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Financial Reporting Quality and Investment Efficiency of Private Firms in Emerging Markets

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ABSTRACT: Prior research shows that financial reporting quality (FRQ) is positively related to investment efficiency for large U.S. publicly traded companies. We examine the role of FRQ in private firms from emerging markets, a setting in which extant research suggests that FRQ would be less conducive to the mitigation of investment inefficiencies. Earlier studies show that private firms have lower FRQ, presumably because of lower market demand for public information. Prior research also shows that FRQ is lower in countries with low investor protection, bank-oriented financial systems, and stronger conformity between tax and financial reporting rules. Using firm-level data from the World Bank, our empirical evidence suggests that FRQ positively affects investment efficiency. We further find that the relation between FRQ and investment efficiency is increasing in bank financing and decreasing in incentives to minimize earnings for tax purposes. Such a connection between tax-minimization incentives and the informational role of earnings has often been asserted in the literature. We provide explicit evidence in this regard.

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I. INTRODUCTION

This study examines the relation between financial reporting quality (FRQ) and investment efficiency for a sample of private firms in emerging markets.[1] We believe that such a study is important for the following reasons. First, and foremost, it is inherently interesting to examine settings in which the mitigation of investment inefficiencies is less likely. As discussed in detail below (see Section II), widely cited prior research concludes that private firms have lower FRQ than do public firms. The most common explanation offered is that private firms face less demand for high-quality financial information. In addition, a long line of research suggests that the value relevance of accounting information is lower in less developed countries than in more developed countries. Combining these two findings from prior research, this study examines the importance of accounting information in a setting that, *ex ante*, is expected to be less conducive to the mitigation of under- and overinvestment observed in the literature for U.S. publicly traded firms (e.g., Biddle and Hilary 2006; Hope and Thomas 2008; McNichols and Stubben 2008; Biddle et al. 2009).

Second, notwithstanding the fact that private firms (i.e., firms that are not traded on public stock exchanges) are the predominant organization in most countries, little is known about private firms' financial reporting. Compared with the large literature on developed countries' accounting systems and managers' reporting incentives, much less is known about the role of accounting in emerging markets. Research on private firms from emerging markets is virtually nonexistent despite its importance to international organizations such as the World Bank, the International Accounting Standards Board (IASB), and others.

Finally, our study complements and extends prior research on the economic consequences of variations in FRQ. In addition to investigating the overall effect of FRQ on investment efficiency, we introduce two conditional hypotheses. First, high-quality accounting information is likely more desirable in mitigating information asymmetry for private firms when they are in need of external financing. Thus, we examine whether private firms' investment efficiency is more sensitive to FRQ when these firms seek bank financing. Although prior research has examined the importance of financing sources in other settings, we are unaware of tests relating financing sources, FRQ, and investment efficiency for private firms from emerging markets. We also are unaware of studies that examine the importance of bank financing relative to other non-public equity external financing.

As our second conditional test, we consider the role of tax incentives, as prior studies generally ignore tax considerations (Hanlon and Heitzman 2010). Our study contributes by examining how tax incentives affect the strength of the relation between FRQ and investment decisions. Based on prior literature, tax considerations are especially important for private firms. In addition, there is some indication from cross-country analyses that conformity in book and tax reporting is associated with lower quality earnings (Atwood et al. 2010) and that it distorts investment decisions (Cummins et al. 1994). As book-tax conformity is higher, on average, in emerging markets than in developed countries, examining firms in emerging markets makes it possible to investigate whether the investment-FRQ relation still exists in an environment where tax considerations are important and where book-tax conformity could distort investment decisions (Cummins et al. 1994).

We obtain data from the World Bank's Enterprise Survey (WBES), a major cross-sectional firm survey conducted around the world by the World Bank. This database has been used in a

[1] Consistent with Biddle et al. (2009), we define FRQ as the precision with which financial reporting conveys information about firms' operations.

number of prior studies (e.g., Beck and Demirguc-Kunt 2006; Beck et al. 2005, 2006, 2008; Carlin et al. 2007; Brown et al. 2008; Hope et al. 2011).[2] Unlike studies of the role of accounting information in influencing investment decisions that only use data on public firms, WBES data allow us to examine small- and medium-size private enterprises. Further, the WBES database includes information on both the sources of financing (e.g., bank financing, internal financing, informal financing) used in making new investments and the degree to which the firm faces income tax pressures (i.e., higher tax rates and stronger tax enforcement), without having to rely on proxies. This unique database allows us to investigate whether the effects of FRQ on investment efficiency varies with the source of financing and with firms' tax incentives.

To generalize our results and reduce measurement error, we use several proxies for FRQ in our empirical tests. Specifically, we use (1) the Kothari et al. (2005) discretionary accruals measure; (2) the McNichols and Stubben (2008) and Stubben (2010) revenue-based measure; (3) the Dechow and Dichev (2002) measure as implemented by Francis et al. (2005) and Srinidhi and Gul (2007); and (4) a summary statistic formed by aggregating these three measures. Analyzing WBES data from 2002 to 2005, our main findings are as follows. First, all four proxies for FRQ are statistically and economically significantly related to investment efficiency. Specifically, all four of our FRQ proxies are significantly negatively associated with both under- and overinvestment. Second, the importance of FRQ is increasing in the degree of bank financing, likely reflecting the use of financial statements by banks in granting credit. Third, for firms facing greater income tax pressures, the relation between FRQ and investment efficiency is reduced. It is often argued in the literature that a focus on minimizing taxes can negatively affect the usefulness of financial statement information; however, to date, evidence on this issue has been limited. Our results are robust to the inclusion of firm-level control variables, industry and country fixed effects, to the use of alternative investment models to measure investment efficiency (including a change specification), to alternative measures of FRQ, to endogeneity, and to several other controls.

Our study advances the literature by providing empirical evidence that FRQ enhances firm-level investment efficiency in a sample of small, private firms across 21 emerging markets. Given that prior widely cited research suggests that FRQ should be considerably lower for these firms than for publicly traded companies in developed countries, this study can be viewed as an examination of "boundary conditions" for the importance of accounting information. Our findings concerning how the importance of FRQ varies with financing sources and tax incentives complement and extend current research on the relation between FRQ and investment efficiency (e.g., Biddle and Hilary 2006; McNichols and Stubben 2008; Biddle et al. 2009). Existing research examines only listed firms, so that even the smallest firms in prior studies are relatively large. In contrast, we focus on a sample of private firms that are important drivers of economic growth globally and for which there is limited extant research.[3]

II. BACKGROUND AND HYPOTHESES DEVELOPMENT

One objective of financial reporting information is to facilitate the efficient allocation of capital. An important aspect of this role is to improve firms' investment decisions. Specifically, theory suggests that improved financial transparency has the potential to alleviate both under- and overinvestment problems and recent studies support this prediction (e.g., Biddle and Hilary 2006;

[2] For a more extensive list, please see http://www.enterprisesurveys.org/documents/Research-used-in-different-studies.xls.

[3] Guidance on how to improve the quality of investment decisions in emerging markets is directly relevant to the World Bank's mission of "offering assistance to developing countries around the world." See http://www.enterprisesurveys.org.

Hope and Thomas 2008; McNichols and Stubben 2008; Biddle al. 2009). This evidence, however, has been mostly limited to large, publicly traded companies in the United States.

We examine the role of financial reporting quality in a very different setting from that examined in prior studies. Specifically, we deliberately "turn two dials at once" by moving from public to private firms and by moving from developed countries to emerging markets—allowing us to examine the importance of FRQ under conditions that prior research suggests are less conducive to the mitigation of under- and overinvestment previously observed for publicly traded enterprises in the United States. As such, our study can be viewed as a natural laboratory for examining boundary conditions for the relevance of FRQ for investment efficiency in several ways.

First, in contrast to prior research, we focus on *private* firms. More than 99 percent of limited liability companies, in most countries, are not listed on a stock exchange (e.g., Pacter 2004; Berzins et al. 2008; Nagar et al. 2011). In the aggregate, non-listed firms have about four times more employees, three times higher revenues, and twice the amount of assets than do listed firms (Berzins et al. 2008). In spite of their economic importance and likely differences from public companies, comparatively little is known about financial reporting of private firms.

Private firms are different from publicly traded firms in several respects. Private firms are more closely held and have greater managerial ownership. Moreover, their major capital providers often have insider access to corporate information and typically take a more active role in management (e.g., Van Tendeloo and Vanstraelen 2008). With greater ownership concentration, large shareholders can take advantage of their controlling positions and direct private benefits for personal consumption, which is the typical problem of expropriation of minority shareholders and creditors (e.g., Morck et al. 1988). Furthermore, given the stronger ownership concentration, shareholder turnover is lower, and shareholders take a more active role in management, which reduces their reliance on financial statements for monitoring managers compared with public firms (Ball and Shivakumar 2005). Finally, private firms' financial statements are not as widely distributed to the public and are more likely to be influenced by taxation, dividend, and other objectives (Ball and Shivakumar 2005).

Prior studies find evidence suggesting that private firms have lower earnings quality on average than do public firms. For example, Ball and Shivakumar (2005) show that private U.K. companies exhibit less timely loss recognition than do public companies. Using a European dataset, Burgstahler et al. (2006) find that private firms exhibit lower quality earnings. Both studies argue that the main explanation for their findings of lower FRQ is the lower market demand for high-quality financial reporting for such firms.

Thus, based on prior research, there are reasons to believe that FRQ is lower for private firms than for public firms.[4] Consequently, it is not clear whether results from U.S. publicly traded companies will hold for our sample of small, private firms.

Second, in addition to focusing on private firms and in contrast to prior research, we also focus on firms from emerging markets. An extensive line of research exists that provides evidence of variation in accounting standards, accounting practices, enforcement of accounting rules, properties of accounting earnings, and the value relevance of accounting information around the world (e.g.,

[4] Not all extant research provides this conclusion. In a recent study, Givoly et al. (2010) find that whereas U.S. firms with privately held equity have less timely loss recognition, they have higher quality accruals and lower propensity to manage income *vis-à-vis* earnings thresholds than do private equity firms. However, they have a rather small sample of firms classified as "private" (531) and these firms all issue public debt, and are thus really a hybrid form of companies (and classified as "public" by the Securities and Exchange Commission). In addition, the sample firms are owned by financial sponsors and/or management. Finally, the sample firms are very large compared to the typical private firms and almost all employ a Big 4 auditor (94 percent). Thus, their results may not generalize to the typical U.S. private firms. In fact, we view further exploration of FRQ in private versus public firms as fertile ground for future research.

Alford et al. 1993; Ali and Hwang 2000; Ball et al. 2000; Hung 2000; Hope 2003; Leuz et al. 2003; Hail and Leuz 2006). For example, Ball et al. (2000) argue that the role of accounting information is more limited in environments that are characterized by low investor protection and more concentrated ownership structures. Ali and Hwang (2000) show that the value relevance of accounting information is lower for countries with bank-oriented (as opposed to market-oriented) financial systems and for countries with a greater degree of conformity between financial accounting and tax rules. Similarly, Atwood et al. (2010) show that earnings have lower persistence and a lower association with future cash flows when book-tax conformity is higher. The emerging markets included in our sample can, on average, be characterized as having lower investor protection, greater ownership concentration, higher book-tax conformity, and more bank-based financing than do the United States and other highly developed markets. In sum, our tests using private firms from emerging markets can be viewed as a test of the "boundary condition" (or lower bound) for the importance of FRQ in ameliorating investment efficiencies.

