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The Real Effect of the Initial Enforcement of Insider Trading Laws☆

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Abstract

Based on a difference-in-differences approach, we find strong evidence that the initial enforcement of insider trading laws improves capital allocation efficiency. The effect is concentrated in developed markets and manifests shortly after the enforcement year. Further analysis shows that the improvement is positively associated with the increase in liquidity around the enforcement year and the opaqueness of the information environment before the enforcement year. The improvement is more pronounced for firms operating in more competitive markets, being more financially constrained, and with more severe agency problems. Finally, we find increased accounting performance after the enforcement and the increase is positively associated with the improvement in capital allocation efficiency. Overall, our evidence suggests that the initial enforcement of insider trading laws improves capital allocation efficiency by providing more information to guide managerial decisions and by reducing market frictions arising from information asymmetry and agency problems.

Keywords: Enforcement; Insider trading laws; Capital allocation; Investment; Managerial learning; Market frictions; Real effect.

JEL Classification: D83, G15, G31, K22

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Abstract

Based on a difference-in-differences approach, we find strong evidence that the initial enforcement of insider trading laws improves capital allocation efficiency. The effect is concentrated in developed markets and manifests shortly after the enforcement year. Further analysis shows that the improvement is positively associated with the increase in liquidity around the enforcement year and the opaqueness of the information environment before the enforcement year. The improvement is more pronounced for firms operating in more competitive markets, being more financially constrained, and with more severe agency problems. Finally, we find increased accounting performance after the enforcement and the increase is positively associated with the improvement in capital allocation efficiency. Overall, our evidence suggests that the initial enforcement of insider trading laws improves capital allocation efficiency by providing more information to guide managerial decisions and by reducing market frictions arising from information asymmetry and agency problems.

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1. Introduction

A large body of international literature has shown that capital resources are allocated more efficiently in countries with more developed financial markets, stronger legal protection of investors, and more transparent informational environments.[1] While these cross-country analyses offer valuable insights, they are also limited in the potential to draw causal inferences (Bushman and Smith, 2001). One way to improve these analyses is to examine within-country changes in capital allocation efficiency over time using experimental settings (Wurgler, 2000; Leuz and Wysocki, 2016). In this study, we contribute to the literature by testing whether and how the initial enforcement of insider trading laws (hereafter enforcement) affects capital allocation efficiency using a difference-in-differences (DID) design.

We hypothesize that enforcement improves capital allocation efficiency by enhancing market efficiency. Restriction on insider trading reduces information asymmetry and enhances liquidity, which in turn attracts more informed risk arbitrage and improves the information efficiency of prices (Bushman, Piotroski, and Smith, 2005; Fernandes and Ferreira, 2009). More efficient prices improve capital allocation efficiency through at least three channels: (1) by providing more precise information to guide managers' decisions, (2) by reducing financing constraints, and (3) by increasing the effectiveness of monitoring (Wurgler, 2000; Bushman and Smith, 2001; Bond, Edmans and Goldstein, 2012).

We test our hypothesis on a sample of 123,343 firm-year observations (17,924 firms) in 23 developed markets and 19,923 observations (4,264 firms) in 22 emerging markets between 1982 and 2003. Following Wurgler (2000) and Bushman et al. (2011), we measure capital allocation

[1] See, for example, Wurgler (2000), Fisman and Love (2004), Biddle and Hilary (2006), Francis, Huang, Khurana and Pereira (2009), Bushman, Piotroski and Smith (2011), and McLean, Zhang, and Zhao (2012).

efficiency by the sensitivity of capital investment growth to investment opportunity shocks. We measure investment opportunity shocks by the lagged industry returns of US-listed firms. This design choice builds on the assumption that there exist common global industry-specific shocks to growth opportunities (Fisman and Love, 2004). In addition, since the US market is the most efficient, the industry returns of the US-listed firms are likely the best measure of such common shocks (Rajan and Zingales, 1998; Fisman and Love, 2007).

We find strong evidence that firms allocate capital more efficiently after enforcement. In particular, we find a statistically significant increase in the sensitivity of investment growth to return following enforcement, after controlling for country and year fixed effects on the sensitivity. The increase is also economically significant. Based on the estimate from our baseline model, the investment growth associated with a one-standard-deviation increase in shocks to investment opportunities is about 6% higher in the post-enforcement period than in the pre-enforcement period.

