) = \alpha + \sum_{j=1}^{43}\alpha_j Ind_j + \beta_1 NEG_{j,k,t-1} + \beta_2 TLR_k + \beta_3 \log(1+BM_{i,t-1}) + \beta_4 \log(MVE_{i,t-1}) + \beta_5 FD\_EQ_k + \beta_6 FD\_DEBT_k +$$
$$\beta_7 GDP_k + \beta_8 RIGHTS_k + \beta_9 SOE_k + \lambda_1 RET_{j,k,t-1} + \sum_{j=1}^{43}\gamma_j Ind_j * RET_{j,k,t-1} + \lambda_2 TLR_k * RET_{j,k,t-1} + \lambda_3 \log(1+BM_{i,t-1}) * RET_{j,k,t-1}$$
$$+ \lambda_4 \log(MVE_{i,t-1}) * RET_{j,k,t-1} + \lambda_5 FD\_EQ_k * RET_{j,k,t-1} + \lambda_6 FD\_DEBT_k * RET_{j,k,t-1} + \lambda_7 GDP_k * RET_{j,k,t-1} + \lambda_8 RIGHTS_k * RET_{j,k,t-1}$$
$$+ \lambda_9 SOE_k * RET_{j,k,t-1} + \lambda_{10} NEG_{j,t-1} * RET_{j,k,t-1} + \lambda_{11} TLR_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{12} \log(1+BM_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \sum_{j=1}^{43}\omega_j Ind_j * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{13} \log(MVE_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{14} FD\_EQ_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \lambda_{15} FD\_DEBT_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{16} GDP_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{17} RIGHTS_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \lambda_{16} SOE_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \varepsilon_{i,t}$$

where FD_EQ_k is the ratio of stock market capitalization to GDP for country k in 1992 and FD_DEBT is the ratio of credit market to GDP for country k in 1992. All remaining variables are defined in Appendix 1. The first set of estimations utilize raw, mean-adjusted firm-specific and institutional data; the second set of estimations use ranked country-level institutions (ranking -0.5 to 0.5). T-statistics and the related standard errors are based on the empirically derived distribution of nine annual coefficients. Two-tailed p-values are presented in parentheses (one-sided test for predicted TLR relations; two-tailed test otherwise).

	Raw, mean-adjusted variables			Ranked Institutions		
TLR Variable:	Baseline	All Countries	Exclude U.S.	Baseline	All Countries	Exclude U.S.
Response to increasing investment opportunities						
$RET_{j,k,t-1}$	0.315	0.318	0.364	0.148	0.189	0.399
	(0.111)	(0.097)	0.110	(0.594)	(0.503)	(0.218)
$TLR_k*RET_{j,k,t-1}$	-	-0.521	-0.614	-	-0.205	-0.245
	-	(0.178)	(0.086)	-	(0.418)	(0.351)
$FD\_EQ_k*RET_{j,k,t-1}$	-0.025	-0.046	-0.077	-0.089	-0.245	-0.299
	(0.878)	(0.743)	(0.600)	(0.831)	(0.613)	(0.507)
$FD\_DEBT_k*RET_{j,k,t-1}$	-0.029	-0.009	-0.171	-0.196	-0.380	-0.482
	(0.930)	(0.979)	(0.572)	(0.640)	(0.495)	(0.376)
Incremental response to deteriorating investment opportunities						
$NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.202	0.201	-0.120	0.198	0.193	-0.169
	(0.517)	(0.506)	(0.746)	(0.521)	(0.547)	(0.680)
$TLR_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-	1.932[a]	2.115[a]	-	0.909[a]	0.951[a]
	-	(0.000)	(0.000)	-	(0.005)	(0.007)
$FD\_EQ_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.162	-0.132	-0.200	-0.219	-0.271	-0.460
	(0.438)	(0.475)	(0.341)	(0.745)	(0.695)	(0.517)
$FD\_DEBT_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.101	-0.228	-0.359	-0.102	-0.031	-0.133
	(0.829)	(0.619)	(0.482)	(0.870)	(0.969)	(0.867)
MVE and BM Interactions	Included	Included	Included	Included	Included	Included
Institutional Interactions	Included	Included	Included	Included	Included	Included
Industry Interactions	Included	Included	Included	Included	Included	Included
Average Adj. R^2	0.0491	0.0494	0.0400	0.0485	0.0488	0.0401

[a,b,c] The sum of the coefficients on TLR*RET and TLR*NEG*RET is significantly positive at the 1,5 and 10% level using a one-tailed t-test.