While there are clear reasons to expect that FRQ will play a less prominent role for our sample firms, counter-arguments do exist. The economic theories that provide a role for FRQ are not limited to public firms, although the effect may be magnified in a public-firm setting. There are several mechanisms through which financial reporting can mitigate under- and overinvestment problems. First, accounting information can aid investment efficiency by reducing adverse selection, liquidity risk, and information risk (Diamond and Verrecchia 1991; Leuz and Verrecchia 2000; Easley and O'Hara 2004; Lambert et al. 2007). In the absence of public equity markets, these effects could be muted, but could still exist for non-equity financing. Second, disclosed financial information aids corporate control mechanisms in preventing managers from expropriating wealth from investors or creditors (e.g., Fama and Jensen 1983), hence, providing external suppliers of capital with greater assurance about managers' activities as well as aiding in internal stewardship functions (e.g., board supervision of management). Third, improved accounting information can enhance the efficiency with which managers make investment decisions.[5]

In addition, private firms typically have a weaker information disclosure environment than that characterizing public firms (e.g., Burgstahler et al. 2006). This observation suggests that, even if FRQ is lower for private firms, accounting information could still play a role because there are fewer competing sources of information.[6] As noted above, McNichols and Stubben (2008) emphasize the role that accounting information plays in internal decision making. Small firms are unlikely to have management accounting systems that are separate from financial accounting (e.g., Drury and Tayles 1995), potentially enhancing the role of accounting in internal decision making.

Finally, it is possible that the lack of analyst coverage, lower media coverage, and overall lower-quality institutions in emerging markets makes accounting information a relatively greater component of the overall information set used for decision making by insiders or outsiders.[7,8]

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[5] As McNichols and Stubben (2008, 1571) point out, investment decisions depend on expectations of investment benefits. These benefits in turn depend on expectations of future growth and product demand. In other words, high-quality information can help managers form more accurate expectations and identify better investment opportunities, thereby improving investment efficiency even in a world without adverse selection and/or moral hazard (Bushman and Smith 2001; McNichols and Stubben 2008).

[6] For example, Indjejikian and Matejka (2009) highlight the importance of accounting information for private firms in compensation contracts.

[7] Abu-Nassar and Rutherford (1996), Mirshekary and Saudagaran (2005), and Al-Razeen and Karbhari (2007) conduct surveys and conclude that accounting information is the most important information source for users in emerging markets.

[8] Accounting information may be useful for bank financing, for attracting new equity capital (for the private firms with more dispersed ownership and/or firms that are selling shares to new investors), to suppliers in their decisions to grant trade credit, to other providers of finance such as leasing companies, and to non-manager employees (e.g., Bova et al. 2011).

Based on the above discussion, we follow the approach of Biddle et al. (2009) and test whether the FRQ of private firms from emerging markets helps mitigate both under- and overinvestment. In other words, we investigate if FRQ also mitigates capital investment inefficiencies under less conducive conditions than those examined in prior research. Our first hypothesis is as follows:

H1: Financial reporting quality mitigates both underinvestment and overinvestment.

In addition to examining the overall effect of FRQ on investment efficiency, we explore two conditional effects: financing sources and tax incentives. We first investigate the effect of financing sources on the effect of FRQ on investment efficiency. WBES data provide a detailed breakdown of financing sources as a percentage of new investment. Private firms in emerging markets fund investment from external sources including bank lending, issuance of private equity, leasing, trade credit, financing from special development agencies or governments, and informal financing (i.e., financing from moneylenders, family, and friends), and from retained earnings and additional contributions by owners (Beck et al. 2008). A large body of literature documents how the availability of external or internal funds affects investment decisions (Myers and Majluf 1984; Fazzari et al. 1988; Blanchard et al. 1994), where these prior studies have used samples of public firms that rely mainly on equity and debt financing. In contrast, for private firms, external financing sources are usually limited and consist mainly of bank loans and trade credit.

We argue that, the financing source will affect the relation between FRQ and investment efficiency. Specifically, we are interested in whether firms that rely more on bank financing have a stronger relation between FRQ and investment efficiency than do other private firms in emerging economies.

Bank lending is the most common source of external capital for private firms in developing countries (Beck et al. 2008; Brown et al. 2008). Banks may well have access to additional information beyond the financial statements, potentially reducing the importance of accounting information. However, besides the large body of research documenting the role of accounting information for lending decisions in the U.S. and other developed countries, there is also extensive evidence that banks rely on borrowers' financial reports in credit decisions in emerging markets and for small firms (e.g., Danos et al. 1989; Berry et al. 1993; Berry et al. 2004; Kitindi et al. 2007). Compared with other external capital suppliers that rely more on mutual trust and private communication, banks are likely to screen the financial statements of corporate clients more carefully. Importantly, banks not only lend larger amounts compared with other sources of informal financing, but also extend loans with longer maturities, which makes them more vulnerable to information and incentive problems. Failure rates are higher among smaller firms, further encouraging banks to carefully examine financial information in their lending decisions. Examining a client's financial statements helps banks to determine the firm's assets that can serve as collateral, to evaluate its future cash-flow generating capability, to gauge the firm's debt capacity, and to analyze the riskiness of the firm in determining a lending rate. In other words, the importance of FRQ should increase with the extent of bank financing compared with other, more informal sources of financing. This discussion motivates our second hypothesis:[9]

H2: The relation between financial reporting quality and investment efficiency is stronger if a firm's investment is mainly funded through bank financing.

Finally, we explore the conditional effect of tax incentives. We know from prior research that private firms are influenced relatively more by tax objectives than are public firms (e.g., Ball and Shivakumar 2005). Further, the alignment between financial and tax accounting is higher for our

[9] Note that our hypothesis differs from Biddle and Hilary (2006), who compare bank financing with public equity financing across countries. In contrast, as private firms do not rely on public equity financing, we compare the role of bank financing primarily with other non-public debt, private equity, and informal financing.

sample than for publicly traded firms in developed countries. High alignment means that financial statements serve as the basis for taxation or that tax laws explicitly require an equivalent treatment for certain items in both sets of accounts (e.g., Burgstahler et al. 2006). In such an environment, a focus on minimizing taxes can directly impact FRQ, and we test for the effect of cross-sectional variation in tax incentives. That is, for firms that face especially high income tax rates and strong enforcement by tax authorities (i.e., high "tax pressure"), the primary objective of financial reporting could be to minimize income taxes rather than to provide information to suppliers of capital or to management, which could reduce the role of FRQ on investment efficiency. This reasoning motivates our final hypothesis:

H3: The relation between financial reporting quality and investment efficiency is less pronounced for firms that have strong incentives to manage their earnings for tax purposes.

III. SAMPLE AND MEASUREMENT OF MAIN VARIABLES

Data Source

We obtain our data from World Bank's Enterprise Survey (WBES) conducted during 2002–2005 by the World Bank in 79 countries, including many low-income countries.[10] Prior studies that have used this database include Beck and Demirguc-Kunt (2006), Beck et al. (2005, 2006, 2008), Carlin et al. (2007), Brown et al. (2008), and Hope et al. (2011).

The primary goal of WBES is to provide quantitative data that allow an assessment of a country's investment climate in an internationally comparable manner.[11] The surveys are administered in face-to-face interviews with managing directors, accountants, human resource managers, and other relevant company staff.[12] Samples are stratified by size, industry, and location. Although the surveys are conducted with the knowledge and support of relevant government authorities, governments are not provided with the raw data or other information that would allow them to identify the responses of individual firms, and businesses are informed of this confidentiality prior to interviews to encourage truthful responses.[13]

The dataset includes a large sample of firms across multiple sectors (manufacturing, services, agriculture, and construction). Usable data include both quantitative and qualitative information on firm characteristics, including sources of finance, barriers to growth, access to infrastructure services, legal difficulties, and corruption. The dataset also includes measures of firm performance, such as multiple years of historical data on capital investment and operating performance.

A limitation of using survey data is that financial statement information is necessarily restricted. Thus, we do not have access to some potential control variables used in prior studies. However, the survey does contain data on a number of important firm characteristics and, consistent

[10] Although WBES also has some data before and after our sample period, the availability of accounting information is very limited in the other years.

[11] This discussion draws on *Productivity and Investment Climate Survey (PICS): Implementation Manual* (IBRD 2003).

[12] WBES begins from a minimum core set of questions that are common across all countries. However, survey managers at the country or region level are allowed to extend the survey. To maintain cross-country comparability, core questions cannot be reworded except in translating to well-understood phrases with the same meaning. In addition, all core questions are asked using standardized instructions provided by the survey's designers. Finally, note that since the data are based on face-to-face interviews, the World Bank data do not suffer from the typical issues related to survey response bias as when using mail- or web-based surveys.

[13] Carlin et al. (2007), Beck et al. (2008), and Hope et al. (2011) contain several validity tests of the WBES data.

with prior research that employs the WBES data, we include these firm characteristics as well as industry and country fixed effects in our empirical tests.

We describe the sample selection procedure in Table 1. The main constraints on our sample size are the availability of data to compute the investment efficiency measure and the four FRQ measures. Each firm appears only once in the database (and hence the number of observations equals the number of unique firms). However, firms are requested to not only provide data for the current year, but also for the previous two years. The requirement to have previous years' data (necessary for our tests) is the main constraint on our sample size. We utilize 6,727 unique firms for the test of H1 involving discretionary revenues (described below) as our FRQ proxy, and somewhat smaller sample sizes for tests using the other three FRQ proxies. The sample size is reduced further for the tests of H2 and H3 for which we require additional data for the firm's financing sources and tax burden.

Table 2 provides a distribution of the sample by country. A total of 21 countries are represented, with the greatest number of observations coming from Thailand, Brazil, Pakistan, Vietnam, and India. These five countries make up 63 percent of the total sample. Although all of our sample countries are considered "developing" or emerging markets as per United Nations classifications, there is considerable variation across our sample countries. We examine the effects of FRQ on investment efficiency across country characteristics in Section V.

Proxy for Investment Efficiency

The two key constructs in the analysis are investment efficiency and financial reporting quality, and we investigate how FRQ in the current year affects *next* year's investment efficiency.

