Capital Allocation and Timely Accounting Recognition of Economic Losses

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Abstract

This paper explores direct relations between corporate investment behavior and the timeliness of accounting recognition of economic losses (TLR) reflected in a country's accounting regime. We explicitly investigate the extent to which TLR influences investment decisions of firm managers. Given the asymmetric emphasis on negative outcomes inherent in TLR, we hypothesize that TLR will most strongly influence investment behavior when managers face deteriorating investment environments. We conjecture that TLR will have an asymmetric impact on investment behavior whereby TLR impacts firms' investment decisions in the face of declining investment opportunities, but not in the face of increasing in investment opportunities. Using firm-level investment decisions spanning twenty five countries, we find that investment responses to declining opportunities increases with TLR, while we find no evidence that TLR influences the sensitivity of investment to increasing investment opportunities. 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.

1. Introduction

Efficient capital allocation dictates that capital be invested in projects expected to be value creating and withdrawn from projects with poor prospects. At the heart of economic theories connecting a country's financial sector development with enhanced resource allocation is the role of the financial sector in reducing frictions due to information asymmetry and in promoting value-maximizing decisions by managers of firms.[1] Financial disclosure and related institutions designed to promote credible disclosure between managers and investors play a key role in facilitating efficient capital allocation. In particular, credible financial accounting information forms the foundation of the firm-specific information set available to investors, regulators and other stakeholders in an economy. Financial accounting provides a rich set of credible variables that support a wide range of enforceable contractual arrangements and that form a basis for outsiders to monitor and discipline the investment decisions and statements of firms' managers.[2]

In this paper, we investigate relations between corporate investment behavior and an important characteristic of a country's financial accounting regime, the timeliness of accounting recognition of economic losses (TLR). TLR derives from the notion of conditional accounting conservatism, defined as the imposition of stricter verification standards for recognizing good news than for recognizing bad news (Basu, 1997; Watts, 2003). Such asymmetric verification standards generally lead to timelier recognition in financial statements of bad news relative to good news (i.e., TLR). The impetus for conditional conservatism follows from the premise that

[1] Theories include, among others, that efficient market prices help improve investment decisions (Durnev et al., 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) and Shleifer and Vishny (1997).

[2] Bushman and Smith (2001) provide an extensive review of the literature on the corporate governance role of financial accounting.

managers have less incentive to recognize the effects of bad news than good news in the financial statements. Therefore, if the financial reporting regime requires early recognition of bad news, then bad news disclosures will have credibility despite being subject to lower verifiability thresholds. In contrast, the verifiability thresholds are not relaxed for good news because such reporting is likely to be unreliable. The timely incorporation of bad news into financial statements is posited to potentially influence managerial behavior because it provides timely, credible evidence about negative developments affecting the firm to shareholders and lenders, thus enabling these parties to respond more quickly to the deterioration in the firm's performance and/or financial condition. Thus, if managers know *ex ante* that negative consequences of their current decisions will trigger swift and decisive intervention by outside stakeholders, they will be less likely to engage in value destroying investments in the first place and more likely to exit losing projects on a timely basis.[3]

Given the asymmetric emphasis on negative outcomes inherent in TLR, we hypothesize that TLR will most strongly influence investment behavior when managers face deteriorating investment environments. We conjecture that TLR will have an asymmetric impact on investment behavior whereby TLR impacts firms' investment decisions in the face of declining investment opportunities, but not in the face of increasing in investment opportunities.[4] We empirically investigate whether country-level TLR differentially impacts the sensitivity of capital investment to declines and increases in investment opportunities. We find that the sensitivity of

[3] See for example Watts and Zimmerman (1986), Ball (2001), Watts (2003), Ball and Shivakumar (2005) and Kothari et al. (2010) for in-depth discussions of the disciplining role of conditional conservatism.

[4] Extant theories posit that managers have incentives to over-invest by pursuing value destroying projects, resisting exit from losing projects, and escalating commitment to losing projects. Theories include perquisite consumption (Jensen and Meckling, 1976), empire building (Jensen, 1986), pain avoidance (Jensen, 1998), signaling (Spence, 1974), and escalation of commitment (e.g., Staw, 1981; Kanodia et al., 1989; Camerer and Weber, 1999). TLR could also conceivably drive managers to under-invest in value increasing projects. For example, TLR could predispose risk-averse managers towards accepting low-risk projects and discarding high-risk projects even if they are value adding (e.g., Roychowdhury, 2010). We find no evidence of this in the data.

investment to declining opportunities increases with TLR, while we find no evidence that TLR influences sensitivity of investment to increasing investment opportunities.

A large literature in economics characterizes optimal investment decisions following two related approaches. The first approach, the real options literature, uses option pricing techniques to derive and characterize optimal investment behavior in settings allowing for uncertainty, partial irreversibility of investment, and path dependent investment decisions (see Dixit and Pindyck, 1994) for a survey and systematic exposition). This literature powerfully highlights situations where the classic, net present value rule for evaluating investment projects breaks down by explicitly incorporating strategic options, such as the option to delay, contract, or expand, into the decision rule. The second approach, *q*-theory, models the firm as facing convex costs of adjustment where, along the optimal investment path, the firm equates the marginal value of capital, measured by *q*, with the marginal cost of investment (e.g., Abel and Eberly, 1994; 1996). In *q*-theory, *q* summarizes the incentive to invest, where the real options literature focuses on isolating and understanding the distinct real options pertinent to the decision. Both the real options approach and the *q*-theory approach correctly characterize optimal behavior, but each approach offers distinctive insights about the investment decision (Abel et al., 1996).