Table 4
The influence of TLR practices on the responsiveness of firm-level investment after separately controlling for shareholder and creditor rights

This table presents select average coefficients from nine annual estimations (fiscal years 1995 to 2003) of the following cross-sectional model:

$$\log(I_{i,t} / I_{i,t-1}) = \alpha + \sum_{j=1}^{43}\alpha_j Ind_j + \beta_1 NEG_{j,k,t-1} + \beta_2 TLR_k + \beta_3 \log(1+BM_{i,t-1}) + \beta_4 \log(MVE_{i,t-1}) + \beta_5 FD_k + \beta_6 GDP_k + \beta_7 SHR\_RTS_k + \beta_8 CR\_RTS_k + \beta_9 SOE_k + \lambda_1 RET_{j,k,t-1} + \sum_{j=1}^{43}\gamma_j Ind_j * RET_{j,k,t-1} + \lambda_2 TLR_k * RET_{j,k,t-1} + \lambda_3 \log(1+BM_{i,t-1}) * RET_{j,k,t-1} + \lambda_4 \log(MVE_{i,t-1}) * RET_{j,k,t-1} + \lambda_5 FD_k * RET_{j,k,t-1} + \lambda_6 GDP_k * RET_{j,k,t-1} + \lambda_7 SHR\_RTS_k * RET_{j,k,t-1} + \lambda_8 CR\_RTS_k * RET_{j,k,t-1} + \lambda_9 SOE_k * RET_{j,k,t-1} + \lambda_{10} NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{11} TLR_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{12} \log(1+BM_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1} + \sum_{j=1}^{43}\omega_j Ind_j * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{13} \log(MVE_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{14} FD_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{15} GDP_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{16} SHR\_RTS_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{17} CR\_RTS_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{16} SOE_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \varepsilon_{i,t}$$

where SHR_RTS_k (CR_RTS_k) is a measure of shareholder (creditor) protections in the country's legal code. All remaining variables are defined in Appendix 1. The first set of estimations utilize raw, mean-adjusted firm-specific and institutional data; the second set of estimations use ranked country-level institutions (ranking -0.5 to 0.5). T-statistics and the related standard errors are based on the empirically derived distribution of nine annual coefficients. Two-tailed p-values are presented in parentheses (one-sided test for predicted TLR and SHR_RTS relations; two-tailed test otherwise).

	Raw, mean-adjusted variables			Ranked Institutions		
TLR Variable:	Baseline	All Countries	Exclude U.S.	Baseline	All Countries	Exclude U.S.
Response to increasing investment opportunities						
$RET_{j,k,t-1}$	0.277 (0.200)	0.288 (0.164)	0.424 (0.063)	0.146 (0.593)	0.158 (0.532)	0.365 (0.186)
$TLR_k*RET_{j,k,t-1}$	- -	-0.458 (0.375)	-0.558 (0.229)	- -	-0.303 (0.308)	-0.282 (0.221)
$SHR\_RTS_k*RET_{j,k,t-1}$	0.039 (0.192)	0.052 (0.094)	0.044 (0.137)	0.315 (0.078)	0.447 (0.012)	0.328 (0.062)
$CR\_RTS_k*RET_{j,k,t-1}$	-0.012 (0.730)	-0.004 (0.939)	-0.007 (0.896)	-0.158 (0.403)	-0.039 (0.876)	-0.017 (0.941)
Incremental response to deteriorating investment opportunities						
$NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.353 (0.321)	0.343 (0.290)	0.026 (0.901)	0.151 (0.552)	0.139 (0.536)	-0.255 (0.401)
$TLR_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	- -	1.307[b] (0.003)	1.499[b] (0.000)	- -	0.653[c] (0.027)	0.649[c] (0.004)
$SHR\_RTS_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.122 (0.087)	0.095 (0.115)	0.101 (0.061)	0.353 (0.216)	0.168 (0.359)	0.309 (0.145)
$CR\_RTS_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.002 (0.975)	0.005 (0.951)	0.044 (0.675)	0.200 (0.603)	0.097 (0.854)	0.209 (0.688)
MVE and BM Interactions	Included	Included	Included	Included	Included	Included
Institutional Interactions	Included	Included	Included	Included	Included	Included
Industry Interactions	Included	Included	Included	Included	Included	Included
Average Adj. R^2	0.0495	0.0500	0.0409	0.0493	0.0496	0.0405

[a,b,c] The sum of the coefficients on TLR*RET and TLR*NEG*RET is significantly positive at the 1,5 and 10% level using a one-tailed t-test.