TABLE 1

Sample Selection

All firm-years in the WBES database with listing status information	47,712
Less firms residing in "Other" sectors	770
Less publicly traded firms	3,200
Private firms with all necessary industry information	43,742
Less firms without information in the financial statement section	18,658
Less firms with missing data on revenue growth in the prior year	9,146
Less firms with missing data on investment	5,869
Additional deduction by data requirement of investment model (i.e., at least ten firms in each industry by country for Equation (1))	77
Firms with the investment efficiency variable (*InvEff*)	9,992
(1) Missing data on discretionary revenue (*DisRev*) and control variables (Table 4)	3,265
Sample size for the main tests with *DisRev* as a proxy for financial reporting quality	6,727
(2) Missing data on discretionary accruals (*DisAccr*) and control variables (Table 4)	3,520
Sample size for the main tests with *DisAccr* as a proxy for financial reporting quality	6,472
(3) Missing data on the modified Dechow-Dichev measure (*DD*) and control variables (Table 4)	3,604
Sample size for the main tests with *DD* as a proxy for financial reporting quality	6,388
(4) Firms with missing data for any of the three financial reporting quality measures (*DisRev*, *DisAccr*, or *DD*) or for control variables.	3,671
Sample size for the main tests with aggregate FRQ (*Aggreg*) as a proxy for financial reporting quality	6,321

TABLE 2

Sample Distribution by Country

Country	n	Percentage
Bangladesh	483	7.17%
Brazil	1,033	15.35%
Ecuador	55	0.81%
El Salvador	88	1.31%
Eritrea	24	0.36%
Ethiopia	36	0.54%
Guatemala	65	0.97%
Honduras	41	0.61%
India	486	7.22%
Indonesia	314	4.67%
Nicaragua	39	0.58%
Oman	36	0.54%
Pakistan	850	12.64%
Philippines	371	5.52%
South Africa	388	5.77%
Sri Lanka	296	4.40%
Syria	44	0.65%
Tanzania	75	1.11%
Thailand	1,307	19.43%
Vietnam	587	8.73%
Zambia	109	1.62%
Total	6,727	100%

This table shows the sample distribution by country. There are a total number of 6,727 observations from 21 countries.

Conceptually, investment efficiency refers to firms undertaking all and only projects with positive net present value. Consistent with prior research (e.g., Biddle et al. 2009), we measure investment efficiency as deviations from expected investment using a model that predicts investment as a function of growth opportunities. Thus, both underinvestment (negative deviations from expected investment) and overinvestment (positive deviations from expected investment) are considered inefficient investments. Specifically, we estimate a parsimonious model for expected investment as a function of revenue growth (see, e.g., Modigliani and Miller 1958; Hubbard 1998). As the relation between investment and revenue growth could differ between revenue decreases and revenue increases (e.g., Eberly 1997; McNichols and Stubben 2008), we allow for differential predictability for revenue increases and revenue decreases by employing a piecewise linear regression model:

$$Invest_{i,t} = \alpha_0 + \alpha_1 NEG_{i,t-1} + \alpha_2 \%RevGrowth_{i,t-1} + \alpha_3 NEG * \%RevGrowth_{i,t-1} + \varepsilon_{i,t}. \quad (1)$$

Following Biddle et al. (2009), we define $Invest_{i,t}$ as the sum of new investment in machinery, equipment, vehicles, land, buildings, and research and development expenditures, less the sale of fixed assets, and scaled by lagged total assets for firm i in year t. $\%RevGrowth_{i,t-1}$ is the annual revenue growth rate for firm i in year t–1. The indicator variable $NEG_{i,t-1}$ takes the value of 1 for negative revenue growth, and 0 otherwise.

We estimate the investment model cross-sectionally with at least ten observations in each WBES industry by country. The sample consists of 9,992 firm-year observations with available data

to estimate Equation (1). To mitigate the influence of outliers, we winsorize all variables at the 1 percent and 99 percent levels. We then classify firms into two groups based on the residuals of Equation (1) (i.e., the deviations from the predicted investment levels). To ease exposition, we multiply the underinvestment variable by −1 so that a higher value suggests a more severe underinvestment.[14]

Proxies for Financial Reporting Quality

There is no universally accepted measure of FRQ. We employ three measures that have been used in prior research as well as an aggregate measure for the following reasons. First, a single proxy is unlikely to cover all facets of FRQ. Second, the use of multiple proxies helps to generalize our results. Third, using alternative measures mitigates the possibility that results using one particular proxy capture some factor other than FRQ, and that this other factor is driving our results.

The first measure is performance-adjusted discretionary accruals as developed by Kothari et al. (2005). Specifically, we estimate the following model by country and for each industry that has at least 16 observations:

$$TAccr_{i,t} = \alpha_0 + \alpha_1(1/Assets_{i,t-1}) + \alpha_2 \Delta Rev_{i,t} + \alpha_3 PPE_{i,t} + \alpha_4 ROA_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where $TAccr_{i,t}$ is total accruals, measured as the change in non-cash current assets minus the change in current non-interest-bearing liabilities, minus depreciation and amortization expense for firm i at year t, scaled by lagged total assets ($Assets_{i,t-1}$); $\Delta Rev_{i,t}$ is the annual change in revenues scaled by lagged total assets; $PPE_{i,t}$ is property, plant, and equipment for firm i at year t, scaled by lagged total assets; $ROA_{i,t}$ is return on assets for firm i at year t. The residuals from the regression model are discretionary accruals. In our tests, we use the absolute values of discretionary accruals as a proxy for FRQ. We multiply the absolute values of discretionary accruals by −1 (*DisAccr*). Thus, higher values of *DisAccr* represent higher FRQ.

To calculate the second proxy, we follow McNichols and Stubben (2008) and Stubben (2010) and estimate discretionary revenues. Specifically, we use the following regression:

$$\Delta AR_{i,t} = \alpha_0 + \alpha_1 \Delta Rev_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where $\Delta AR_{i,t}$ represents the annual change in accounts receivable and $\Delta Rev_{i,t}$ is the annual change in revenues, each scaled by lagged total assets. Discretionary revenues are the residuals from Equation (3), which is estimated separately for each industry-country group that has at least eight observations. We multiply the absolute values of discretionary revenues by −1 (*DisRev*). Thus, higher values of *DisRev* represent higher FRQ.

Our third proxy is based on the cross-sectional Dechow and Dichev (2002) model, as modified by McNichols (2002) and Francis et al. (2005). Specifically, we estimate the following model by country and for each industry that has at least 16 observations:

$$TCAccr_{i,t} = \alpha_0 + \alpha_1 OCF_{i,t-1} + \alpha_2 OCF_{i,t} + \alpha_3 OCF_{i,t+1} + \alpha_4 \Delta Rev_{i,t} + \alpha_5 PPE_{i,t} + \varepsilon_{i,t} \quad (4)$$

where $TCAccr_{i,t}$ is total current accruals, measured as the change in non-cash current assets minus the change in current non-interest-bearing liabilities, scaled by lagged total assets; *OCF* is cash flow

[14] The average adjusted R^2 for the investment model is 12.2 percent. To provide some benchmarks we note the following. First, when we estimate the same model for all Compustat firms (other than finance, utilities, and services industries) for 2002–2006, we obtain an R^2 of 10.1 percent. Second, McNichols and Stubben (2008) report an adjusted R^2 of 13 percent (see their Table 4, Panel A, which includes both Q and cash flows). We further note that the investment model with seven additional explanatory variables and the change specification (described later) obtain adjusted R^2s of 28.8 percent and 34.3 percent, respectively.

from operations, measured as the sum of net income, depreciation and amortization, and changes in current liabilities, minus changes in current assets, scaled by lagged total assets;[15] $\Delta Rev_{i,t}$ is the annual change in revenues scaled by lagged total assets; $PPE_{i,t}$ is property, plant, and equipment, scaled by lagged total assets. The residuals from Equation (4) represent the estimation errors in the current accruals that are not associated with operating cash flows and that cannot be explained by the change in revenue and the level of *PPE*. Given the short longitudinal time frame in our study, we follow Srinidhi and Gul (2007) and use the absolute value of this residual as a proxy for FRQ. We multiply the absolute values of the Dechow-Dichev measure by −1 (*DD*). Thus, higher values of *DD* represent higher FRQ.[16]

Last, to mitigate measurement error in the individual FRQ components and to provide evidence based on an overall FRQ metric, we aggregate the three proxies into one aggregate score. Specifically, following Biddle et al. (2009), we first normalize all proxies and then take the average of the three measures as our summary FRQ statistic (*Aggreg*).

Bank Financing and Tax Burden Variables

To test H2, we use an indicator variable, *Bank*, to capture bank financing as a major external financing source for firms. Specifically, this indicator takes a value of 1 if bank financing is the dominant source of external financing. Prior studies document that internal sources of finance predominate (e.g., Beck et al. 2008; Brown et al. 2008). To ensure that bank financing is economically important, we further require that bank financing constitutes more than 5 percent of all sources that fund new investments.[17]

Our measure of income tax pressure refers to managers' perceptions of whether tax rates and tax administration impose a major or severe obstacle in the operation and growth of their firms. In the WBES database, higher ratings of tax rates and/or tax administration suggest a heavier tax burden borne by the firm, implying that firms have greater incentives to manage earnings for tax purposes. We use an indicator variable, *Tax*, to test H3. The indicator takes a value of 1 when the average rating of managers' responses is 3 or greater.[18]

Descriptive Statistics

Table 3 provides descriptive statistics for our measures of investment efficiency, FRQ, bank financing, tax burden, as well as for our main control variables. Panel A shows that only 27 percent of firms belong to the overinvestment group, while an overriding majority of sample firms belong to the underinvestment group. This intuitive result confirms that private firms in emerging markets, due to their difficulty in securing external financing, are more likely subject to the problem of underinvestment rather than overinvestment.

For the 4,590 firms that provide information about their financing sources, 38 percent have bank financing as their dominant source of external financing (constituting more than 5 percent of

[15] Due to data limitations, for year $t-1$ we proxy for operating cash flows using net income adjusted for depreciation and amortization.

[16] In untabulated analyses we find that the use of the *signed* measures of three FRQ proxies (i.e., *DisAccr*, *DisRev*, and *DD*) corroborates the conclusions reached using residuals with absolute values.

[17] As sensitivity tests we (1) remove the 5 percent threshold requirement; (2) change the threshold to 10 percent; and (3) instead use an indicator value that takes the value of 1 if the firm has non-zero bank financing (0 otherwise). In all three cases inferences are unaffected. Note that bank financing includes financing from both local and foreign banks. However, only 100 sample firms have foreign bank financing, and deleting these observations does not affect any inferences.

[18] Specifically, in the WBES database, a rating of 0 denotes no obstacle; 1 denotes a minor obstacle; 2, a moderate obstacle; 3, a major obstacle; and 4, a very severe obstacle.