Christensen, Hail, and Leuz (2016) argue that the effect of regulations could either be weaker or stronger in countries with weaker pre-regulation institutions. Prior studies have also documented mixed findings of the enforcement effect in developed and emerging markets (Bushman et al., 2005; Fernandes and Ferreira, 2009). Thus, we examine the effect of enforcement in developed and emerging markets separately. We find a significant increase in capital allocation efficiency after enforcement only in the developed markets. One possible reason is that new regulations are more likely to be abused in countries with weak institutions and inefficient bureaucracies (Shleifer, 2005). In addition, emerging markets have poor protection of private property rights, which deters informed risk arbitrage. Therefore curbing insider trading may not increase price informativeness in emerging markets (Morck, Yeung, and Yu, 2000; Fernandes and Ferreira, 2009). Moreover, mechanisms that seek to restrict managers' rent-seeking behavior and reduce the cost of external financing may have limited benefits when private property rights are weakly protected (Stulz, 2005; Durnev, Errunza, and Molchanov, 2009).

We conduct two robustness tests for our identification strategy. First, we examine the change in the sensitivity of investment growth to return in the developed markets over a relatively short period of time around the enforcement year (i.e., years -2 to +3, where year 0 is the enforcement year). We find a significant increase in sensitivity in years +1 to +3 from that in years -2 to 0. Second, we randomly assign a pseudo enforcement year to firms in countries that began enforcing their insider trading laws before our sample period or in countries that did not enforce their insider trading laws until after our sample period. We find a significant increase in the sensitivity of investment growth to return after the true enforcement year but not after the pseudo enforcement year.

We find that our baseline results are robust to various model specifications, sample selections, and measurements of investment growth and investment opportunity shocks. The results are also qualitatively similar when we conduct analysis at the country-year level by using the country-year-specific estimates of the sensitivity of investment growth to return as the dependent variable.

We then examine the cross-sectional variation in the effect of enforcement on capital allocation efficiency in the developed markets to further substantiate our hypothesis and highlight the potential channels through which enforcement works. First, if enforcement improves capital allocation efficiency by enhancing the informativeness of stock prices, the increase in capital allocation efficiency and the increase in price informativeness should be positively correlated. Prior studies have suggested that curbing insider trading improves liquidity and higher liquidity attracts more informed trading, which results in more informative prices (Bhattacharya and Spiegel, 1991; Chordia, Roll, and Subrahmanyam, 2008). We measure price informativeness enhancement by the increase in liquidity around the enforcement year. We find that the increase in capital allocation efficiency is positively associated with the increase in liquidity.

Second, as insiders trade more aggressively in more opaque information environments (Aboody, Hughes, and Liu, 2005), curbing insider trading should improve price efficiency to a greater extent in countries with more opaque information environments before the enforcement year. We follow Leuz, Nanda, and Wysocki (2003) and Bhattacharya, Daouk, and Welker (2003) to measure information opacity in each country before the enforcement year. Consistent with our prediction, the improvement in capital allocation efficiency is more pronounced in countries where information environments are more opaque before the enforcement year.

Third, while managers have a great deal of internal information (such as technology, production costs, and strategies), outside investors are more likely to have external information (such as the status of the industry and competitors) that managers may not know (Bond et al., 2012). In more competitive industries, the external information would be more useful because firms are more vulnerable to changes in their peers' fortunes and strategies (Ozoguz and Rebello, 2013). Therefore, to the extent that enforcement improves capital allocation efficiency by providing more information to guide managers' decisions, the effect is expected to be more pronounced for firms that operate in more competitive product markets. Consistent with this prediction, we find a more pronounced effect of enforcement on the sensitivity of investment growth to return in industries with a lower Herfindahl index.

Fourth, to the extent that enforcement improves capital allocation efficiency by relaxing external financing constraints and reducing agency problems, the effect should be more pronounced for more financially constrained firms and for firms with more severe agency conflicts between insiders and outside shareholders. Consistent with this prediction, we find a more pronounced increase in capital allocation efficiency for firms with greater financial constraints as measured by the Whited and Wu (2006) index. The effect of enforcement is also more pronounced for firms with more severe agency problems, as reflected in a positive wedge between the control rights and cash flow rights of the largest shareholder (Claessens, Djankov, Fan, and Lang, 2002; Faccio and Lang, 2002). Overall, our evidence provides strong support for the hypothesis that enforcement improves capital allocation efficiency by providing more information to guide managers' decisions, by relaxing financing constraints, and by mitigating moral hazard problems.