Table 5
Influence of TLR practices on the responsiveness of firm-level investment after controlling for the general information environment in the country

This table presents select average coefficients from nine annual estimations (fiscal years 1995 to 2003) of the following cross-sectional model:

$$\log(I_{i,t} / I_{i,t-1}) = \alpha + \sum_{j=1}^{43}\alpha_j Ind_j + \beta_1 NEG_{j,k,t-1} + \beta_2 TLR_k + \beta_3 \log(1+BM_{i,t-1}) + \beta_4 \log(MVE_{i,t-1}) + \beta_5 FD_k + \beta_6 GDP_k + \beta_7 RIGHTS_k$$
$$+ \beta_8 CIFAR_k + \beta_9 SOE_k + \lambda_1 RET_{j,t-1} + \sum_{j=1}^{43}\gamma_j Ind_j * RET_{j,k,t-1} + \lambda_2 TLR_k * RET_{j,k,t-1} + \lambda_3 \log(1+BM_{i,t-1}) * RET_{j,k,t-1}$$
$$+ \lambda_4 \log(MVE_{i,t-1}) * RET_{j,k,t-1} + \lambda_5 FD_k * RET_{j,k,t-1} + \lambda_6 GDP_k * RET_{j,k,t-1} + \lambda_7 RIGHTS_k * RET_{j,k,t-1} + \lambda_8 CIFAR_k * RET_{j,k,t-1}$$
$$+ \lambda_9 SOE_k * RET_{j,k,t-1} + \lambda_{10} NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{11} TLR_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{12} \log(1+BM_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \sum_{j=1}^{43}\omega_j Ind_j * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{13} \log(MVE_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{14} FD_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \lambda_{15} GDP_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{16} RIGHTS_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{17} CIFAR_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \lambda_{16} SOE_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \varepsilon_{i,t}$$

where the country's general information environment / corporate transparency is measured using the 1995 CIFAR score. All remaining variables are defined in Appendix 1. The first set of estimations utilize raw, mean-adjusted firm-specific and institutional data; the second set of estimations use ranked country-level institutions (ranking -0.5 to 0.5). T-statistics and the related standard errors are based on the empirically derived distribution of nine annual coefficients. Two-tailed p-values are presented in parentheses (one-sided test for predicted TLR relations; two-tailed test otherwise).

	Raw, mean-adjusted variables			Ranked Institutions		
TLR Variable:	Baseline	All Countries	Exclude U.S.	Baseline	All Countries	Exclude U.S.
Response to increasing investment opportunities						
$RET_{j,k,t-1}$	0.371	0.363	0.373	0.213	0.247	0.293
	(0.271)	(0.301)	(0.169)	(0.597)	(0.552)	(0.465)
$TLR_k*RET_{j,k,t-1}$	-	-0.543	-0.496	-	-0.292	-0.209
	-	(0.259)	(0.264)	-	(0.268)	(0.431)
$CIFAR_k*RET_{j,k,t-1}$	0.000	-0.001	0.008	0.027	-0.051	0.207
	(0.961)	(0.917)	(0.341)	(0.907)	(0.816)	(0.326)
Incremental response to deteriorating investment opportunities						
$NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.192	0.281	0.227	0.328	0.276	0.215
	(0.633)	(0.549)	(0.543)	(0.506)	(0.588)	(0.599)
$TLR_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-	1.630[c]	1.640[c]	-	0.726	0.749[c]
	-	(0.028)	(0.036)	-	(0.041)	(0.058)
$CIFAR_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.012	-0.011	-0.021	0.031	0.099	-0.193
	(0.572)	(0.542)	(0.445)	(0.932)	(0.782)	(0.720)
MVE and BM Interactions	Included	Included	Included	Included	Included	Included
Institutional Interactions	Included	Included	Included	Included	Included	Included
Industry Interactions	Included	Included	Included	Included	Included	Included
Average Adj. R^2	0.0479	0.0482	0.0387	0.0483	0.0483	0.0381

[a,b,c] The sum of the coefficients on TLR*RET and TLR*NEG*RET is significantly positive at the 1,5 and 10% level using a one-tailed t-test.