TABLE 3

Descriptive Statistics of the Main Sample

Panel A: Descriptive Statistics

Variable	n	Mean	25%	Median	75%	STD
InvEff (signed values)	6,727	0.002	−0.050	−0.023	0.004	0.097
Overinvestment	1,810	0.122	0.025	0.081	0.223	0.112
Underinvestment	4,917	0.043	0.018	0.037	0.061	0.030
DisRev	6,727	−0.047	−0.065	−0.024	−0.008	0.056
DisAccr	6,472	−0.100	−0.136	−0.056	−0.020	0.112
DD	6,388	−0.090	−0.117	−0.050	−0.019	0.107
SDisAccr (signed values)	6,472	−0.001	−0.063	−0.004	0.048	0.151
SDisRev (signed values)	6,727	0.000	−0.029	−0.005	0.018	0.073
SDD (signed values)	6,388	0.000	−0.058	−0.006	0.042	0.141
Aggreg	6,321	0.007	−0.335	0.296	0.611	0.820
Bank	4,590	0.382	0.000	0.000	1.000	0.486
Tax	6,695	0.174	0.000	0.000	0.000	0.379
Assets (in thousands)	6,727	51,300	172	943	6,341	181,000
Age (in years)	6,727	17.334	9.000	15.000	31.000	14.337
Tang	6,727	0.375	0.151	0.348	0.563	0.254
Slack	6,727	0.069	0.007	0.028	0.089	0.103
Audit	6,727	0.522	0.000	1.000	1.000	0.500

Panel B: Correlation Matrix

	InvEff	*DisRev*	*DisAccr*	*DD*	*Aggreg*	*Bank*	*Tax*	*LogAssets*	*LogAge*	*Tang*	*Slack*
DisRev	−0.231***										
DisAccr	−0.150***	0.417***									
DD	−0.146***	0.379***	0.836***								
Aggreg	−0.210***	0.714***	0.900***	0.884***							
Bank	−0.046***	−0.036**	−0.052***	−0.020*	−0.045***						
Tax	0.011***	0.009	0.010	0.020	0.022*	−0.087***					
LogAssets	−0.247***	0.076***	0.143***	0.140***	0.147***	0.086***	0.070***				

(continued on next page)

TABLE 3 (continued)

	InvEff	*DisRev*	*DisAccr*	*DD*	*Aggreg*	*Bank*	*Tax*	*LogAssets*	*LogAge*	*Tang*	*Slack*
LogAge	−0.064***	0.074***	0.068***	0.074***	0.089***	−0.039***	0.019	0.145***			
Tang	−0.040***	0.176***	0.205***	0.206***	0.236***	0.094***	−0.005	0.076***	−0.131***		
Slack	0.051***	−0.017	−0.042***	−0.061***	−0.043***	−0.102***	−0.025**	−0.175***	−0.043***	−0.136***	
Audit	−0.080***	0.024**	0.059***	0.078***	0.062***	0.156***	−0.088***	0.208***	0.107***	−0.036***	−0.058***

*, **, *** Represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively, using two-tailed tests.

Panel A presents descriptive statistics for the variables used in the analyses. Panel B presents Pearson correlations for these variables. Variable computations are described in Appendix A unless noted here: Panel A: *InvEff* is the signed residual values from the investment efficiency model. *SDisAccr*, *SDisRev*, and *SDisRev* refer to the signed residuals from the discretionary accruals model, the discretionary revenue model, and the modified Dechow-Dichev model, respectively. *Assets* are reported in thousand dollars and *Age* is reported in years; Panel B: *DisAccr*, *DisRev*, and *DisRev* refer to the absolute value of residuals from the estimation models, multiplied by −1.

all sources that fund new investments). For the 6,695 firms that provide information about the firm-level tax burden, about 17 percent report facing severe tax obstacles. The average firm has been in existence for 17 years. As expected, there is wide variation in firm size measured by total assets. But most firms are quite small, with half the firms having total assets of $943,000 or less. In all tests we use log transformations of both firm age and firm size.

Table 3, Panel B reports Pearson correlations. As predicted, all four proxies of FRQ are significantly negatively correlated with the proxy for investment inefficiency. In addition, the FRQ proxies are positively and significantly correlated. However, as the correlation coefficients are below 1, they still capture somewhat different dimensions of FRQ, and using all four proxies in our tests increases the generalizability of our inferences.[19] As correlation results do not control for differences in firm, industry, or country characteristics, we now turn to multivariate tests.

IV. RESEARCH DESIGN AND RESULTS

Basic Empirical Model

Because we are interested in how financial reporting quality affects investment efficiency, we test H1 by regressing the measure of investment efficiency in year t+1 on the measures of FRQ in year t. Similar to Biddle et al. (2009), we also estimate Equation (5) separately for underinvestment and overinvestment. This design allows us to test whether higher FRQ mitigates both. The basic model is:

$$InvEff_{i,t+1} = \beta_0 + \beta_1 FRQ_{i,t} + \beta_n Control\ Variables_{i,t} + \sum Industries + \sum Countries + \varepsilon_{i,t}, \quad (5)$$

where:

InvEff = excess investment (*underinvestment* or *overinvestment*) is the residual of the investment model as described above. We use the absolute value of the residuals for *underinvestment*; and

FRQ = financial reporting quality measured in the following four ways: (1) *DisAccr*, which is the absolute residual of the Kothari et al. (2005) performance-adjusted discretionary accruals model, multiplied by −1; (2) *DisRev*, which is the absolute residual of the McNichols and Stubben (2008) discretionary revenue model, multiplied by −1; (3) *DD*, which is the absolute residual of the modified Dechow and Dichev (2002) model, multiplied by −1; and (4) *Aggreg*, which is the average of the standardized previous three measures.

Motivated by prior research, we include firm size, firm age, asset tangibility, financial slack, and external auditing as control variables, as well as industry fixed effects.[20] We also include country fixed effects in all models, which is a common approach for controlling country-specific effects and addressing correlated omitted country-level variable problems (Doidge et al. 2007).

To the extent that FRQ mitigates under- and overinvestment (H1), β_1 is expected to be negative.

[19] We also note that, as expected, firms that have their financial statements reviewed by auditors have higher financial reporting quality, as evidenced by the positive correlation between *Audit* and all four FRQ proxies.

[20] Untabulated tests show that our results are almost identical using number of employees or revenues as alternative proxies of firm size. Note further that we later report results of tests that include ten additional control variables. Please see Appendix A for all variable definitions.

Results

Table 4 reports the regression results for the test of H1 using all four FRQ proxies. The models have adjusted R^2s of between 14 percent and 46 percent, with a higher explanatory power for underinvestment (the most prevalent scenario in our sample). The first four columns use underinvestment as the dependent variable and the last four columns use overinvestment as the dependent variable.

Across all eight test specifications, the conclusion is the same: FRQ enhances investment efficiency. Specifically, all eight estimated FRQ coefficients are negative and significant at the 1 percent level. These results are consistent with the Pearson correlation coefficients and are robust to controls for five firm-level characteristics as well as country and industry fixed effects. Of the control variables, firm size is negatively and significantly associated with both under- and overinvestment, consistent with expectations and prior research. Asset tangibility is positively correlated with deviations from expected investment. External auditing has a mostly negative estimated coefficient but is not statistically significant.

The test results are also economically significant. For example, in the overinvestment scenario, a one standard deviation decrease in the *DisAccr* measure implies a decrease of overinvestment by 1.44 percent of total assets.

Taken together, the results in Table 4 suggest that, although prior research suggests that FRQ should be lower among private firms than among public firms and lower in emerging markets than in developed markets, we observe evidence that the quality of financial reporting affects subsequent capital investment efficiency in accordance with theory, even for private firms from emerging markets. Specifically, our results support H1 and suggest that higher FRQ enhances investment efficiency even in what prior research would classify as a "boundary condition." We present results of numerous additional analyses that test the robustness of the findings in Section V.

In addition to complementing and extending prior academic research, our findings should be relevant to the World Bank, whose mission is to aid in improving living conditions in developing countries, as it is likely that more efficient investments should lead to higher social welfare. We further believe that the findings should be important to the IASB, which is currently working on standards for small- and medium-sized enterprises (SMEs), including private companies around the world. In fact, it is a reasonable conjecture that, compared with publicly traded companies in the U.S. and similar countries, our sample firms face fewer mandatory accounting recognition and measurement (as well as disclosure) requirements. Therefore, our sample firms' choices regarding FRQ have the potential to be especially important for improving investment efficiency.

For tests of the relative role of bank financing (H2) and the effect of tax incentives (H3), we add the main effects of these variables as well as interaction effects with the FRQ measures. We predict a negative coefficient on $FRQ \times Bank$ and a positive coefficient on $FRQ \times Tax$.

Table 5 presents results for the conditional effect of bank financing. The additional data requirement for financing sources results in a reduced sample size, ranging from 4,590 firms for the tests employing discretionary revenues to 4,234 firms for the tests using the aggregate measure. We first note that, after controlling for the effect of bank financing, all *FRQ* measures (for both under- and overinvestment) continue to load negatively and significantly (at the 5 percent level or better). The main effect of *Bank* is not significant. Our focus, however, is on $FRQ \times Bank$, and we observe negative estimated coefficients using all four proxies and for both underinvestment and overinvestment. However, whereas all interaction effects are significant for underinvestment, statistical significance is lacking for overinvestment (possibly due to the smaller sample size available for the latter test). The results suggest that the importance of *FRQ* is increasing in the

TABLE 4

The Relation between Financial Reporting Quality and Investment Efficiency

$$InvEff_{i,t+1} = \beta_0 + \beta_1 FRQ_{i,t} + \beta_n Control\ Variables_{i,t} + \sum Industries + \sum Countries + \varepsilon_{i,t}$$

		Dependent Variable = *Underinvestment*				Dependent Variable = *Overinvestment*			
Variables	**Predictions**	***FRQ* Measured by *DisAccr* (1)**	***FRQ* Measured by *DisRev* (2)**	***FRQ* Measured by *DD* (3)**	***FRQ* Measured by *Aggreg* (4)**	***FRQ* Measured by *DisAccr* (5)**	***FRQ* Measured by *DisRev* (6)**	***FRQ* Measured by *DD* (7)**	***FRQ* Measured by *Aggreg* (8)**
FRQ	− (H1)	−0.020***	−0.055***	−0.020***	−0.004***	−0.102***	−0.105***	−0.095***	−0.013***
		(−5.95)	(−6.69)	(−5.84)	(−8.50)	(−4.15)	(−2.73)	(−3.83)	(−4.12)
LogAssets		−0.001**	−0.001*	−0.001*	−0.001**	−0.022***	−0.022***	−0.022***	−0.021***
		(−2.19)	(−1.92)	(−1.74)	(−2.56)	(−6.44)	(−6.32)	(−6.18)	(−6.10)
LogAge		−0.001	0.001	−0.001	0.001	−0.007	−0.007	−0.010	−0.008
		(−0.22)	(0.60)	(−0.37)	(0.06)	(−0.84)	(−0.78)	(−1.17)	(−0.91)
Tang		0.002*	0.002	0.002	0.003**	0.028**	0.025*	0.027**	0.031**
		(1.75)	(1.37)	(1.60)	(2.22)	(2.18)	(1.93)	(2.14)	(2.42)
Slack		0.004	0.001	0.002	0.003	0.011	0.015	0.005	0.005
		(1.24)	(0.26)	(0.56)	(0.81)	(0.44)	(0.59)	(0.21)	(0.21)
Audit		−0.000	−0.001	0.001	0.001	−0.011	−0.013*	−0.010	−0.009
		(−0.08)	(−1.52)	(0.23)	(0.35)	(−1.59)	(−1.91)	(−1.52)	(−1.32)
Intercept		0.046***	0.046***	0.046***	0.048***	0.259***	0.264***	0.261***	0.261***
		(15.91)	(15.63)	(16.08)	(17.62)	(10.87)	(10.92)	(10.90)	(10.89)
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.434	0.463	0.448	0.450	0.143	0.138	0.139	0.140
n		4,653	4,917	4,594	4,533	1,819	1,810	1,794	1,788

*, **, *** Represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively, using two-tailed tests.
The table reports OLS regression results. Variables are defined in Appendix A. Huber-White robust standard errors are used to control for heteroscedasticity.