Finally, we examine the change in accounting performance, as measured by return on assets (*ROA*), after enforcement. If enforcement improves capital allocation efficiency, we should observe an improvement in ex-post accounting performance. Based on a DID analysis, we find a significant increase in *ROA* after enforcement. In addition, the increase in *ROA* is positively associated with the improvement in capital allocation efficiency after enforcement.

Our study makes several contributions. First, to our best knowledge, our paper is the first empirical study on the effect of insider trading regulations on real investment. There is a long-standing analytical debate on how insider trading regulations affect real investment.[2] However, most empirical studies have focused on the financial markets (e.g., Bhattacharya and Daouk, 2002), contracting (Denis and Xu, 2013), and the information side of the economy (e.g., Bushman et al., 2005; Fernandes and Ferreira, 2009; Jayaraman, 2012). Hail, Tahoun, and Wang (2014) examine the effect of enforcement on dividend payouts, but they do not examine investment decisions. This study contributes to the literature by empirically examining the effect of insider trading regulations on capital allocation decisions.

[2] See, for example, Carlton and Fischel (1983), Manove (1989), Ausubel (1990), Leland (1992), and Khanna, Slezak, and Bradley (1994).

Second, we contribute to the empirical studies on how the legal, institutional, and regulatory environments at the country level affect real investment. Prior studies have examined the effects of legal protection (Wurgler, 2000; Kusnadi et al., 2009; McLean et al., 2012) and financial development (Rajan and Zingales, 1998; Wurgler, 2000; Fisman and Love, 2004). Whereas these studies make cross-country comparisons, we investigate the *change* in capital allocation efficiency after an exogenous shock to insider trading regulations and provide causal inferences. Insider trading regulations are among the most important controls placed on security markets and an important element shaping corporate transparency (Bushman, Piotroski, and Smith, 2004). Thus, our study is also linked to prior country-level studies on the effect of corporate transparency on capital allocation decisions (Biddle and Hilary, 2006; Francis et al., 2009; Bushman et al., 2011).

Third, our paper is also linked to recent studies on securities regulation and enforcement of securities laws (Leuz and Wysocki, 2016). By testing the effect of insider trading laws on real investment decisions, we respond to the call for research on the real effect of regulations using regulatory shifts as an experimental setting (Leuz and Wysocki, 2016). We also conduct cross-sectional analyses to highlight the important mechanisms through which insider trading regulations affect real corporate decisions.

Finally, our study is related to recent research on the real effect of financial markets and information environments in general (Dow and Gorton, 1997; Chen, Jiang and Goldstein, 2007; Bond et al., 2012). This line of research argues that financial markets affect how real corporate decisions are made by changing the information available to decision-makers as well as shaping their incentives (Bond et al., 2012). Two recent studies examine the change in investment efficiency after cross-listing in the US (Foucault and Frésard, 2012) and after adopting the International Financial Reporting Standards (IFRS) (Loureiro and Taboada, 2015). We contribute to this literature by using the initial enforcement of insider trading laws as an exogenous shock to price efficiency. Furthermore, our cross-sectional results highlight the channels through which financial markets affect real corporate decisions.

An independent and closely-related paper by Edmans, Jayaraman, and Schneemeier (2017) also studies how enforcement changes the sensitivity of investment to prices after controlling for total price efficiency. Their purpose is to isolate the effect of managerial learning from the price of his own firm (Bond, Edmans, and Goldstein, 2012). Our paper differs from theirs in that we examine the effect of total price efficiency on resource allocation. As recognized in Edmans et al. (2017), enforcement affects resource allocation through multiple channels. For instance, enforcement may improve price efficiency of peer firms and enhance managerial learning from their peer firms (Foucault and Frésard, 2014). Enforcement may also reduce market frictions due to information asymmetry and moral hazard (Dow and Gorton, 1997; Bond et al., 2012). These effects do not necessarily hinges on the ability of a manager to learn from the prices of his own firm. We show that the effect of enforcement on resource allocation efficiency is more pronounced for firms that operate in more competitive industries in which the benefit of learning from peer firms is greater (Ozoguz and Rebello, 2013). We also show a more pronounced effect for firms that are more financially constrained and firms that have more severe agency problems.