Table 6
Influence of TLR practices on the responsiveness of firm-level investment after controlling for the entry/exit barriers in the country

This table presents select average coefficients from nine annual estimations (fiscal years 1995 to 2003) of the following cross-sectional model:

$$\log(I_{i,t} / I_{i,t-1}) = \alpha + \sum_{j=1}^{43}\alpha_j Ind_j + \beta_1 NEG_{j,t-1} + \beta_2 TLR_k + \beta_3 \log(1+BM_{i,t-1}) + \beta_4 \log(MVE_{i,t-1}) + \beta_5 FD_k + \beta_6 GDP_k + \beta_7 RIGHTS_k$$
$$+ \beta_8 BARRIERS_k + \beta_9 SOE_k + \lambda_1 RET_{j,k,t-1} + \sum_{j=1}^{43}\gamma_j Ind_j * RET_{j,k,t-1} + \lambda_2 TLR_k * RET_{j,k,t-1} + \lambda_3 \log(1+BM_{i,t-1}) * RET_{j,k,t-1}$$
$$+ \lambda_4 \log(MVE_{i,t-1}) * RET_{j,k,t-1} + \lambda_5 FD_k * RET_{j,k,t-1} + \lambda_6 GDP_k * RET_{j,k,t-1} + \lambda_7 RIGHTS_k * RET_{j,k,t-1} + \lambda_8 SOE_k * RET_{j,k,t-1}$$
$$+ \lambda_9 BARRIERS_k * RET_{j,k,t-1} + \lambda_{10} NEG_{j,t-1} * RET_{j,k,t-1} + \lambda_{11} TLR_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{12} \log(1+BM_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \sum_{j=1}^{43}\omega_j Ind_j * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{13} \log(MVE_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{14} FD_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \lambda_{15} GDP_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{16} RIGHTS_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{17} SOE_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \lambda_{16} BARRIERS_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \varepsilon_{i,t}$$

where the country's level of regulation with respected to entry/exit barriers, BARRIERS, is measured as the log of the time it takes for a start-up entity to obtain legal status to operate as a firm, in days. All remaining variables are defined in Appendix 1. The first set of estimations utilize raw, mean-adjusted firm-specific and institutional data; the second set of estimations use ranked country-level institutions (ranking -0.5 to 0.5). T-statistics and the related standard errors are based on the empirically derived distribution of nine annual coefficients. Two-tailed p-values are presented in parentheses (one-sided test for predicted TLR and BARRIERS relations; two-tailed test otherwise).

	Raw, mean-adjusted variables			Ranked Institutions		
TLR Variable:	Baseline	All Countries	Exclude U.S.	Baseline	All Countries	Exclude U.S.
Response to increasing investment opportunities						
$RET_{j,k,t-1}$	0.272	0.282	0.434	0.157	0.166	0.292
	(0.235)	(0.186)	(0.070)	(0.610)	(0.573)	(0.336)
$TLR_k*RET_{j,k,t-1}$	-	-0.762	-0.848	-	-0.285	-0.381
	-	(0.089)	(0.080)	-	(0.213)	(0.135)
$BARRIERS_k*RET_{j,k,t-1}$	-0.082	-0.119	-0.121	-0.208	-0.333	-0.453
	(0.054)	(0.046)	(0.063)	(0.293)	(0.234)	(0.152)
Incremental response to deteriorating investment opportunities						
$NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.479	0.455	0.047	0.314	0.289	0.107
	(0.300)	(0.289)	(0.891)	(0.401)	(0.413)	(0.720)
$TLR_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-	1.675[b]	2.022[b]	-	1.034[b]	1.093[b]
	-	(0.004)	(0.005)	-	(0.023)	(0.029)
$BARRIERS_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.189	-0.078	0.018	-0.875	-0.315	-0.142
	(0.311)	(0.651)	(0.893)	(0.238)	(0.657)	(0.838)
MVE and BM Interactions	Included	Included	Included	Included	Included	Included
Institutional Interactions	Included	Included	Included	Included	Included	Included
Industry Interactions	Included	Included	Included	Included	Included	Included
Average Adj. R^2	0.0499	0.0502	0.0412	0.0480	0.0486	0.0394