Our empirical design follows the *q*-theoretic approach, building directly on the work of Abel and Eberly (1994), and Eberly (1997) who investigate non-linearity in the relation between optimal investment and investment opportunities. These papers incorporate fixed, linear, and convex adjustment costs into an optimizing model of the firm. Optimal investment is shown to follow a threshold rule where above an upper threshold value of *q,* investment is positive and increasing in *q*, below a lower threshold value of *q,* investment is negative and increasing in *q,*

and between the two thresholds, investment is zero and unresponsive to q.[5] Moreover, in the regions where investment responds to q, the relationship between investment and fundamentals need not be linear. Following the spirit of this literature, our empirical analysis allows for non-linearity in the relation between investment and changes in investment opportunities conditional on the sign of the change in investment opportunities. Specifically, we allow the sensitivity of investment to differ for positive and negative changes in investment opportunities. Non-linearity in this relationship is central to our study given our hypothesis that TLR asymmetrically influences investment responses to decreases and increases in investment opportunities.

In our first empirical specification, we utilize cross-country data spanning twenty five countries, allowing us to exploit both documented evidence of substantial cross-country variation in TLR (e.g., Ball et al., 2000; Ball et al., 2003; Bushman and Piotroski, 2006)), and substantial cross-country variation in investment behavior to be explained (e.g., Rajan and Zingales, 1998; Wurgler, 2000). In this specification, we measure investment at the firm level, use lagged industry stock returns to proxy for changes in q, and estimate TLR at the country level. Given data limitations, we focus here only on new capital investment which is bounded below by zero, and so we cannot speak to divestment behavior. In essence, this analysis presumes that firms are in the upper threshold region described in the previous paragraph, where investment is positive and increasing in q, and follows a non-linear relation that varies with TLR. We find that TLR increases the sensitivity of corporate investment to declining investment opportunities, and find no evidence that TLR influences the sensitivity of investment to increasing investment opportunities. These results are robust to different measures of TLR and extensive controls for firm-level, industry-level and country-level factors.

[5] Of course, such threshold strategies can be derived using the real option approach. See for example Abel et al. (1996) and Dixit (1992) for useful discussions.

We also find support for our hypotheses using a different data set and alternative investment sensitivity measures based on capital expenditures *net* of asset sales from Wurgler (2000).[6] Overall, these results are consistent with arguments that TLR disciplines investment by managers who are 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 value destroying projects). Our robustness tests using Wurgler's sensitivity measures are consistent with disciplinary effects that embed both *ex ante* and *ex post* (i.e. exiting or downsizing projects determined to be losers) aspects, although even with the Wurgler data we cannot examine investment and divestment separately.

Our paper contributes to the literature by providing evidence on a direct channel, investment behavior, through which TLR manifests a governance role. In this, we complement a recent paper by Francis and Martin (2010) who examine the link between firm-level conservatism and project selection by exploiting acquisition announcements. In contrast to their study, we examine relations between country-level TLR and general capital expenditures, and further, we explicitly allow TLR to have an asymmetric impact on investment behavior that depends on the investment environment. Our analysis complements the growing literature on the role of conservatism in facilitating efficient debt contracting, including Beatty et al. (2008), Zhang (2008), and Wittenberg-Moerman (2008). We also complement the largely indirect evidence on TLR's monitoring and governance benefits for shareholders, including Ahmed and Duellman (2007), LaFond and Watts (2008) and LaFond and Roychowdhury (2008).

There is also a growing literature that examines relations between general properties of accounting quality and investment behavior. Rajan and Zingales (1998), Biddle and Hillary

[6] Specifically, Wurgler uses the United Nations' *General Industrial Statistics* panel data to estimate investment elasticities at the country level. This contrasts with our first specification where our measure of investment behavior is estimated using recent accounting and returns data from Global Vantage.

(2006), and Francis et al. (2009) directly investigate how capital allocation around the world varies with the general transparency environment of a country, while Biddle et al. (2009) documents that higher financial reporting quality is associated with both lower over- and under-investment for a sample of US firms. Our focus on TLR allows us to extend the literature by considering asymmetric responses of investment to changes in investment opportunities.

The remainder of the paper is organized as follows. Section 2 develops 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. Conceptual framework

2.1 q-theory as a basis for estimating investment efficiency

A large investment literature has been built on the foundation of *q*-theory (see Hubbard, 1998) for a review of the literature). Formally, *q*-theory can be understood by examining the first order conditions with respect to maximizing investment and capital level choice in a firm's dynamic optimization problem. The first order condition with respect to current period investment equates the marginal cost of investment to the marginal value (shadow price) of capital, denoted by *q*. That is, the first order condition is

$$q_t = \Phi_I(I_t, K_t), \tag{1}$$

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. The

adjustment cost function embeds the cost of investment capital incurred when the firm buys capital or the price received when the firm sells capital, as well as costs of physical adjustment which may include both a fixed cost component and a component that is convex and increasing in investment.