The rest of the paper is organized as follows. Section 2 reviews the related literature and develops our hypotheses. Section 3 describes the data and research design issues. Section 4 shows the results of the regression analysis on the association between enforcement and the sensitivity of investment growth to return. Section 5 presents cross-sectional analyses attempting to uncover the mechanisms through which enforcement affects capital allocation efficiency. Section 6 examines the effect of enforcement on firm operating performance. Finally, Section 7 concludes the paper.

2. Prior Literature and Hypothesis Development

2.1. Insider trading restriction and price efficiency

Economic theory suggests that uninformed investors protect themselves from trading against insiders by decreasing liquidity and participation in trading (Kyle, 1985; Bhattacharya and Spiegel, 1991). Admati and Pfleiderer (1988) show that increased liquidity trading motivates information acquisition and informed trading by outside investors, which leads to more informative stock prices. Chordia et al. (2008) present empirical evidence showing that increased liquidity stimulates informed risk arbitrage activity and enhances price efficiency. Fishman and Hagerty (1992) demonstrate that restricting insider trading encourages outside investors to acquire private information and trade more aggressively. Under certain conditions, the gain in price efficiency resulting from more informed trading by outside investors exceeds the loss in price informativeness arising from prohibitions on insider trading. In this case, restricting insider trading results in a net increase in price efficiency. Empirical evidence supports the notion that curbing insider trading enhances liquidity, participation by outside investors, and stock price efficiency. Bhattacharya and Daouk (2002) find that trading volume increases after enforcement. Christensen et al. (2016) find increased market liquidity in EU countries when new regulations concerning insider trading, market manipulation and corporate transparency are put in force. Bushman et al. (2005) document increased analyst following after enforcement, suggesting more active participation by investors after enforcement. Finally, Fernandes and Ferreira (2009) show improved price efficiency and liquidity after enforcement.[3]

[3] In addition, as insiders are likely to benefit more from their trades when information asymmetry is high, restricting insider trading could improve market efficiency by motivating them to improve the quality of public disclosure and

2.2. Price efficiency and capital allocation efficiency

Based on the framework outlined by Bushman and Smith (2001), more efficient prices lead to more efficient capital allocation through at least three channels. First, stock prices can guide corporate investment by providing information for managers to evaluate investment opportunities (Dow and Gorton, 1997). Optimal decision-making depends not only on the internal information available to the firm (such as technology, production costs, and strategies), but also on external information (such as the state of the economy, the position of competitors, and the demand from consumers). While managers would certainly have better internal information, outside informed investors are likely to have external information that managers may not know (Bond et al., 2012). Although the amount of information from each individual investor might be negligible, the market aggregates all information from a large population of investors so that the total amount of information can be significant (Subrahmanyam and Titman, 1999). Managers can extract useful information from the prices of their own firm and of their peer firms to guide their capital allocation decisions. Consistent with this notion, the existing literature finds that a firm's investment is sensitive to its own stock prices and to those of its peers, and the sensitivity is positively associated with its own price informativeness and that of its peers (Chen et al., 2007; Ozoguz and Rebello, 2013; Foucault and Frésard, 2014). Badertscher, Shroff, and White (2013) show that the presence of public firms in an industry provides information for private firms to evaluate investment opportunities more accurately and thereby increases their capital allocation efficiency.

Second, efficient prices improve capital allocation efficiency by giving the right incentives to managers who have discretions in making decisions (Dow and Gorton, 1997; Bond et al., 2012).

financial reporting. Zhang and Zhang (2014) and Jayaraman (2012) both find an increase in financial reporting quality after enforcement.