TABLE 5

The Conditional Effect of Bank Financing on the Relation between Financial Reporting Quality and Investment Efficiency

$$InvEff_{i,t+1} = \beta_0 + \beta_1 FRQ_{i,t} + \beta_2 Bank_{i,t} + \beta_3 FRQ \times Bank_{i,t} + \beta_n Control\ Variables_{i,t} + \sum Industries + \sum Countries + \varepsilon_{i,t}$$

		Dependent Variable = *Underinvestment*				Dependent Variable = *Overinvestment*			
Variables	**Predictions**	***FRQ* Measured by *DisAccr* (1)**	***FRQ* Measured by *DisRev* (2)**	***FRQ* Measured by *DD* (3)**	***FRQ* Measured by *Aggreg* (4)**	***FRQ* Measured by *DisAccr* (5)**	***FRQ* Measured by *DisRev* (6)**	***FRQ* Measured by *DD* (7)**	***FRQ* measured by *Aggreg* (8)**
FRQ	− (H1)	−0.011**	−0.031**	−0.015***	−0.003***	−0.117***	−0.129**	−0.090***	−0.014***
		(−2.11)	(−2.50)	(−2.94)	(−4.20)	(−3.67)	(−2.49)	(−2.65)	(−3.44)
Bank		0.001	−0.002	0.001	0.002	0.006	0.005	−0.002	−0.002
		(1.20)	(−1.44)	(0.81)	(1.52)	(0.66)	(0.57)	(−0.23)	(−0.22)
FRQ × *Bank*	− (H2)	−0.015**	−0.044**	−0.017**	−0.002**	−0.065	−0.092	−0.001	−0.006
		(−2.06)	(−2.29)	(−2.21)	(−1.98)	(−1.22)	(−1.14)	(−0.03)	(−0.83)
LogAssets		−0.001	−0.001	−0.001	−0.001	−0.023***	−0.023***	−0.022***	−0.022***
		(−1.03)	(−0.78)	(−0.80)	(−1.03)	(−6.00)	(−5.81)	(−5.56)	(−5.57)
LogAge		−0.001	0.001	−0.001	−0.001	−0.009	−0.009	−0.011	−0.009
		(−0.38)	(0.42)	(−1.03)	(−0.10)	(−0.86)	(−0.85)	(−1.12)	(−0.86)
Tang		0.004**	0.003	0.003**	0.005**	0.034**	0.033**	0.035**	0.040***
		(2.28)	(1.58)	(1.96)	(2.57)	(2.35)	(2.26)	(2.42)	(2.71)
Slack		0.010***	0.005	0.009**	0.008**	0.020	0.023	0.022	0.020
		(2.61)	(1.12)	(2.17)	(2.01)	(0.69)	(0.78)	(0.74)	(0.67)
Audit		0.001	−0.002	0.001	0.001	−0.013	−0.016**	−0.013	−0.012
		(0.50)	(−1.56)	(1.02)	(0.96)	(−1.62)	(−1.99)	(−1.63)	(−1.47)
Intercept		0.042***	0.045***	0.042***	0.042***	0.265***	0.270***	0.263***	0.265***
		(11.49)	(11.89)	(12.34)	(12.47)	(10.07)	(10.00)	(9.92)	(10.00)
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.271	0.304	0.275	0.274	0.093	0.088	0.086	0.088
n		2,977	3,200	2,881	2,861	1,397	1,390	1,378	1,373

, * Represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively, using two-tailed tests.
The table reports OLS regression results. Compared with Table 4, we further require availability of data for a firm's financing sources. Variables are defined in Appendix A. Huber-White robust standard errors are used to control for heteroscedasticity.

presence of bank financing (relative to other external financing sources), which is consistent with banks making use of financial statements in their lending decisions.[21]

In Table 6, we test H3, the effect of tax incentives. Recall that we argue that the informational role of *FRQ* will be reduced when the overriding objective is to minimize taxes. The main effect of *FRQ* continues to be negative and significant in this specification. As predicted, we observe coefficients on the interaction of *FRQ* and *Tax* that are positive across all eight specifications. More specifically, *FRQ* $\times$ *Tax* is positive and significant (at the 1 percent level) for all *FRQ* proxies for the overinvestment sample. In other words, consistent with H3, the effect of *FRQ* in mitigating the overinvestment problem is reduced to the extent that firms' incentives are primarily tax-oriented.[22] In the underinvestment scenario we observe positive but statistically weaker coefficients on *FRQ* $\times$ *Tax*. Thus, there is at least some support for the often-argued (but seldom-tested) notion in the literature that tax motivations detract from the usefulness of accounting information. This finding adds to the literature insights regarding how financial reporting and tax incentives jointly influence investment decisions; previous studies have generally ignored tax considerations (Hanlon and Heitzman 2010).

Finally, to test whether bank financing and tax incentives have incremental effects in the presence of each other, Table 7 reports tests in which we include both *Bank* and *Tax* jointly (and thus have a smaller sample). As before, the estimated coefficient on *FRQ* $\times$ *Bank* continues to be negative in all specifications and statistically significant for the underinvestment scenario. Furthermore, the estimated coefficient on *FRQ* $\times$ *Tax* is significantly positive for the overinvestment case but not significant for the underinvestment case. Importantly, the main effect of *FRQ* is yet again significantly negative across all test specifications. In addition to being of interest themselves, our interaction tests also serve the function of providing additional credence to H1 (e.g., related to correlated omitted variables or causality). The estimated coefficients on the two interaction terms have the predicted signs and are statistically significant in several cases. In other words, the effect is more (less) pronounced in subsamples in which we predict the effect to be stronger (weaker). As Rajan and Zingales (1998) point out, it would be difficult to envision a consistent theory in which causality is reversed yet the subsample results hold.[23]

V. ADDITIONAL TESTS

In this section, we report results of additional tests that lend robustness and extend the reported results. For brevity, we only tabulate the results of the alternative investment model specifications.

Alternative Investment Efficiency Model Specifications

We conduct four sensitivity tests related to our measurement of investment efficiency. First, we estimate the investment efficiency model after adding lagged investment to Equation (1). By using

[21] Unlike our proxy for tax incentives, which we consider mostly outside of managers' control, the importance of bank financing could be driven by other firm characteristics. For this reason we estimate a two-stage Heckman model in which the first stage (which is based on Beck et al. 2008) predicts *Bank* and the second stage controls for the Inverse Mills Ratio estimated from the first stage. As an instrument we include the approximate value of collateral as a percentage of the loan value (*Collateral*). Banks may be less willing to lend to firms when the amount of assets that can be pledged as collateral is limited. In untabulated tests we find that *Collateral* is significantly correlated with the choice of bank financing but is not significantly associated with over- or underinvestment. After controlling for potential self-selection, our conclusions regarding H2 remain unchanged: the importance of earnings quality for investment efficiency is increasing in bank financing.

[22] In fact, for all four financial reporting quality proxies, the sum of the coefficients on *FRQ* and *FRQ* $\times$ *Tax* ($\beta_1 + \beta_3$) is not statistically different from 0 in the overinvestment tests.

[23] For example, the theory would need to explain why, for firms with low bank financing and for firms that are more motivated to manage accounting earnings for tax purposes, relatively higher levels of *FRQ* would result in especially high investment efficiency.

TABLE 6

The Conditional Effect of Tax Burdens on the Relation between Financial Reporting Quality and Investment Efficiency

$$InvEff_{i,t+1} = \beta_0 + \beta_1 FRQ_{i,t} + \beta_2 Tax_{i,t} + \beta_3 FRQ \times Tax_{i,t} + \beta_n Control\ Variables_{i,t} + \sum Industries + \sum Countries + \varepsilon_{i,t}$$

		Dependent Variable = *Underinvestment*				Dependent Variable = *Overinvestment*			
Variables	**Predictions**	***FRQ* Measured by *DisAccr*** **(1)**	***FRQ* Measured by *DisRev*** **(2)**	***FRQ* Measured by *DD*** **(3)**	***FRQ* Measured by *Aggreg*** **(4)**	***FRQ* Measured by *DisAccr*** **(5)**	***FRQ* Measured by *DisRev*** **(6)**	***FRQ* Measured by *DD*** **(7)**	***FRQ* Measured by *Aggreg*** **(8)**
FRQ	− (H1)	−0.020***	−0.062***	−0.022***	−0.004***	−0.128***	−0.139***	−0.124***	−0.018***
		(−5.89)	(−7.20)	(−5.83)	(−8.47)	(−4.80)	(−3.35)	(−4.34)	(−5.11)
Tax		−0.002	−0.001	−0.001	−0.002*	0.015*	0.011	0.007	−0.005
		(−1.51)	(−0.22)	(−1.02)	(−1.89)	(1.87)	(1.38)	(0.95)	(−0.75)
FRQ × *Tax*	+ (H3)	0.002	0.038*	0.008	0.001	0.148***	0.209***	0.145***	0.023***
		(0.19)	(1.72)	(0.79)	(0.78)	(3.12)	(2.63)	(3.08)	(4.01)
LogAssets		−0.001**	−0.001*	−0.001*	−0.001**	−0.022***	−0.022***	−0.021***	−0.021***
		(−2.03)	(−1.82)	(−1.66)	(−2.47)	(−6.34)	(−6.30)	(−6.01)	(−6.01)
LogAge		−0.001	0.001	−0.001	0.001	−0.007	−0.007	−0.010	−0.008
		(−0.17)	(0.62)	(−0.41)	(0.02)	(−0.84)	(−0.79)	(−1.10)	(−0.88)
Tang		0.002*	0.002	0.002	0.003**	0.026**	0.024*	0.026**	0.031**
		(1.90)	(1.44)	(1.63)	(2.25)	(2.03)	(1.85)	(2.02)	(2.37)
Slack		0.004	0.001	0.002	0.003	0.013	0.017	0.009	0.009
		(1.27)	(0.32)	(0.53)	(0.79)	(0.52)	(0.65)	(0.34)	(0.36)
Audit		0.000	−0.001	0.001	0.001	−0.011	−0.013*	−0.011	−0.010
		(0.02)	(−1.45)	(0.30)	(0.41)	(−1.55)	(−1.85)	(−1.58)	(−1.43)
Intercept		0.046***	0.046***	0.046***	0.048***	0.255***	0.262***	0.255***	0.258***
		(15.71)	(15.45)	(16.02)	(17.59)	(10.65)	(10.79)	(10.62)	(10.78)
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.434	0.464	0.448	0.450	0.146	0.139	0.141	0.144
n		4,628	4,892	4,594	4,533	1,811	1,803	1,786	1,781

*, **, *** Represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively, using two-tailed tests.