[a,b,c] The sum of the coefficients on TLR*RET and TLR*NEG*RET is significantly positive at the 1,5 and 10% level using a one-tailed t-test.

Table 7
Influence of TLR practices on the responsiveness of firm-level investment after controlling for the timeliness of gain recognition in the country

This table presents select average coefficients from nine annual estimations (fiscal years 1995 to 2003) of the following cross-sectional model:

$$\log(I_{i,t} / I_{i,t-1}) = \alpha + \sum_{j=1}^{43}\alpha_j Ind_j + \beta_1 NEG_{j,t-1} + \beta_2 TLR_k + \beta_3 \log(1+BM_{i,t-1}) + \beta_4 \log(MVE_{i,t-1}) + \beta_5 FD_k + \beta_6 GDP_k + \beta_7 RIGHTS_k$$
$$+ \beta_8 TGR_k + \beta_9 SOE_k + \lambda_1 RET_{j,k,t-1} + \sum_{j=1}^{43}\gamma_j Ind_j * RET_{j,k,t-1} + \lambda_2 TLR_k * RET_{j,k,t-1} + \lambda_3 \log(1+BM_{i,t-1}) * RET_{j,k,t-1}$$
$$+ \lambda_4 \log(MVE_{i,t-1}) * RET_{j,k,t-1} + \lambda_5 FD_k * RET_{j,k,t-1} + \lambda_6 GDP_k * RET_{j,k,t-1} + \lambda_7 RIGHTS_k * RET_{j,k,t-1} + \lambda_8 SOE_k * RET_{j,k,t-1}$$
$$+ \lambda_9 TGR_k * RET_{j,k,t-1} + \lambda_{10} NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{11} TLR_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{12} \log(1+BM_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \sum_{j=1}^{43}\omega_j Ind_j * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{13} \log(MVE_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{14} FD_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \lambda_{15} GDP_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{16} RIGHTS_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{17} SOE_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \lambda_{16} TGR_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \varepsilon_{i,t}$$

where the country's level of timely gain recognition, TGR, is measured as the coefficient on positive returns from our country-level estimations of Ball, Kothari and Robin's non-linear earnings-return model. All remaining variables are defined in Appendix 1. The first set of estimations utilize raw, mean-adjusted firm-specific and institutional data; the second set of estimations use ranked country-level institutions (ranking -0.5 to 0.5). T-statistics and the related standard errors are based on the empirically derived distribution of nine annual coefficients. Two-tailed p-values are presented in parentheses (one-sided test for predicted TLR relations, two-tailed test otherwise).

	Raw, mean-adjusted variables			Ranked Institutions		
TLR Variable:	Baseline	All Countries	Exclude U.S.	Baseline	All Countries	Exclude U.S.
Response to increasing investment opportunities						
$RET_{j,k,t-1}$	0.276	0.268	0.387	0.146	0.171	0.355
	(0.164)	(0.161)	(0.107)	(0.620)	(0.554)	(0.255)
$TLR_k*RET_{j,k,t-1}$	-	-0.383	-0.530	-	-0.176	-0.271
	-	(0.378)	(0.226)	-	(0.549)	(0.381)
$TGR_k*RET_{j,k,t-1}$	-2.829	-2.437	-1.685	-0.158	-0.093	-0.016
	(0.400)	(0.463)	(0.612)	(0.646)	(0.799)	(0.965)
Incremental response to deteriorating investment opportunities						
$NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.237	0.291	-0.158	0.264	0.263	-0.062
	(0.459)	(0.377)	(0.694)	(0.419)	(0.411)	(0.857)
$TLR_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-	1.607[b]	1.601[b]	-	0.654[b]	0.744[c]
	-	(0.004)	(0.005)	-	(0.063)	(0.053)
$TGR_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	2.637	1.899	4.704	0.064	-0.005	0.111
	(0.625)	(0.711)	(0.477)	(0.917)	(0.994)	(0.880)
MVE and BM Interactions	Included	Included	Included	Included	Included	Included
Institutional Interactions	Included	Included	Included	Included	Included	Included
Industry Interactions	Included	Included	Included	Included	Included	Included
Average Adj. R^2	0.0489	0.0495	0.0418	0.0492	0.0496	0.0412