Efficient prices are key inputs to external governance devices, such as the corporate control market, by conveying precise signals about the quality of managers' decisions and when to intervene (Durnev, Morck, and Yeung, 2004). Edmans (2009) argues that more informative prices encourage managers to undertake efficient real investment by revealing the long-run value of the investment. Faure-Grimaud and Gromb (2004) posit that informative prices increase insiders' incentives to take value-maximizing actions by revealing the consequences of their actions precisely and promptly. In addition, more informative prices increase the effectiveness of incentive compensation in aligning the interests of managers and shareholders (Holmström and Tirole, 1993). Kang and Liu (2008) find that more informative prices are associated with more powerful incentive contracts based on stock prices. Finally, efficient prices increase board monitoring effectiveness by making the board better informed (Ferreira, Ferreira, and Raposo, 2011). Consistent with this view, Ferreira et al. (2011) find a negative association between board independence and stock price informativeness, suggesting that more informative prices reduce the need for board independence. This negative association is more pronounced when firms have fewer takeover defenses, more concentrated institutional ownership, and higher CEO pay-for-performance sensitivity. The evidence is consistent with the notion that more informative prices increase the effectiveness of external monitoring and incentive contracts, which further reduces the need for board independence.[4]

Third, one important impediment to efficient capital allocation is the adverse selection problem which prevents the transfer of capital from firms with bad growth opportunities to those

[4] Several studies suggest that restrictions on insider trading may directly mitigate agency problems. Manove (1989) and Ausubel (1990) suggest that insiders can expropriate outside investors by trading on foreknowledge about investment outcomes. Anticipating this, investors will distort stock investment to protect themselves. Bebchuk and Fershtman (1990) argue that managers may distort investment decisions in order to increase insider trading profits.

with good opportunities (Fisman and Love, 2004). More efficient markets reduce information asymmetry between managers and outside investors and help identify entrepreneurs that have access to good investment opportunities. More efficient prices also help reduce investors' risk of estimating the intrinsic value of a firm, thereby decreasing the required rate of return (Lambert, Leuz, and Verrecchia, 2007). Naiker, Navissi, and Truong (2013) find that firms with more active option trading have a lower cost of equity, consistent with the view that option trading reduces information asymmetry and increases price informativeness (Ho, Hassell, and Swidler, 1995). Fernandes and Ferreira (2009) suggest that the cost of equity is negatively associated with price informativeness. Sunder (2004) finds that more informative equity prices are associated with a lower cost of debt. Thus, more efficient prices help reduce the cost of raising external capital and relax financing constraints.

Prior studies have shown that more efficient capital allocation is associated with mechanisms that help alleviate market frictions arising from moral hazard and adverse selection. For example, the literature finds that resources are allocated more efficiently in countries with more developed financial markets (Wurgler, 2000; Fisman and Love, 2004), more transparent information environments (Francis et al., 2009; Biddle and Hilary, 2006), accounting practices that recognize loss more timely (Bushman et al., 2011; Lara, Osma, and Penalva, 2016), and stronger investor protection (Wurgler, 2000; McLean et al., 2012).

2.3. Hypotheses

The literature discussed above suggests that enforcement enhances the liquidity and the information efficiency of stock prices, which leads to more efficient capital allocation, by providing more relevant information for managers to guide their investment decisions and by mitigating market frictions arising from adverse selection and moral hazard. The discussion leads to the following testable hypotheses.

H1. *Capital allocation efficiency increases after enforcement.*

H2a. *The increase in capital allocation efficiency after enforcement is positively associated with the increase in price efficiency after enforcement.*

In addition, insiders are likely to trade more aggressively when information environments are opaque (Aboody et al., 2005). Thus, the effect of enforcement on liquidity and price efficiency is likely to be greater in countries that have more opaque information environments before enforcement. The above discussion leads to the following hypothesis.

H2b. *The increase in capital allocation efficiency after enforcement is more pronounced in countries with more opaque information environments before enforcement.*

As discussed before, outside informed investors are more likely to possess external information about the status of competitors, the industry, and customer demand that managers may not know (Bond et al., 2012). The importance of such information for decision-making is likely to vary across the competitive landscape. More intense competition exposes firms more strongly to changes in their peers' fortunes and strategies (Ozoguz and Rebello, 2013), which increases the value of external information. Therefore, the potential benefit for managers of learning from the stock prices of their own firm or of peer firms is greater when their firms are operating in a more competitive product market. Consistent with this notion, Ozoguz and Rebello (2013) find that a firm's investment is more sensitive to the prices of its peer firms when it is operating in a more competitive product market. Chircop, Collins, and Hass (2016) also provide evidence that the peer learning effect is stronger in more competitive product markets. Thus, to the extent that enforcement improves capital allocation efficiency by enabling stock prices to provide more information to guide managers' decisions, the improvement is expected to be more pronounced for firms that operate in more competitive product markets. The above discussion leads to the following hypothesis.