Abel and Eberly (1994), allowing fixed, linear, and convex adjustment costs, show that optimal investment follows a threshold rule where above an upper threshold value of *q,* investment is positive and increasing in *q*, below a lower threshold value of *q,* investment is negative and increasing in *q,* and between the two thresholds, investment is zero and unresponsive to *q*. However, as discussed in the introduction, our data does not allow us to separately examine investment and divestment decisions as we are limited to new capital investment which is bounded below by zero. As a result, we follow the approach in Eberly (1997) and focus only on the region above the upper threshold where investment is positive and increasing in *q*. Because we only consider new capital investment and not abandonment, we do not directly consider important phenomenon like investment hysteresis in which investment decisions do not immediately reverse themselves when the investment environment reverses.

As noted by Eberly (1997), the relation between investment and *q* in this upper threshold region can be non-linear and can take on many alternative shapes. For example, Eberly (1997) considers an adjustment cost function of the form:

$$\Phi(I_t, K_t) = \frac{\lambda}{1+\lambda}\left(\frac{I_t}{K_t}\right)^{\frac{1+\lambda}{\lambda}} K_t \quad , \quad \lambda > 0 \quad , \tag{2}$$

where λ is an exogenous parameter. Taking the derivative of (2) with respect to I_t and substituting into (1) yields the optimal investment rule

$$\frac{I_t}{K_t} = q_t^{\lambda} \quad . \tag{3}$$

It can be seen from (3) that λ parameterizes the shape of the functional relation between investment and q. If λ = 1, the relation is linear, if λ >1 it is convex, and if λ < 1 it is concave. The precise functional form of this relation has yet to be determined in the literature.

In our analysis, we posit a simple non-linear relation between investment and q. To derive our empirical specification, start with equation (3) and set λ=1, log both sides, and express the relation in changes, yielding

$$\begin{aligned} &\Delta \ln(I/K) = \ln(q_t/q_{t-1}) \Leftrightarrow \\ &\ln\left(\frac{I_t}{I_{t-1}} * \frac{K_{t-1}}{K_t}\right) = \ln(q_t/q_{t-1}) \Leftrightarrow \\ &\ln\left(\frac{I_t}{I_{t-1}}\right) = \ln(q_t/q_{t-1}) - \ln\left(\frac{K_{t-1}}{K_t}\right), \end{aligned} \tag{4}$$

where Δ denotes changes in a variable. Instead of positing a single shape parameter λ as in Eberly (1997), 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 investment opportunities to differ. That is, we modify equation (4) to yield our baseline model,

$$\ln\left(\frac{I_t}{I_{t-1}}\right) = \beta NEG + \lambda_1 \ln(q_t/q_{t-1}) + \lambda_2 NEG * \ln(q_t/q_{t-1}) - \ln\left(\frac{K_{t-1}}{K_t}\right). \tag{5}$$

In this model, NEG is an indicator variable set equal 1 for decreasing investment opportunities (i.e., $q_t < q_{t-1}$) and zero otherwise.[7] Thus, λ_1 captures the investment response to an expansion of investment opportunities (i.e., $q_t > q_{t-1}$), 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.

[7] In equation (5), the term $ln(K_{t-1}/K_t)$ is unrelated to the asymmetric response of investment to positive and negative changes in investment opportunities. Thus, for parsimony, we suppress this term for the remainder of this section.

Turning to our main research hypothesis, we seek to explicitly investigate the extent to which TLR asymmetrically impacts the investment behavior of firm managers. Economic justifications for TLR generally argue that the timely incorporation of bad news into financial statements shapes managerial behavior by providing credible information to shareholders and lenders about negative developments affecting the firm, enabling these parties to respond more quickly to a deterioration in the firm's profitability and / or financial condition (Kothari et al., 2010) provide a comprehensive discussion of the arguments). These arguments suggest that the asymmetric emphasis on negative outcomes inherent in TLR will more strongly influence managerial behavior in situations where managers face a deteriorating operating environment. This leads to our main research hypotheses:

TLR has an asymmetric impact on firms' investment behavior whereby

i. *The sensitivity of corporate investment to a decrease in investment opportunities is higher in economies with financial reporting regimes characterized by relatively high TLR practices, and*

ii. *The sensitivity of corporate investment to an increase in investment opportunities is not related to TLR practices.*

To test this hypothesis, we estimate TLR at the country level for 25 countries, and examine the responses of firms' investment decisions to decreasing and increasing investment opportunities as a function of country level TLR. Specifically, the impact of TLR on investment behavior is estimated by extending equation (5) to yield:

$$\ln(I_t / I_{t-1}) = \beta_1 NEG + \beta_2 TLR + \lambda_1 \ln(q_t / q_{t-1}) + \lambda_2 \ln(q_t / q_{t-1}) * TLR + \lambda_3 NEG * \ln(q_t / q_{t-1}) + \lambda_4 NEG * \ln(q_t / q_{t-1}) * TLR. \quad (6)$$

Our hypotheses can be restated in terms of estimated coefficients from model 6:

i. The sensitivity of corporate investment to a decrease in investment opportunities is higher in countries with relatively higher TLR practices if $\lambda_4 > 0$ for incremental sensitivity and $\lambda_2 + \lambda_4 > 0$ for total sensitivity.

ii. The sensitivity of corporate investment to an increase in investment opportunities is not related to TLR practices if $\lambda_2 = 0$.