The table reports OLS regression results. Compared with Table 4, we further require availability of data for a firm's tax burden. Variables are defined in Appendix A. Huber-White robust standard errors are used to control for heteroscedasticity.

TABLE 7

The Conditional Effect of Bank Financing and Tax Burdens on the Relation between Financial Reporting Quality and Investment Efficiency

$$InvEff_{i,t+1} = \beta_0 + \beta_1 FRQ_{i,t} + \beta_2 Bank_{i,t} + \beta_3 FRQ \times Bank_{i,t} + \beta_4 Tax_{i,t} + \beta_5 FRQ \times Tax_{i,t} + \beta_n Control\ Variables_{i,t} + \sum Industries + \sum Countries + \varepsilon_{i,t}$$

		Dependent Variable = *Underinvestment*				Dependent Variable = *Overinvestment*			
Variables	**Predictions**	***FRQ* Measured by *DisAccr* (1)**	***FRQ* Measured by *DisRev* (2)**	***FRQ* Measured by *DD* (3)**	***FRQ* Measured by *Aggreg* (4)**	***FRQ* Measured by *DisAccr* (5)**	***FRQ* Measured by *DisRev* (6)**	***FRQ* Measured by *DD* (7)**	***FRQ* Measured by *Aggreg* (8)**
FRQ	− (H1)	−0.011**	−0.037***	−0.014***	−0.003***	−0.158***	−0.176***	−0.116***	−0.019***
		(−2.06)	(−2.85)	(−2.70)	(−4.04)	(−4.56)	(−3.14)	(−3.04)	(−4.15)
Bank		0.002	−0.001	0.001	0.002	0.007	0.006	−0.002	−0.002
		(1.35)	(−1.24)	(0.81)	(1.34)	(0.77)	(0.73)	(−0.26)	(−0.24)
FRQ × *Bank*	− (H2)	−0.014*	−0.042**	−0.017**	−0.002**	−0.079	−0.118	−0.001	−0.007
		(−1.95)	(−2.14)	(−2.22)	(−1.98)	(−1.52)	(−1.47)	(−0.02)	(−1.10)
Tax		−0.002	−0.001	−0.002	−0.002	0.017*	0.009	0.004	−0.007
		(−1.56)	(−0.59)	(−1.51)	(−1.62)	(1.82)	(0.95)	(0.41)	(−0.96)
FRQ × *Tax*	+ (H3)	−0.003	0.020	−0.003	0.000	0.191***	0.228***	0.125**	0.021***
		(−0.23)	(0.71)	(−0.24)	(0.08)	(3.66)	(2.57)	(2.33)	(2.96)
LogAssets		−0.001	−0.001	−0.001	−0.001	−0.023***	−0.023***	−0.021***	−0.021***
		(−1.00)	(−0.78)	(−0.79)	(−1.02)	(−5.85)	(−5.75)	(−5.31)	(−5.38)
LogAge		−0.001	0.001	−0.001	−0.000	−0.009	−0.009	−0.011	−0.009
		(−0.28)	(0.49)	(−1.03)	(−0.11)	(−0.87)	(−0.86)	(−1.08)	(−0.87)
Tang		0.005**	0.003*	0.003**	0.005**	0.032**	0.033**	0.034**	0.039***
		(2.42)	(1.69)	(1.96)	(2.57)	(2.22)	(2.27)	(2.32)	(2.68)
Slack		0.011***	0.005	0.008**	0.008**	0.022	0.025	0.024	0.022
		(2.67)	(1.19)	(2.15)	(1.99)	(0.76)	(0.86)	(0.81)	(0.74)
Audit		0.001	−0.002	0.001	0.001	−0.013	−0.016**	−0.014*	−0.013
		(0.55)	(−1.54)	(1.04)	(0.98)	(−1.62)	(−2.01)	(−1.70)	(−1.60)

(continued on next page)

TABLE 7 (continued)

		Dependent Variable = *Underinvestment*				Dependent Variable = *Overinvestment*			
Variables	**Predictions**	***FRQ*** **Measured by *DisAccr*** **(1)**	***FRQ*** **Measured by *DisRev*** **(2)**	***FRQ*** **Measured by *DD*** **(3)**	***FRQ*** **Measured by *Aggreg*** **(4)**	***FRQ*** **Measured by *DisAccr*** **(5)**	***FRQ*** **Measured by *DisRev*** **(6)**	***FRQ*** **Measured by *DD*** **(7)**	***FRQ*** **Measured by *Aggreg*** **(8)**
Intercept		0.041***	0.044***	0.042***	0.042***	0.259***	0.266***	0.257***	0.262***
		(11.40)	(11.79)	(12.39)	(12.51)	(9.81)	(9.80)	(9.63)	(9.87)
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.270	0.303	0.276	0.274	0.098	0.089	0.088	0.092
n		2,955	3,178	2,881	2,861	1,390	1,384	1,371	1,367

*, **, *** Represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively, using two-tailed tests.
The table reports OLS regression results. Compared with Table 4, we further require availability of data for firms' financing sources, and tax burden. Variables are defined in Appendix A. Huber-White robust standard errors are used to control for heteroscedasticity.

such a "change specification," we in effect use the firm as its own control, mitigating the possibility of omitted variables from the model. However, this control comes at the cost of a reduced sample size.

As our second test, we measure investment efficiency using an expanded model based on Richardson (2006). We estimate optimal investment according to the following regression specification:

$$\begin{aligned} Invest_{i,t} = {} & \alpha_0 + \alpha_1 NEG_{i,t-1} + \alpha_2 \%RevGrowth_{i,t-1} + \alpha_3 NEG * \%RevGrowth_{i,t-1} \\ & + \alpha_4 LogAssets_{i,t-1} + \alpha_5 LogAge_{i,t-1} + \alpha_6 Slack_{i,t-1} + \alpha_7 Lev_{i,t-1} \\ & + \alpha_8 BConIndex_{i,t} + \alpha_9 LConIndex_{i,t} + \alpha_{10} PEConIndex_{i,t} + \varepsilon_{i,t}. \end{aligned} \tag{6}$$

In addition to the proxy for growth opportunity, we also include firm size, firm age, financial slack, and financial leverage as controls for financing constraints. Moreover, based on Brown et al. (2008), we augment the model with three additional firm-level variables related to constraints in the operating environment: business constraints, legal constraints, and political/economic constraints.[24]

Third, we replace revenue growth with asset growth (*AssetGrowth*) as our proxy for investment opportunities. Specifically, we follow McNichols and Stubben (2008, 1579) and use the natural log of total assets at the end of year $t-1$ divided by total assets at the end of year $t-2$ for the estimation of Equation (1).

Finally, we follow Biddle et al. (2009) and sort firms, based on the positive and negative residuals, respectively, into deciles. Within the positive-residual group, we remove the bottom decile because these firms, whose unexpected investments are closest to 0 among all overinvesting firms, are more likely to be affected by measurement error in the investment model (i.e., misclassified as overinvesting firms). Similarly, we remove the top decile from the negative-residual group. We then repeat all the tests using the remaining observations.

The results of these four tests are tabulated in Panels A through D of Table 8. Even with the smaller sample sizes in these tests, results are similar to those of the main test specifications, and no inferences are affected.

Additional Control Variables

Although we include several firm-level control variables as well as industry and country fixed effects in our main tests, it is always possible that there are some omitted (and correlated) variables. However, adding more control variables comes at the cost of reducing the sample size and, thus, a trade-off exists between sample size (and hence generalizability) and "model completeness." In untabulated tests, we add several additional controls to all regressions.

Following Biddle et al. (2009), we include (1) long-term liabilities divided by total assets (*Lev*); (2) the standard deviation of sales in the past three years (*StdRev*); (3) the standard deviation of investments in the past three years (*StdInvest*); (4) the operating cycle calculated by using both accounts receivables and sales (*OperCycle*); and (5) an indicator variable referring to whether a firm reports a loss (*Loss*). We also (6) control for profitability (*ROA*). Furthermore, we take advantage of the availability of certain unique data items from WBES and include: (7) an indicator variable referring to whether the firm exports (*Export*); (8) an indicator variable for whether any foreign company or individual has ownership interests in the firm (*Foreign*); (9) an indicator variable that

[24] Appendix A contains detailed definitions of these additional variables. Note that with the expanded set of control variables, we require more observations to estimate the model than for the estimation of Equation (1). Therefore, we estimate this model by country and adjust both dependent and independent variables by the country-specific industry median. The adjustment for industry median accounts for industry heterogeneity.

TABLE 8

Sensitivity Analyses Related to the Investment Efficiency Model

$$InvEff_{i,t+1} = \beta_0 + \beta_1 FRQ_{i,t} + \beta_2 Bank_{i,t} + \beta_3 FRQ \times Bank_{i,t} + \beta_4 Tax_{i,t} + \beta_5 FRQ \times Tax_{i,t} + \beta_n Control\ Variables_{i,t} + \sum Industries + \sum Countries + \varepsilon_{i,t}$$

Panel A: Alternative Investment Efficiency Model with Lagged Investment

		Dependent Variable = *Underinvestment*				Dependent Variable = *Overinvestment*			
Variables	**Predictions**	***FRQ* Measured by *DisAccr* (1)**	***FRQ* Measured by *DisRev* (2)**	***FRQ* Measured by *DD* (3)**	***FRQ* Measured by *Aggreg* (4)**	***FRQ* Measured by *DisAccr* (5)**	***FRQ* Measured by *DisRev* (6)**	***FRQ* Measured by *DD* (7)**	***FRQ* Measured by *Aggreg* (8)**
FRQ	− (H1)	−0.016***	−0.022*	−0.0167***	−0.003***	−0.080***	−0.200***	−0.059*	−0.013***
		(−2.62)	(−1.68)	(−2.69)	(−3.26)	(−2.82)	(−4.11)	(−1.93)	(−3.49)
Bank		−0.001	−0.003***	−0.001	0.001	0.002	0.008	−0.002	−0.002
		(−0.22)	(−2.59)	(−0.39)	(1.02)	(0.30)	(1.23)	(−0.31)	(−0.34)
FRQ × *Bank*	− (H2)	−0.015*	−0.056***	−0.018**	−0.003**	−0.004	−0.111	−0.003	−0.003
		(−1.77)	(−2.72)	(−2.01)	(−2.46)	(−0.10)	(−1.45)	(−0.08)	(−0.56)
Tax		−0.001	0.001	−0.002	−0.001	0.004	0.008	−0.002	−0.008
		(−0.77)	(0.35)	(−1.55)	(−0.49)	(0.56)	(1.05)	(−0.24)	(−1.25)
FRQ × *Tax*	+ (H3)	−0.006	0.015	0.022	0.001	0.099**	0.254***	0.073*	0.016***
		(−0.38)	(0.58)	(1.35)	(0.54)	(2.20)	(3.12)	(1.68)	(2.67)
Control variables		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.196	0.238	0.198	0.198	0.103	0.107	0.098	0.103
n		2,836	3,042	2,788	2,768	1,337	1,332	1,301	1,296