H3. *The increase in capital allocation efficiency after enforcement is more pronounced for firms operating in more competitive product markets.*

Investments of financially constrained firms are less responsive to investment opportunities because external financing is costly (Hubbard, 1998). Thus, the benefit of a reduction in external financing costs should be greater for financially constrained firms. Consistent with this notion, Rajan and Zingales (1998) find that industry sectors with higher external financing needs grow faster in countries with more developed financial markets. Thus, to the extent that enforcement improves capital allocation efficiency by reducing external financing costs and relaxing external financing constraints, the effect should be more pronounced for more financially constrained firms.

Firms with more severe agency conflict between insiders and outside investors also make less efficient capital allocation decisions. The inefficiency can arise from shirking or expropriation of investment opportunities (Bertrand and Mullainathan, 2003; Johnson, La Porta, Lopez-de-Silanes, and Shleifer, 2000), or result from a waste of free cash flows in projects with negative net present value (Hubbard, 1998). Consistent with this notion, Jiang, Kim, and Pang (2011) find that firms with a positive wedge between the largest shareholder's control rights and cash flow rights make investments that are less sensitivity to investment opportunities. The above discussion leads to the following two hypotheses.

H4. *The increase in capital allocation efficiency after enforcement is more pronounced for more financially constrained firms.*

H5. *The increase in capital allocation efficiency after enforcement is more pronounced for firms with more severe agency problems between insiders and outside shareholders.*

Several studies suggest that enforcement may reduce the efficiency of capital resource allocation. Carlton and Fischel (1983) argue that insider trading can be an efficient way of motivating managers to acquire and develop private information to guide their investment decisions. In addition, insider trading can motivate risk-averse managers to undertake risky projects that would benefit shareholders (Bebchuk and Fershtman, 1994). This possibility adds tension to our prediction and, if valid, would increase the difficulty in finding an improvement in capital allocation efficiency after enforcement.

3. Research Design and Data

3.1. Model specification

Our analysis follows the literature on capital allocation efficiency which is built on the *q*-theory of optimal investment.[5] The *q*-theory suggests that under certain assumptions, the sensitivity of investments to investment opportunities (λ) is a function of capital adjustment costs. A lower adjustment cost implies a higher value of sensitivity (λ) and thus more efficient capital allocation. We follow Wurgler (2000) and Bushman et al. (2011) and use the first-order difference model to derive our empirical specification.[6]

$$\Delta \ln\left(\frac{I_{i,t}}{K_{i,t-1}}\right) = \lambda \Delta q_{i,t-1}, \qquad (1)$$

[5] See, for example, Tobin (1969), Hayashi (1982), Abel and Eberly (1994; 1996), Wurgler (2000), and Bushman et al. (2011).

[6] More specifically, Abel and Eberly (1996) consider a capital adjustment cost function $C(I,K) = \frac{\lambda}{1+\lambda}\left(I/K\right)^{\frac{1+\lambda}{\lambda}} K$, where $\lambda > 0$ and is an exogenous parameter. They show that the optimal investment should follow $I/K = Q^{\lambda}$, where Q is the shadow price of capital, or marginal Q. Taking the logarithm of both sides and then taking the first-order difference generates equation (1).

where Δq is the change in the natural logarithm of marginal Q. Prior literature has suggested that corporate investment is also influenced by internal cash flow (e.g., Hubbard, 1998). We therefore extend equation (1) by adding changes in operating cash flow (Δcf) to give our empirical regression model as follows:[7]

$$\Delta \ln\left(\frac{I_{i,t}}{K_{i,t-1}}\right) = \lambda \Delta q_{i,t-1} + \gamma \Delta cf_{i,t-1}. \qquad (2)$$

Wurgler (2000) interprets the market frictions arising from information acquisition costs, moral hazard, and adverse selection as capital adjustment costs in general. Following this rationale, we model λ as a function of enforcement, which we hypothesize would reduce market frictions. We adopt a DID approach to examine the effect of enforcement on the sensitivity of investment growth to Δq (λ). In particular, we model λ as follows:[8]

$$\lambda = \lambda_1 ITENF_{k,t} + \sum_{k=1}^{45} \omega_k \mu_k + \sum_{t=1982}^{2003} \theta_t w_t + \sum_{j=1}^{44} \phi_j v_j + \lambda_2 SIZE_{i,t-1} + \lambda_3 MB_{i,t-1} + \lambda_4 GDP_{k,t}, \qquad (3)$$

where i, j, k and t are subscripts for firm, industry, country, and year, respectively; and μ_k, v_j, and w_t are the fixed effects of country, industry, and year, respectively. $ITENF_{k,t}$ is a dummy variable that equals one for the years after (excluding the year of) enforcement, and zero otherwise.