[a,b,c] The sum of the coefficients on TLR*RET and TLR*NEG*RET is significantly positive at the 1,5 and 10% level using a one-tailed t-test.

Table 8
Alternative measure of timely loss recognition practices: Ball and Shivakumar (2005)

This table presents select average coefficients from nine annual estimations (fiscal years 1995 to 2003) of the following cross-sectional model:

$$\log(I_{i,t} / I_{i,t-1}) = \alpha + \sum_{j=1}^{43}\alpha_j Ind_j + \beta_1 NEG_{j,k,t-1} + \beta_2 TLR_k + \beta_3 \log(1+BM_{i,t-1}) + \beta_4 \log(MVE_{i,t-1}) + \beta 5 FD_k + \beta_6 GDP_k$$
$$+ \beta_7 RIGHTS_k + \beta_8 SOE_k + \lambda_1 RET_{j,k,t-1} + \sum_{j=1}^{43}\gamma_j Ind_j * RET_{j,k,t-1} + \lambda_2 TLR_k * RET_{j,t-1} + \lambda_3 \log(1+BM_{i,t-1}) * RET_{j,k,t-1}$$
$$+ \lambda_4 \log(MVE_{i,t-1}) * RET_{j,k,t-1} + \lambda_5 FD_k * RET_{j,k,t-1} + \lambda_6 GDP_k * RET_{j,k,t-1} + \lambda_7 RIGHTS_k * RET_{j,k,t-1} + \lambda_8 SOE_k * RET_{j,k,t-1}$$
$$+ \lambda_9 NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{10} TLR_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{11} \log(1+BM_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \sum_{j=1}^{43}\omega_j Ind_j * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{12} \log(MVE_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{13} FD_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$$
$$+ \lambda_{14} GDP_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{15} RIGHTS_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \lambda_{16} SOE_k * NEG_{j,k,t-1} * RET_{j,k,t-1} + \varepsilon_{i,t}$$

	Raw, mean-adjusted variables			Ranked institutional data		
	Baseline	All Countries	Exclude U.S.	Baseline	All Countries	Exclude U.S.
Response to increasing investment opportunities						
$RET_{j,k,t-1}$	0.288	0.272	0.396	0.115	0.096	0.251
	(0.210)	(0.287)	(0.166)	(0.672)	(0.742)	(0.436)
$TLR_k * RET_{j,k,t-1}$	-	0.005	-0.048	-	-0.030	-0.020
	-	(0.990)	(0.893)	-	(0.925)	(0.953)
$\log(BM_{i,t-1}) * RET_{j,k,t-1}$	0.001	-0.004	0.077	-0.014	-0.017	0.074
	(0.995)	(0.985)	(0.714)	(0.941)	(0.930)	(0.717)
$\log(MVE_{i,t-1}) * RET_{j,k,t-1}$	-0.034	-0.036	-0.028	-0.037	-0.037	-0.030
	(0.430)	(0.397)	(0.600)	(0.386)	(0.390)	(0.573)
$FD_k * RET_{j,k,t-1}$	0.105	0.134	0.009	0.130	0.107	-0.028
	(0.374)	(0.338)	(0.490)	(0.355)	(0.389)	(0.469)
$GDP_k * RET_{j,k,t-1}$	0.124	0.078	0.131	0.186	0.164	0.251
	(0.035)	(0.106)	(0.049)	(0.059)	(0.083)	(0.105)
$RIGHTS_k * RET_{j,k,t-1}$	0.022	0.018	0.015	0.247	0.350	0.280
	(0.218)	(0.319)	(0.343)	(0.110)	(0.126)	(0.162)
$SOE_k * RET_{j,k,t-1}$	0.045	0.048	0.056	0.531	0.569	0.592
	(0.122)	(0.154)	(0.147)	(0.118)	(0.090)	(0.127)
Incremental response to deteriorating investment opportunities						
$NEG_{j,k,t-1} * RET_{j,k,t-1}$	0.207	0.401	0.169	0.259	0.458	0.197
	(0.501)	(0.355)	(0.558)	(0.390)	(0.241)	(0.573)
$TLR_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$	-	1.032[b]	1.014[b]	-	0.995[b]	0.915[a]
	-	(0.219)	(0.141)	-	(0.072)	(0.064)
$\log(BM_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1}$	-0.259	-0.258	-0.210	-0.236	-0.246	-0.224
	(0.273)	(0.277)	(0.473)	(0.311)	(0.284)	(0.427)
$\log(MVE_{i,t-1}) * NEG_{j,k,t-1} * RET_{j,k,t-1}$	-0.014	-0.016	-0.029	-0.004	-0.009	-0.020
	(0.823)	(0.792)	(0.706)	(0.953)	(0.890)	(0.805)
$FD_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$	-0.493	-0.551	-0.640	-0.801	-0.760	-0.823
	(0.376)	(0.279)	(0.195)	(0.198)	(0.193)	(0.211)
$GDP_k * NEG_{j,k,t-1} * RET_{j,k,t-1}$	0.111	0.124	0.091	0.449	0.361	0.295