2.2 Institutions other than TLR that impact investment and other control variables

Wurgler (2000), among others, shows that primitive legal, financial and economic institutions, other than accounting practices, impact firms' responses to changes in investment opportunities. We extend equation (6) to incorporate control variables, denoted as X:

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

In this equation, λ_5 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 $\lambda_5 + \lambda_6$ captures the total effect of X on investment sensitivity to deteriorating opportunities.[8]

To mitigate concerns about omitted correlated variables, we control for four country level institutions in our baseline model: (1) 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, (2) per capita GDP in 1992 (GDP_k), (3) investor rights ($RIGHTS_k$), measured as the product of the LaPorta et al.'s (1998) measures of domestic "rule of law" and the total number of shareholder and creditor

[8] For example, suppose that X impacts investment sensitivity symmetrically regardless of the sign of the change in investment opportunities. In this case, $\lambda_5 = \eta \neq 0$ 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 $\lambda_5 = 0$ and $\lambda_6 = \eta$. Finally, if X impacts the sensitivity of investment to increased opportunities while having no impact on the overall sensitivity of investment to decreased opportunities, then $\lambda_5 = \eta$ and $\lambda_6 = -\eta$ (i.e., $\lambda_5 + \lambda_6 = 0$). As such, our research design allows institutions to impact investment behavior differentially conditional on whether investment opportunities are expanding or contracting.

rights identified in the country's legal code, and (4) a measure of the importance of state-owned enterprises to the economy's total output (SOE_k).

Based on prior empirical studies, these country-level institutions are correlated with TLR (e.g., Bushman and Piotroski, 2006), and are expected to affect investment sensitivities to changes in investment opportunities.[9] 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). The extent of state ownership of economic enterprises may affect investment sensitivities because the investment policies of firms with high levels of state ownership are likely to be sensitive to the incentives of politicians. Because the survival of a political regime often depends on its ability to promote employment opportunities for its citizens, 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, may differ across industries regardless of country and can directly impact investment adjustment costs. To control for these types of industry effects, we allow both intercepts and slopes on changes in investment opportunities to vary 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. 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

[9] 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 et al. (2002), Love (2003) and Biddle and Hilary (2006), among others, for evidence of an overall effect of these institutions on investment decisions. The Appendix describes all of our variables and their sources. In section 4.2 we also include legal origin and measures of the regulatory burden placed on firms.

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 (2006), Fama and French (2006), and Fama and French (1995), among others document that investment growth (and profitability) are strongly related to the book-to-market ratio. Although we use change in investment to remove firm fixed-effects, the firm's book-to-market ratio can also control for firm-level differences in unconditional conservatism (see discussion in Roychowdhury and Watts, 2007). Finally, firm size is included to control for differing stages in firms' life cycles. For example, young firms respond differently than mature firms to a given change in investment opportunities.

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 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 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.[10] 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 *q* are estimated using lagged industry stock returns. A number of papers use stock returns to proxy for change in investment opportunities, including Fama (1981), Morck et al. (1990), Blanchard et al. (1993), Barro (1990) and Lamont (2000). We define change in *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 provides evidence of such a time lag between change in opportunities and investment response.[11] Because of this lagged response, investment and lagged stock returns positively co-vary. The idea is that when discount rates fall, stock prices rise and firms increase investment in response to the falling hurdle rate.[12] 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 from the Global Vantage Industrial/Commercial and Issues file, respectively. Our final sample is limited to investment activity over the nine year period 1995 to 2003. This time period is chosen to correspond with the period over which our country-level data on timely loss recognition practices and institutional characteristics are drawn

[10] 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.
[11] 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.
[12] 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 *q*.

(e.g., Bushman and Piotroski, 2006; LaPorta et al., 1998). 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.

3.2 Measurement of timely loss recognition in accounting earnings

We use cross-country estimates of TLR practices from Bushman and Piotroski (2006).[13] Following Ball et al. (2000), Bushman and Piotroski create country-level estimates of TLR practices by estimating the following piece-wise linear earnings-return model (i.e., Basu, 1997) 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.[14] 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*.[15]

[13] In recent years, a number of papers have examined conditional conservatism in an international context. Papers include Giner and Rees (2001), Raonic et al. (2004), Lara et al. (2005), Dargenidou et al. (2007), Jenkins et al. (2009), Lara et al. (2009), and Shuto and Takada (2010).

[14] 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.

[15] Pope and Walker (1999) introduce a model designed to capture Basu's intuition, and use this model to develop new measures of earnings conservatism. In addition, they examine the sensitivity of TLR estimates to the choice of earnings measure, and the inclusion of proxies for prior period news in the analysis. Our results are robust to an alternative measure of TLR based on the piece-wise linear accruals-cash flow model of Ball and Shivakumar (2005).