(continued on next page)

TABLE 8 (continued)

Panel B: Alternative Investment Efficiency Model with Additional Control Variables

		Dependent Variable = *Underinvestment*				Dependent Variable = *Overinvestment*			
Variables	**Predictions**	***FRQ* Measured by *DisAccr*** **(1)**	***FRQ* Measured by *DisRev*** **(2)**	***FRQ* Measured by *DD*** **(3)**	***FRQ* Measured by *Aggreg*** **(4)**	***FRQ* Measured by *DisAccr*** **(5)**	***FRQ* Measured by *DisRev*** **(6)**	***FRQ* Measured by *DD*** **(7)**	***FRQ* Measured by *Aggreg*** **(8)**
FRQ	− (H1)	−0.019***	−0.011*	−0.018**	−0.003***	−0.114***	−0.157**	−0.104***	−0.016***
		(−2.74)	(−1.66)	(−2.39)	(−2.71)	(−3.14)	(−2.46)	(−2.62)	(−3.17)
Bank		0.002	−0.001	0.001	0.003	0.009	0.008	−0.001	−0.002
		(1.26)	(−0.02)	(0.81)	(1.50)	(0.98)	(0.73)	(−0.13)	(−0.34)
FRQ × *Bank*	− (H2)	−0.011*	−0.048**	−0.017*	−0.002**	−0.090	−0.096	−0.021	−0.008
		(−1.72)	(−2.04)	(−1.78)	(−2.05)	(−1.43)	(−1.02)	(−0.35)	(−1.05)
Tax		0.003	0.003	0.002	0.003**	0.009	0.002	0.001	−0.008
		(1.56)	(1.62)	(0.93)	(2.00)	(0.93)	(0.20)	(0.04)	(−1.06)
FRQ × *Tax*	+ (H3)	−0.001	0.002	0.014	−0.001	0.141***	0.185**	0.095*	0.016*
		(−0.02)	(0.05)	(0.92)	(−0.28)	(2.67)	(2.02)	(1.73)	(1.95)
Control variables		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.239	0.251	0.248	0.247	0.083	0.149	0.076	0.079
n		2,177	2,308	2,128	2,114	1,167	1,168	1,138	1,135

(continued on next page)

TABLE 8 (continued)

Panel C: Alternative Investment Efficiency Model with the Asset Growth Variable

		Dependent Variable = *Underinvestment*				Dependent Variable = *Overinvestment*			
Variables	**Predictions**	***FRQ* Measured by *DisAccr* (1)**	***FRQ* Measured by *DisRev* (2)**	***FRQ* Measured by *DD* (3)**	***FRQ* Measured by *Aggreg* (4)**	***FRQ* Measured by *DisAccr* (5)**	***FRQ* Measured by *DisRev* (6)**	***FRQ* Measured by *DD* (7)**	***FRQ* Measured by *Aggreg* (8)**
FRQ	− (H1)	−0.028***	−0.011*	−0.031***	−0.004***	−0.135***	−0.194***	−0.101***	−0.017***
		(−4.50)	(−1.77)	(−4.68)	(−4.85)	(−4.02)	(−3.44)	(−2.76)	(−3.76)
Bank		0.001	−0.002	−0.001	0.001	0.002	0.005	−0.005	−0.006
		(0.18)	(−1.55)	(−0.54)	(1.17)	(0.21)	(0.51)	(−0.56)	(−0.84)
FRQ × *Bank*	− (H2)	−0.013*	−0.032**	−0.018**	−0.002*	−0.058	−0.125	−0.011	−0.006
		(−1.65)	(−2.00)	(−2.08)	(−1.86)	(−1.10)	(−1.57)	(−0.20)	(−0.93)
Tax		−0.003**	−0.003*	−0.004**	−0.001	0.019**	0.009	0.007	−0.005
		(−2.09)	(−1.84)	(−2.45)	(−1.02)	(2.02)	(0.99)	(0.82)	(−0.60)
FRQ × *Tax*	+ (H3)	0.018	0.041	0.019	0.003	0.193***	0.195**	0.131**	0.018**
		(1.39)	(1.27)	(1.16)	(1.51)	(3.76)	(2.16)	(2.46)	(2.54)
Control variables		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.274	0.291	0.273	0.234	0.092	0.086	0.082	0.085
n		2,948	3,171	2,893	2,873	1,397	1,391	1,359	1,355

(continued on next page)

TABLE 8 (continued)

Panel D: Alternative Investment Efficiency Measure after Removing the Deciles around the Zero Residuals

		Dependent Variable = *Underinvestment*				Dependent Variable = *Overinvestment*			
Variables	**Predictions**	***FRQ* Measured by *DisAccr* (1)**	***FRQ* Measured by *DisRev* (2)**	***FRQ* Measured by *DD* (3)**	***FRQ* Measured by *Aggreg* (4)**	***FRQ* Measured by *DisAccr* (5)**	***FRQ* Measured by *DisRev* (6)**	***FRQ* Measured by *DD* (7)**	***FRQ* Measured by *Aggreg* (8)**
FRQ	− (H1)	−0.015***	−0.045***	−0.016***	−0.003***	−0.158***	−0.187***	−0.114***	−0.019***
		(−2.91)	(−3.64)	(−3.15)	(−4.70)	(−4.56)	(−3.33)	(−3.02)	(−4.12)
Bank		0.002	−0.002	0.002	0.002	0.007	0.009	0.001	−0.001
		(1.23)	(−1.50)	(1.34)	(1.57)	(0.77)	(1.01)	(0.05)	(−0.07)
FRQ × *Bank*	− (H2)	−0.010*	−0.047***	−0.016**	−0.002*	−0.079	−0.116	−0.027	−0.011
		(−1.70)	(−2.70)	(−2.08)	(−1.90)	(−1.52)	(−1.42)	(−0.47)	(−1.50)
Tax		−0.001	0.000	−0.001	−0.001	0.017*	0.006	0.000	−0.008
		(−0.70)	(0.12)	(−0.99)	(−0.99)	(1.82)	(0.58)	(0.02)	(−1.05)
FRQ × *Tax*	+ (H3)	−0.001	0.019	−0.003	0.001	0.191***	0.187**	0.093*	0.018**
		(−0.09)	(0.81)	(−0.27)	(0.01)	(3.66)	(2.07)	(1.75)	(2.41)
Control variables		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.292	0.331	0.291	0.292	0.083	0.076	0.073	0.077
n		2,754	2,977	2,725	2,705	1,390	1,283	1,270	1,266

*, **, *** Represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively, using two-tailed tests.

The table reports OLS regression results that replicate results in Table 7 with four alternative investment efficiency models. Variables are defined in Appendix A. In Panel A, we compute investment efficiency by adding the lagged investment variable to Equation (1). In Panel B, we adopt an expanded investment efficiency model from Equation (4). The expanded model includes additional control variables, such as firm size, firm age, financial slack, financial leverage, business constraints, legal constraints, and political/economic constraints. In Panel C, we compute investment efficiency by replacing revenue growth with the asset growth variable in Equation (1). In Panel D, we compute investment efficiency by removing decile observations surrounding the zero residuals of Equation (1). Huber-White robust standard errors are used to control for heteroscedasticity.

takes on the value of 1 if financing obstacles (*FinCon*) are severe; and (10) an indicator variable that takes on the value of 1 if the largest shareholder owns more than 50 percent of the firm (*Control*).

Requiring data on these additional controls reduces the sample size by approximately half. Nevertheless, even with the reduced sample size our conclusions for H1 to H3 remain unaltered.

Controls for Potential Endogeneity

Our tests are based on the premise that FRQ affects investment efficiency. We acknowledge that it is challenging to establish causality in this line of research. However, we have implemented research design features to at least partially alleviate such concerns. First, and perhaps most important, economic theory supports our finding that FRQ has a positive effect on investment decisions. We are unaware of theory suggesting a reverse relation. Second, we test the effect of FRQ in the current period on *next* period's investment efficiency. Third, we include control variables motivated by prior research. In addition, above we introduce a number of additional controls. Fourth, our focus on interaction effects makes it hard to argue for reverse causality (e.g., Rajan and Zingales 1998).

As a final control for endogeneity of *FRQ*, we consider a two-stage least squares model. To model cross-sectional variation in *FRQ*, we first include all control variables from Equation (5). Then we add a variable that reflects the strength of the relation between the firm and local suppliers and customers (or the firm's reliance on local product markets). Extant research (e.g., Bowen et al. 1995; Raman and Shahrur 2008; Dou et al. 2011) shows that a firm's suppliers and customers affect the firm's *FRQ*.[25] The instrument (*LocalMarket*) is constructed by averaging the percentage of domestic sales of outputs and the percentage of domestic purchases of inputs. *LocalMarket* is significantly correlated with all four measures of *FRQ* but is not significantly correlated with investment efficiency.[26] Untabulated results show that no inferences are affected after controlling for potential endogeneity of *FRQ* through this two-stage estimation.

Alternative Country Controls and Possible Variations across Sample Countries

Although all sample countries are emerging economies, they clearly differ from each other in various ways. Recall that we control for such effects using country fixed effects in all reported tests (e.g., Doidge et al. 2007). In this section, we perform two additional tests. First, we replace country fixed effects with legal origin (i.e., English common law versus other legal traditions) and creditor protection, either separately or jointly. These variables come from Djankov et al. (2007) and have been widely used in recent accounting and finance research. No conclusions are altered with this specification. Second, we separate the sample based on legal origins and the values of creditor rights, respectively, and estimate the regressions separately for the two groups.[27] For both partitions, we find that our results are qualitatively unchanged for both sets of countries.

We have also estimated pooled regressions and included both the main of legal origin and creditor rights and their interactions with FRQ. It is interesting to note that the interaction terms are always negative, although only statistically significant for the overinvestment scenario. These

[25] In addition, this instrument reflects the monitoring costs of local stakeholders relative to the costs by foreign stakeholders (e.g., Lerner 1995).

[26] The first-stage model has adjusted R^2s of 21 percent, 13 percent, 15 percent, and 22 percent for the four models, respectively.

[27] As the creditor rights index ranges from 0 (weak) to 4 (strong), we classify any value 0–1 into the low creditor protection group, and any value 2–4 into the high creditor protection group.

results are consistent with prior research that suggests that FRQ is more important in countries with stronger investor protection.

Sensitivity Analyses Related to the Degree of Accrual Accounting Employed

By construction, our sample firms use accrual accounting (i.e., we require data on balance sheet items necessary to compute accrual-based FRQ measures). However, to address the possibility that some firms use accrual accounting to a lesser extent, we conduct the following tests. First, as the smallest private firms are likely to rely less on accrual accounting than larger firms (Allee and Yohn 2009), we repeat the tests after excluding the smallest firms. We run the following four tests: (1) exclude the smallest (based on total assets) 10 percent of firms for the pooled sample; (2) exclude the smallest 20 percent of firms for the pooled sample; (3) exclude the smallest 10 percent of firms by country; and (4) exclude the smallest 20 percent of firms by country. In these samples, which are more likely to generalize to other private firms that also use accrual accounting, our results are qualitatively unchanged. Second, insofar as Allee and Yohn (2009) find that most U.S. private firms that are audited use accrual accounting, we repeat the tests keeping only firms that are audited. Again, inferences are unaffected.