	(0.502)	(0.430)	(0.538)	(0.354)	(0.404)	(0.525)
$RIGHTS_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.046	-0.041	-0.010	0.239	-0.447	-0.228
	(0.259)	(0.582)	(0.887)	(0.595)	(0.414)	(0.690)
$SOE_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.083	-0.095[c]	-0.110[b]	-1.123[c]	-1.074	-1.223[c]
	(0.056)	(0.042)	(0.025)	(0.063)	(0.059)	(0.064)
Industry Interactions	Included	Included	Included	Included	Included	Included
Average Adj. R^2	0.0479	0.0492	0.0395	0.0482	0.0492	0.0400

Investment growth of firm i (in industry j) in year t is measured as the log of the ratio of current to lagged additions to fixed assets (Global Vantage data item 145). $RET_{j,k,t-1}$ is the average twelve-month return to firms in industry j in country k in year t-1. $NEG_{j,k,t-1}$ is an indicator variable equal to one if $RET_{j,k,t-1}$ is less than zero in year t-1, zero otherwise. TLR is measured using coefficients from country-level estimations of non-linear accruals-cash flow model (BS_TLR). All remaining variables are defined in Appendix 1. The first three columns ("raw data") present coefficients from estimations where all firm-level and country-level independent variables have been mean-adjusted annually; the second set of columns ("ranked data") present coefficients from estimations where country-level institutions have been ranked between -0.5 and 0.5. The "all countries" sample consists of 43,210 firm-year observations from 25 countries. The sample excluding U.S. domiciled firms consists of 21,539 firm-year observations. T-statistics and the related standard errors are based on the empirically derived distribution of nine annual coefficients. P-values are presented in parentheses (one-sided for predicted TLR, FD, GDP, RIGHTS and SOE relations; two-sided otherwise). The superscripts a, b and c denote that the sum of the coefficients on RET and NEG*RET, interacted with either TLR or SOE, is significantly positive at the one, five and ten percent level, respectively, using a one-tailed t-test.

Table 9
Impact of timely loss recognition practices on the difference in elasticity of investment between declining and growing industries ($\eta_k^- - \eta_k^+$) using Wurgler (2000) data

Panel A: Descriptive Statistics

This panel presents descriptive statistics for the full set of countries with both Wurgler's estimates of investment elasticity and Bushman and Piotroski's estimates of timely loss recognition.