Our decision to measure TLR as a country level attribute reflects both pragmatic and conceptual considerations. First, Ball et al. (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 country-level institutions play in shaping reporting incentives, variation in TLR across firms or industries 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.[16]

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 *q*, TLR, and other firm-specific and country-level attributes, our primary tests involve estimating alternative specifications of the following cross-sectional model:

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[16] Conceptualize that the TLR practices of firm i, in industry j, in country k consist of three components: a country-specific component that captures the general TLR tendency of all firms in the country; an industry-specific component; and a firm-specific component. Then, a given firm's observed TLR reporting practice is:

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

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. Prior research pools all firms and industries within a country for all available years to achieve maximum power in estimating TLR. These country-level estimations capture an estimate of the first-order, country component of financial reporting practices. Thus, our research design examines relations between the general tendency towards timely loss recognition practices in a country and firm-level investment decisions. We do not provide evidence on whether industry or firm-specific components of TLR have an incremental effect on firm-level investment behavior.

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

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 in the Appendix.

As discussed earlier, 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 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 of 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 $\lambda_{10} > 0$ and $\lambda_2 + \lambda_{10} > 0$. 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, TLR is expected to have a larger positive effect on investment sensitivities to declining investment opportunities than on investment sensitivities to increasing opportunities. Second, a variety of unspecified country-level factors potentially correlated with TLR may symmetrically influence the sensitivity of investment to both expanding and deteriorating investment opportunities. In principle, focusing on the incremental effect implicitly controls for these symmetric shifts in investment sensitivity (i.e., taking the difference in these investment sensitivities ($\lambda_2 + \lambda_{10} - \lambda_2 = \lambda_{10}$) controls for symmetric effects), reducing the impact of correlated omitted variables on our inferences.

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 $\lambda_{10} > 0$. Documenting that both $\lambda_{10} > 0$ and $\lambda_2 + \lambda_{10} > 0$ will provide complementary evidence for the hypothesized governance role of TLR that is stronger than evidence gathered from 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 nine annual estimations, and reported p-values and interpretations of statistical significance are based on the empirical distribution of these annual coefficients.[17]

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,

[17] Given the static nature of many of our independent variables, time-series dependence could also be a concern in our data. An alternative approach to control for both cross-sectional and time-series dependence would be to estimate clustered standard errors from a pooled, cross-sectional estimation. However, due to the limited time-series of our data (maximum nine annual observations), this clustering approach also has limited efficiency in our setting (Petersen, 2009).

respectively.[18] 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.

4 Empirical results

4.1 Baseline estimations

Table 2 presents our main results. The first pair of columns presents average coefficients from estimations of equation (10) using raw data. The second pair 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.

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

The results in Table 2 support our main empirical hypotheses. These estimations indicate that the incremental sensitivity of investment spending to a decline in investment opportunities increases with TLR practices (i.e., $\lambda_{10} > 0$, significant at the one-percent level). Additionally, these estimations reveal that the total sensitivity of investment spending to a decline in investment opportunities also increases with TLR (i.e., $\lambda_2 + \lambda_{10} > 0$, significant at the one-percent level). These results hold across both the full sample and the non-U.S. sample, regardless of whether country-level institutions are measured using raw or ranked data, and after controlling for industry effects, firm-level book-to-market ratios and market capitalizations, and country-level measures of financial development, GDP, investor rights, and state ownership of enterprises. In contrast, the sensitivity of investment spending to an *increase* in investment opportunities does not vary significantly with TLR (i.e., λ_2 is not significantly different from zero). Collectively these results are consistent with the hypothesized asymmetric governance role of timely loss recognition practices.

In terms of other institutional variables, we find that the sensitivity of investment spending to changes in investment opportunities increases significantly with per capita wealth (GDP) (i.e., $\lambda_6 > 0$, significant at the ten percent level in all models). In addition, our subset of estimations using ranked institutional variables provides some evidence that the sensitivity of investment to changing investment opportunities significantly increases with investor rights (RIGHTS) (i.e., $\lambda_7 > 0$). The impact of GDP and RIGHTS on investment sensitivities appears to be symmetric for positive and negative changes in investment opportunities, as evidenced by the insignificance of coefficients λ_{14} and λ_{15}, respectively.

The estimations in Table 2 also identify an asymmetric relation between state ownership of enterprise (SOE) and investment sensitivities to increasing vs. decreasing investment

opportunities (i.e., $\lambda_{16} < 0$). Specifically, SOE has a significantly negatively influences the incremental sensitivity of investment to declining investment opportunities (relative to its impact on the 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.[19]

4.2 Refinements to our baseline estimations

The estimations presented in Table 2 incorporate country-level variables proxying for the first-order financial, legal and political institutions that are expected to shape cross-country differences in investment behavior. The following sections extend our baseline analysis to examine the impact of other potentially correlated institutions and firm-specific characteristics on these investment relations.

4.2.1 Separate impact of debt and equity markets on investment behavior

Bushman and Piotroski (2006) and Ball et al. (2008) both show 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

[19] 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.

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 the 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 Influence of entry barriers on investment behavior

An important country-level determinant of investment efficiency is likely to be the regulatory burden faced by business firms. We control for cross-country differences in regulatory burden using a measure of start-up entry barriers ($BARRIERS_k$). 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 et al., 2002). This variable is a powerful proxy for regulatory constraints and government bureaucracy. As documented by Djankov et al. (2002), 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 4 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.

4.2.3 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 5 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.[20]

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

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 et al., 2003; Bushman et al., 2004). Thus, TLR could proxy for more general differences in the country's information environment. Conceptually, an improvement in the transparency of corporate reporting should influence resource allocation. Consistent with these arguments, prior

[20] 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.

research (e.g., Biddle and Hilary, 2006; Francis et al, 2009; Biddle et al., 2009) documents a positive relation between investment sensitivities and various proxies for earnings quality.