Finally, country-level regulations of private firms' financial reporting differ in their strength across our sample countries. We manually collect relevant information and construct a country-level indicator of financial reporting regulation of private firms, *FinRegulation*, set equal to 1 if the sample firm is from a country that imposes substantial financial reporting regulation on private firms, and 0 otherwise.[28] We first add *FinRegulation* as an additional control in our main test. The coefficients on the FRQ proxies still load significantly and with the expected negative signs.[29]

The Importance of Financial Reporting Quality for Public Firms included in the WBES Database

Although the focus in our study is on private firms from emerging markets, the WBES database also contains a relatively small number of public firms. Only 453 (130) underinvestment (overinvestment) observations remain when using public firms and requiring data availability as described above. In this small sample, we find that, consistent with prior research using our private firm results, FRQ is negatively related to both under- and overinvestment.[30]

Additional Tests Related to Cash Constraints

Finally, motivated by prior research (e.g., Jensen 1986; Biddle et al. 2009), we examine the role of FRQ for firms that are above and those that are below the median for cash constraints (defined as the cash balance divided by total assets) separately. Our results suggest that FRQ is positively associated with investment efficiency for both sets of firms.

VI. CONCLUSION

We study the role of accounting information for a set of firms for which there is very limited prior research evidence: private firms from emerging markets. Although private firms make up the

[28] Our classification scheme suggests that Bangladesh, Ecuador, Eritrea, Guatemala, Honduras, Nicaragua, Oman, Philippines, Sri Lanka, and Syria appear to have no or very limited financial reporting regulation of private firms.

[29] In additional tests, we also include an interaction term between *FRQ* and *FinRegulation*. This interaction term is significantly negative for underinvestment but not significant for overinvestment. For all specifications, *FRQ* retains its statistical significance.

[30] Specifically, we find that the estimated coefficients on *FRQ* are statistically significant in all specifications when country fixed effects are excluded and are negative but not always significant when country fixed effects are included. This result is not surprising given the limited within-country variation in this small sample.

vast majority of economic activity around the world, they have received limited attention in academic research, and in particular we are unaware of prior research on the relation between financial reporting quality and investment efficiency in a private firm setting.

Prior research suggests that private firms have lower quality financial reporting, presumably due to reduced market demand. In addition, research indicates that firms from countries with less sophisticated institutions also have lower quality accounting. Thus, our study examines the "boundary condition" (or lower bound) in which FRQ may not have the same effect on investment efficiency as that documented for publicly traded companies in the United States.

Research shows that small- and medium-sized enterprises (SMEs) incur not only higher financing obstacles than large firms, but also that the effect of these financing constraints is stronger for SMEs than for large firms (Beck and Demirguc-Kunt 2006). Policymakers in governmental and international aid organizations believe that, in developing countries, small firms have inadequate access to external financing due to market imperfections (World Bank 2007). In other words, compared with public firms in developed countries, our sample firms are more likely to be underinvestment firms, and our empirical evidence supports this idea. Given the importance of financing for these firms, notwithstanding the arguments put forth in prior research, FRQ could play an important role in their investment decisions, and our results are consistent with this notion.

We find evidence that FRQ is positively associated with investment efficiency for our sample firms. Although they may well have lower FRQ than public firms in developed markets, there are more limited alternative information sources other than accounting for private firms (and in countries with lower disclosure levels, on average). Also, the link between financial accounting and management accounting is likely to be strong in these settings, suggesting that the financial accounting information set is largely the same set used in managers' decisions. Further, compared with publicly traded companies in the U.S. and other developed countries, our sample firms face fewer mandatory accounting recognition and measurement (as well as disclosure) requirements. Therefore, our sample firms have greater flexibility to choose FRQ and their choices have the potential to be especially important for improving investment efficiency.

In addition, we hypothesize that the source of financing as well as firms' tax incentives affect the role of accounting information. We find evidence supporting these hypotheses. Specifically, we find that greater use of bank financing increases the role that accounting information plays. In addition, for firms in which tax incentives are likely to dominate incentives to provide useful information for internal decision making as well as a source of information for outside providers of capital, the informational role of accounting is significantly diminished. Such a connection between tax-minimization incentives and the informational role of earnings has often been asserted in the literature, but, to date, there is limited empirical evidence on this issue.

Our study is subject to some caveats. First, we rely on survey data from the World Bank. Although prior research provides several validity tests of these data, survey data are known to have limitations. Second, we acknowledge that both the investment efficiency and the FRQ variables likely suffer from measurement error. Third, our results do not necessarily generalize to all private firms. Fourth, it is difficult to prove causality.[31] Notwithstanding these potential limitations, we hope that our findings will be of interest to researchers, standard-setters and other regulators, government officials in emerging markets, managers, and, importantly, the World Bank and others involved in improving economic conditions in developing countries.

[31] However, our empirical results are supported by economic theory. Further, we employ research design features that increase our confidence in the inferences drawn. We report results using various specifications of both dependent and test variables, and our tests include numerous control variables motivated by prior research. We further report results of changes tests in addition to association tests, and also report results using 2SLS. Finally, the interaction effects help alleviate concerns over potential omitted variables.

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APPENDIX A

Definitions of Variables

Invest	=	the sum of new investment in machinery, equipment, vehicles, buildings, land, and R&D activities, less the sale of fixed assets in the current year, scaled by the lagged total assets;
%RevGrowth	=	the yearly percent growth rate of sales from year $t-2$ to year $t-1$;
TAccr	=	total accruals, measured as the change in non-cash current assets minus the change in current non-interest-bearing liabilities, minus depreciation and amortization expense, scaled by lagged total assets;

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APPENDIX A (continued)

TCAccr = total current accruals, measured as the change in non-cash current assets minus the change in current non-interest-bearing liabilities, scaled by lagged total assets;

InvEff = a measure of investment efficiency, which is measured as the absolute values of the residuals from the investment model: $Invest_{i,t} = a_0 + a_1 NEG_{i,t-1} + a_2 \%RevGrowth_{i,t-1} + a_3 NEG * \%RevGrowth_{i,t-1} + \varepsilon_{i,t}$. The indicator variable $NEG_{i,t-1}$ takes the value of 1 for negative revenue growth, and 0 otherwise. The investment model is estimated cross-sectionally with at least eight observations in each industry by country. To mitigate the influence of outliers, we winsorize all variables at the 1 percent and 99 percent levels;

Overinvestment = positive residuals from the investment efficiency model;

Underinvestment = absolute value of the negative residuals from the investment efficiency model;

FRQ (*measured by DisAccr*) = the absolute residual of the Kothari et al. (2005) discretionary accrual model, multiplied by −1;

FRQ (*measured by DisRev*) = the absolute residual of the discretionary revenues model as presented in McNichols and Stubben (2008), multiplied by −1;

FRQ (*measured by DD*) = the absolute residual of the modified Dechow-Dichev model as implemented by Francis et al. (2005) and Srinidhi and Gul (2007), multiplied by −1;

FRQ (*measured by Aggreg*) = an aggregate financial reporting metric, measured as the average of the standardized previous three measures (i.e., *DisAccr, DisRev*, and *DD*);

Bank = an indicator variable that takes on the value of 1 if bank financing accounts for the highest percentage of total financing among all external sources of financing, and its percentage is larger than 5 percent among all financing sources, and 0 otherwise; and

Tax = an indicator variable that takes on the value of 1 if the average degree of obstacle is 3 or greater for both tax rates and tax administration, and 0 otherwise.

Control Variables in the Investment Efficiency Test

LogAssets = the log of total assets;

LogAge = the log of the age of the firm in years;

Tang = the ratio of property, plant, and equipment to total assets;

Slack = the ratio of cash to total assets; and

Audit = an indicator variable that takes on the value of 1 if annual financial statement is reviewed by an external auditor, and 0 otherwise.

Additional Variables Used in the Additional Tests

Collateral = the approximate value of collateral required as a percentage of the loan value;

Lev = financial leverage, measured as long-term liabilities divided by total assets;

BConIndex = the business constraint index, which is the average of indicator variables defined as equal to 1 if the firm perceives major or very severe obstacles in telecommunications, electricity, transportation, access to land, and skills and education of available workers, and 0 otherwise;

LConIndex = the legal constraint index, which is the average of indicator variables defined as equal to 1 if the firm perceives major or very severe obstacles in corruption, crime, and anticompetitive practices, and 0 otherwise;

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APPENDIX A (continued)

PEConIndex	=	the political and economic index, which is the average of indicator variables defined as equal to 1 if the firm perceives major or very severe obstacles in customs regulations, labor regulations, business licensing, regulatory policy uncertainty, and the macroeconomic situation, and 0 otherwise;
AssetGrowth	=	asset growth, measured as the natural log of total assets in year $t-1$ divided by total assets in $t-2$;
StdRev	=	the standard deviation of sales in the past three years;
StdInvest	=	the standard deviation of investments in the past three years;
OperCycle	=	operating cycle calculated by the following formula: (average accounts receivables/sales) $\times$ 365 + (average inventory/cost of goods sold) $\times$ 365. We use the log of operating cycle for our tests;
Loss	=	an indicator variable referring to whether a firm reports a loss;
ROA	=	return on assets, measured as net income divided by lagged total assets;
Export	=	an indicator variable referring to whether the firm exports;
Foreign	=	an indicator variable referring to whether any foreign company or individual has a financial stake in the ownership of the firm;
FinCon	=	an indicator variable that takes on the value of 1 if the degree of obstacle for both access to financing and cost of financing is larger than 3, and 0 otherwise;
Control	=	an indicator variable that takes on the value of 1 if the largest shareholder owns more than 50 percent of the firm;
LocalMarket	=	the firm's reliance on local product markets, measured as the average of the percentage of domestic sales of outputs and the percentage of domestic purchases of inputs;
LegalOrigin	=	an indicator variable that equals 1 if the legal origin of the Company Law or Commercial Code of the sample country is English, and 0 otherwise (source: Djankov et al. 2007);
CreditorRights	=	an index aggregating rights of secured lenders that are defined in laws and regulations. The index ranges from 0 (weak creditor rights) to 4 (strong creditor rights) and is constructed as at January for every year from 1978 to 2003 (source: Djankov et al. 2007);
FinRegulation	=	an indicator variable that equals 1 if the sample firm belongs to a country that has substantial equivalent financial reporting regulation of private firms compared to public firms, and 0 otherwise; and
CashConstraint	=	An indicator variable that equals 1 if cash balance scaled by total assets is above the sample median, and 0 otherwise.

All data, unless otherwise noted, are from the World Bank's Enterprise Survey.