Variable	N	Mean	Std. Dev.	Median	Minimum	Maximum
Elasticity of investment (Source: Wurgler 2000)						
η_k	32	0.599	0.253	0.641	0.100	0.988
η_k^+	32	0.504	0.355	0.519	-0.388	1.057
η_k^-	32	0.509	0.355	0.465	-0.105	1.301
$\eta_k^- - \eta_k^+$	32	0.005	0.269	0.007	-0.415	0.654
Measures of timely loss recognition practices (Source: Bushman and Piotroski 2006)						
BKR_TLR	32	0.231	0.166	0.203	-0.024	0.575
BS_TLR	32	-0.359	0.393	-0.3845	-1.214	0.500
Country-level Institutions						
FINDEV	31	0.976	0.555	0.850	0.260	2.670
GDP 1960	32	4.124	2.605	3.375	0.640	9.910
SOE	32	3.781	2.498	4.000	0.000	10.000
RIGHTS	32	4.182	1.866	4.000	0.535	7.713

Panel B: Correlation Matrix

Pearson (Spearman) correlations above (below) the diagonal. Two-tailed p-values in parentheses.

	η_k	η_k^+	η_k^-	$\eta_k^- - \eta_k^+$	BKR_TLR	BS_TLR
η_k	1.000	0.901	0.835	-0.088	0.288	0.175
	-	(0.000)	(0.000)	(0.631)	(0.110)	(0.338)
η_k^+	0.891	1.000	0.712	-0.381	0.177	0.082
	(0.000)	-	(0.000)	(0.032)	(0.333)	(0.656)
η_k^-	0.881	0.767	1.000	0.378	0.424	0.376
	(0.000)	(0.000)	-	(0.033)	(0.016)	(0.034)
$\eta_k^- - \eta_k^+$	-0.075	-0.367	0.272	1.000	0.325	0.388
	(0.683)	(0.039)	(0.132)	-	(0.069)	(0.028)
BKR_TLR	0.346	0.175	0.412	0.273	1.000	0.669
	(0.052)	(0.337)	(0.019)	(0.131)	-	(0.000)
BS_TLR	0.206	0.002	0.292	0.344	0.701	1.000
	(0.258)	(0.993)	(0.105)	(0.054)	(0.000)	-

Table 9 (continued)
Impact of timely loss recognition practices on the difference in elasticity of investment between declining and growing industries ($\eta_k^- - \eta_k^+$)

Panel C: Cross-sectional estimations

This panel presents coefficients from various estimations of the following model:

$$(\eta_k^- - \eta_k^+) = \alpha + \beta_1 FD_k + \beta_2 GDP1960_k + \beta_3 RIGHTS_k + \beta_4 SOE_k + \beta_5 TLR_k + \varepsilon_k$$

where $(\eta_k^- - \eta_k^+)$ is the difference between the elasticity of manufacturing investment to value-added estimate for declining industry-year observations and the elasticity of manufacturing investment to value-added estimate for growing industry-year observations in country k. $FINDEV_k$ is a summary measure of financial development, measured as the log of one plus the average sum of stock market capitalization and credit to GDP. $GDP1960_k$ is the value of log per capital GDP for 1960. TLR_k is a country-level measure of timely loss recognition practices. SOE is index (0 to 10) of the State's involvement in the country's economy, based on the fraction of an economy's output due to state-owned enterprises. RIGHTS is an index of investor rights. It is the product of a measure of the rule of law and the number of important shareholder and creditor protections in the country's legal code.

TLR variable:	Ball Kothari and Robin (BKR_TLR)		Ball and Shivakumar (BS_TLR)	
Intercept	-0.179	-0.106	0.049	0.122
	(0.151)	(0.540)	(0.768)	(0.543)
$FINDEV_k$	-0.202[c]	-0.218[c]	-0.195[c]	-0.212
	(0.067)	(0.059)	(0.078)	(0.066)
$GDP(1960)_k$	-0.016	-0.019	-0.008	-0.012
	(0.475)	(0.414)	(0.712)	(0.593)
$RIGHTS_k$	0.084[b]	0.086[b]	0.064	0.067
	(0.030)	(0.029)	(0.118)	(0.107)
SOE_k	-	-0.012	-	-0.014
	-	(0.545)	-	(0.496)
TLR_k	0.487[c]	0.462[c]	0.213[c]	0.206[c]
	(0.065)	(0.078)	(0.067)	(0.077)
R^2	0.2721	0.2829	0.2702	0.2839
Adj. R^2	0.1601	0.1395	0.1580	0.1407
N	31	31	31	31

[a,b,c] Significant at the one, five and ten percent level, respectively (one-sided test for predicted TLR relation; two-sided test otherwise). P-values are presented in parentheses.