Using the CIFAR index of corporate disclosure intensity compiled by the Center for Financial Analysis and Research as a proxy for corporate transparency in the economy, we find that the inclusion of CIFAR in our estimation of equation (10) does not materially alter our inferences with respect to TLR (results not tabulated).[21] Moreover, with the exception of a weak positive relation after we remove U.S. firms from the sample, our results fail to detect a significant relation between corporate transparency and investment sensitivities.[22,23]

4.2.5 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 et al. (1996) document a negative relation between investment growth and leverage. To mitigate concerns about omitted firm-level variables, 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.

[21] The CIFAR index 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).

[22] We obtain similar inferences if we utilize a country-level measure of stock return synchronicity (e.g., Morck et al., 2000; Durnev et al., 2003) in lieu of CIFAR.

[23] 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. The inclusion of TGR_k in our estimation of equation (10) does not materially alter our inferences with respect to TLR (results not tabulated). Moreover, our estimations fail to detect a significant relation between the timely recognition of economic gains and investment sensitivities.

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 Robustness tests: Alternative measures of TLR practices and investment sensitivities

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 et al., 2000). To the extent that the information content of annual stock returns varies across economies, our measure of TLR would be misspecified. Additionally, Dietrich et al. (2007), among others, argue that the timely loss coefficients from the traditional piece-wise linear earnings-returns model do not reflect accounting properties, but 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., Wittenberg-Moerman, 2008; Ball and Shivakumar, 2008).

Table 6 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.[24] The elasticity coefficient for each country k, η_k, is a measure 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 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

[24] 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). 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.

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 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 TLR data yields a maximum sample of 32 country-level observations. Table 7, 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 7, panel B presents a correlation matrix. Interestingly, both of our TLR measures, TLR_k (from piece-wise linear earnings-return model) and TLR_BS (from piece-wise linear accruals-cash flow model), 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 7, 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 the 10% level, one-sided) in all models, regardless of which TLR measure is employed. More importantly, these estimations produce inferences consistent with those gleaned in earlier tables.

The consistency of the results in Table 7 with the results of 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. Finally, 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 value destroying 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). However, we caution that even with the Wurgler data, we cannot examine investment and divestment separately; an analysis that examines the influence of TLR on divestment decisions remains a significant opportunity for further research.

6. Conclusions

Using firm-level investment decisions spanning twenty five countries, we find that the total and incremental sensitivity of corporate investment to a decrease in investment opportunities is higher in countries with relatively strong TLR practices. These inferences are robust to the use of alternative measures of TLR and alternative measures of investment sensitivity, mitigating concerns that these results are an artifact of our research design or a spurious correlation resulting from the use of stock returns in both the our 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 a proxy for an omitted variable. Together, our findings support the hypothesis that TLR dampens investment in the face of declining investment opportunities.

However, the interpretation of our results is subject to several caveats. First, while we establish a positive relation between TLR and investment responses to declining investment opportunities, this does not necessarily imply a relation between TLR and investment *efficiency*. A positive relation does not unambiguously imply a positive relation between TLR and investment *efficiency* as we cannot quantify precisely the optimal response to changing investment opportunities.[25]

Second, our study does not speak directly to the precise channels through which TLR operates on investments behavior. We appeal to a general notion of governance that encompasses

[25] 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.

a wide potential range of actions by outside equity and debt holders and the use of accounting variables in formal contracts, but do not isolate specific channels through which these actions occur. For example, an important literature exams the role of internal performance measures in inducing efficient, delegated investment decision-making in settings of uncertainty, irreversibility, and path dependent investment options. This literature establishes the existence of performance measures that lead to optimal delegated investment decisions in a variety of different settings (e.g., Stark, 2000; Rogerson, 1997; Grinyer and Walker, 1990; Kay and Mayer, 1986; and Scapens, 1979). However, it is not clear how our results on country-level TLR relate to this literature given the absence of one-for-one mapping between reported accounting income and effective performance measures. If optimal investment can be motivated with performance measures that are independent of country-level TLR practices, it is not clear why TLR should have an incremental impact. Our results are consistent with the idea that control over firms' investment decision is manifested through an interrelated web of mechanisms that include internal performance measures, reported accounting income, board pressure, and pressure from outside investors. Understanding these interrelationships is an important avenue for future research.

Third, 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).

Despite these limitations, our research design had the potential, ex ante, to cast meaningful doubt on the hypothesized investment disciplining role of TLR. We believe that our

analysis represents a useful step in understanding the relation between timely loss recognition practices and investment behavior and contributes to a broader literature examining how firm-level governance practices, and corporate transparency in general, shape corporate investment behavior. Moreover, documenting that timely loss recognition practices is included as part of equilibrium institutional configurations associated with enhanced investment discipline is an important step in understanding the role of accounting information in shaping the real outcomes of firms and countries. Future research can attempt to provide additional insight into the interactions that exist within these institutional configurations, and the unique means by which TLR practices, and accounting and disclosure practices more generally, shape real investment behavior.

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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)
TLR_BS_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 [2000] 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 (2002)
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)
$FINDEV_k$	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	1.391	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
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, 2006)							
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

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	
	All Countries	Exclude U.S.	All Countries	Exclude U.S.
Response to increasing investment opportunities				
$RET_{i,k,t-1}$	0.273 (0.221)	0.394 (0.131)	0.135 (0.611)	0.305 (0.325)
$TLR_k * RET_{i,k,t-1}$	-0.621 (0.137)	-0.610 (0.184)	-0.346 (0.163)	-0.348 (0.191)
$\log(BM_{i,t-1}) * RET_{i,k,t-1}$	0.003 (0.988)	0.072 (0.732)	-0.017 (0.931)	0.069 (0.742)
$\log(MVE_{i,t-1}) * RET_{i,k,t-1}$	-0.033 (0.438)	-0.031 (0.577)	-0.039 (0.378)	-0.036 (0.512)
$FD_k * RET_{i,k,t-1}$	0.055 (0.842)	-0.146 (0.701)	-0.007 (0.984)	-0.189 (0.621)
$GDP_k * RET_{i,k,t-1}$	0.127 (0.035)	0.164 (0.046)	0.277 (0.028)	0.367 (0.051)
$RIGHTS_k * RET_{i,k,t-1}$	0.032 (0.123)	0.031 (0.138)	0.425 (0.036)	0.374 (0.038)
$SOE_k * RET_{i,k,t-1}$	0.042 (0.167)	0.049 (0.192)	0.547 (0.123)	0.527 (0.220)
Incremental response to deteriorating investment opportunities				
$NEG_{i,k,t-1} * RET_{i,k,t-1}$	0.282 (0.399)	0.030 (0.910)	0.266 (0.370)	0.039 (0.901)
$TLR_k * NEG_{i,k,t-1} * RET_{i,k,t-1}$	2.124[a] (0.001)	2.033[a] (0.005)	1.005[a] (0.002)	1.041[a] (0.003)
$\log(BM_{i,t-1}) * NEG_{i,k,t-1} * RET_{i,k,t-1}$	-0.258 (0.282)	-0.187 (0.538)	-0.228 (0.342)	-0.195 (0.512)
$\log(MVE_{i,t-1}) * NEG_{i,k,t-1} * RET_{i,k,t-1}$	-0.015 (0.811)	-0.021 (0.787)	-0.003 (0.967)	-0.007 (0.931)
$FD_k * NEG_{i,k,t-1} * RET_{i,k,t-1}$	-0.523 (0.256)	-0.679 (0.287)	-0.706 (0.214)	-0.777 (0.271)
$GDP_k * NEG_{i,k,t-1} * RET_{i,k,t-1}$	0.062 (0.652)	0.041 (0.766)	0.205 (0.647)	0.052 (0.909)

$RIGHTS_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.023 (0.659)	0.049 (0.533)	-0.078 (0.886)	0.013 (0.981)
$SOE_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.073 (0.082)	-0.094[c] (0.059)	-1.092[c] (0.069)	-1.217[c] (0.069)
Industry Interactions	Included	Included	Included	Included
Average Adj. R^2	0.0485	0.0391	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 piece-wise 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 empirical 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 empirical 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:	All Countries	Exclude U.S.	All Countries	Exclude U.S.
Response to increasing investment opportunities				
$RET_{i,k,t-1}$	0.318 (0.097)	0.364 0.110	0.189 (0.503)	0.399 (0.218)
$TLR_k*RET_{i,k,t-1}$	-0.521 (0.178)	-0.614 (0.086)	-0.205 (0.418)	-0.245 (0.351)
$FD\_EQ_k*RET_{i,k,t-1}$	-0.046 (0.743)	-0.077 (0.600)	-0.245 (0.613)	-0.299 (0.507)
$FD\_DEBT_k*RET_{j,k,t-1}$	-0.009 (0.979)	-0.171 (0.572)	-0.380 (0.495)	-0.482 (0.376)
Incremental response to deteriorating investment opportunities				
$NEG_{i,k,t-1}*RET_{i,k,t-1}$	0.201 (0.506)	-0.120 (0.746)	0.193 (0.547)	-0.169 (0.680)
$TLR_k*NEG_{i,k,t-1}*RET_{i,k,t-1}$	1.932[a] (0.000)	2.115[a] (0.000)	0.909[a] (0.005)	0.951[a] (0.007)
$FD\_EQ_k*NEG_{i,k,t-1}*RET_{i,k,t-1}$	-0.132 (0.475)	-0.200 (0.341)	-0.271 (0.695)	-0.460 (0.517)
$FD\_DEBT_k*NEG_{i,k,t-1}*RET_{i,k,t-1}$	-0.228 (0.619)	-0.359 (0.482)	-0.031 (0.969)	-0.133 (0.867)
MVE and BM Interactions	Included	Included	Included	Included
Institutional Interactions	Included	Included	Included	Included
Industry Interactions	Included	Included	Included	Included
Average Adj. R^2	0.0494	0.0400	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
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 utilizes 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 empirical 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:	All Countries	Exclude U.S.	All Countries	Exclude U.S.
Response to increasing investment opportunities				
$RET_{i,k,t-1}$	0.282 (0.186)	0.434 (0.070)	0.166 (0.573)	0.292 (0.336)
$TLR_k*RET_{i,k,t-1}$	-0.762 (0.089)	-0.848 (0.080)	-0.285 (0.213)	-0.381 (0.135)
$BARRIERS_k*RET_{j,k,t-1}$	-0.119 (0.046)	-0.121 (0.063)	-0.333 (0.234)	-0.453 (0.152)
Incremental response to deteriorating investment opportunities				
$NEG_{j,k,t-1}*RET_{j,k,t-1}$	0.455 (0.289)	0.047 (0.891)	0.289 (0.413)	0.107 (0.720)
$TLR_k*NEG_{i,k,t-1}*RET_{i,k,t-1}$	1.675[b] (0.004)	2.022[b] (0.005)	1.034[b] (0.023)	1.093[b] (0.029)
$BARRIERS_k*NEG_{j,k,t-1}*RET_{j,k,t-1}$	-0.078 (0.651)	0.018 (0.893)	-0.315 (0.657)	-0.142 (0.838)
MVE and BM Interactions	Included	Included	Included	Included
Institutional Interactions	Included	Included	Included	Included
Industry Interactions	Included	Included	Included	Included
Average Adj. R^2	0.0502	0.0412	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 5
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 empirical 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:	All Countries	Exclude U.S.	All Countries	Exclude U.S.
Response to increasing investment opportunities				
$RET_{i,k,t-1}$	0.288 (0.164)	0.424 (0.063)	0.158 (0.532)	0.365 (0.186)
$TLR_k*RET_{i,k,t-1}$	-0.458 (0.375)	-0.558 (0.229)	-0.303 (0.308)	-0.282 (0.221)
$SHR\_RTS_k*RET_{i,k,t-1}$	0.052 (0.094)	0.044 (0.137)	0.447 (0.012)	0.328 (0.062)
$CR\_RTS_k*RET_{i,k,t-1}$	-0.004 (0.939)	-0.007 (0.896)	-0.039 (0.876)	-0.017 (0.941)
Incremental response to deteriorating investment opportunities				
$NEG_{i,k,t-1}*RET_{i,k,t-1}$	0.343 (0.290)	0.026 (0.901)	0.139 (0.536)	-0.255 (0.401)
$TLR_k*NEG_{i,k,t-1}*RET_{i,k,t-1}$	1.307[b] (0.003)	1.499[b] (0.000)	0.653[c] (0.027)	0.649[c] (0.004)
$SHR\_RTS_k*NEG_{i,k,t-1}*RET_{i,k,t-1}$	0.095 (0.115)	0.101 (0.061)	0.168 (0.359)	0.309 (0.145)
$CR\_RTS_k*NEG_{i,k,t-1}*RET_{i,k,t-1}$	0.005 (0.951)	0.044 (0.675)	0.097 (0.854)	0.209 (0.688)
MVE and BM Interactions	Included	Included	Included	Included
Institutional Interactions	Included	Included	Included	Included
Industry Interactions	Included	Included	Included	Included
Average Adj. R^2	0.0500	0.0409	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 6
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:

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

	Raw, mean-adjusted variables		Ranked institutional data	
	All Countries	Exclude U.S.	All Countries	Exclude U.S.
Response to increasing investment opportunities				
$RET_{i,k,t-1}$	0.272 (0.287)	0.396 (0.166)	0.096 (0.742)	0.251 (0.436)
$TLR\_BS_k * RET_{i,k,t-1}$	0.005 (0.990)	-0.048 (0.893)	-0.030 (0.925)	-0.020 (0.953)
Incremental response to deteriorating investment opportunities				
$NEG_{i,k,t-1} * RET_{i,k,t-1}$	0.401 (0.355)	0.169 (0.558)	0.458 (0.241)	0.197 (0.573)
$TLR\_BS_k * NEG_{i,k,t-1} * RET_{i,k,t-1}$	1.032[b] (0.219)	1.014[b] (0.141)	0.995[b] (0.072)	0.915[a] (0.064)
Industry Interactions	Included	Included	Included	Included
Average Adj. R^2	0.0492	0.0395	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_BS_k is measured using coefficients from country-level estimations of piece-wise linear accruals-cash flow 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 empirical 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 7
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)						
TLR	32	0.231	0.166	0.203	-0.024	0.575
TLR_BS	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^-	$\eta_k^- - \eta_k^+$	TLR	TLR_BS
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)
TLR	0.346	0.175	0.412	0.273	1.000	0.669
	(0.052)	(0.337)	(0.019)	(0.131)	-	(0.000)
TLR_BS	0.206	0.002	0.292	0.344	0.701	1.000
	(0.258)	(0.993)	(0.105)	(0.054)	(0.000)	-

Table 7 (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:

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

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 (either TLR_k or TLR_BS_k). 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 (TLR_k)	Ball and Shivakumar (TLR_BS_k)
Intercept	-0.106 (0.540)	0.122 (0.543)
$FINDEV_k$	-0.218[c] (0.059)	-0.212 (0.066)
$GDP(1960)_k$	-0.019 (0.414)	-0.012 (0.593)
$RIGHTS_k$	0.086[b] (0.029)	0.067 (0.107)
SOE_k	-0.012 (0.545)	-0.014 (0.496)
TLR_k	0.462[c] (0.078)	0.206[c] (0.077)
R^2	0.2829	0.2839
Adj. R^2	0.1395	0.1407
N	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.