Equation (3) represents a DID design (Bertrand and Mullainathan, 2003; Christensen et al., 2016). To see this, note that ω_k captures the average sensitivity of investment growth to Δq of country k and takes away the difference in average sensitivity across countries. θ_t (t = 1982 to 2003) controls for the time trend of sensitivity in the absence of enforcement and also eliminates the impact of shocks common to all countries in a given year on sensitivity. As a result, the

[7] Our results are qualitatively the same if we drop Δcf.
[8] As we include indicator variables for country, industry, and year, we do not include a separate intercept.

identification stems from the cross-country variation in the enforcement year, and λ_1 measures the within-country *change* in sensitivity post enforcement after controlling for the time trend of sensitivity. Essentially, the *treatment* countries include those that began enforcing insider trading laws within our sample period (i.e., from 1982 to 2003).[9] For a country whose enforcement occurred in year *t*, Equation (3) implicitly takes all countries whose enforcement did not in year *t* as the *control* group (Bertrand and Mullainathan, 2003).

We also include a set of control variables to allow the sensitivity of investment growth to Δq to vary by firm, industry, and (time-varying) country-level characteristics. These controls include firm size (*SIZE*), market-to-book ratios (*MB*), industry fixed effects (v_j), and annual per capita gross domestic product (GDP) (Wurgler, 2000; Bushman et al., 2011).[10]

We substitute Equation (3) into Equation (2) to derive our baseline regression model. We also include all variables on the right-hand side of Equation (3) in intercepts to prevent their direct effect on the investment growth rate from contaminating estimates of the sensitivity of investment growth to Δq. Thus, our baseline regression is as follows:

$$\begin{aligned}\Delta ln(CAPX_{i,t}) = {} & \beta_1 ITENF_{k,t} + \lambda_1 \Delta q_{j,t-1} \times ITENF_{k,t} + \beta_2 SIZE_{i,t-1} + \lambda_2 \Delta q_{j,t-1} \times SIZE_{i,t-1} + \\ & \beta_3 MB_{i,t-1} + \lambda_3 \Delta q_{j,t-1} \times MB_{i,t-1} + \beta_4 GDP_{k,t} + \lambda_4 \Delta q_{j,t-1} \times GDP_{k,t} + \gamma_1 \Delta cf_{i,t-1} + \\ & \sum_{k=1}^{45} \varpi_k \mu_k + \sum_{k=1}^{45} \omega_k \mu_k \times \Delta q_{j,t-1} + \sum_{j=1}^{44} \varphi_j v_j + \sum_{j=1}^{44} \phi_j v_j \times \Delta q_{j,t-1} + \sum_{t=1982}^{2003} \vartheta_t w_t + \sum_{t=1982}^{2003} \theta_t w_t \times \Delta q_{j,t-1} + \varepsilon_{i,t},\end{aligned} \tag{4}$$

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[9] Thus, the six countries whose enforcement occurred before our sample period (i.e., the U.S., the U.K., Canada, France, Singapore, and Brazil) only serve as control countries. Note that there is no within-country variation in *ITENF* for these countries. Our research design is consistent with prior studies that use data on these six countries to adjust for the trend of the variable of interest (Bushman et al., 2005; Fernandes and Ferreira, 2009).

[10] Prior literature has also examined the effect of country-level institutional factors on capital resource allocation (e.g., Wurgler, 2000; Bushman et al, 2011; McLean et al., 2012). The measures of country-level institutional factors used in these studies are specific to certain countries and do not vary over time, and thus are absorbed by the country fixed effects in Equation (3).

where $\Delta ln(CAPX)$ is our measure of the investment growth rate. Following the prior literature (e.g., Bushman et al., 2011), we measure investment (I/K) in equation (2) by capital expenditures (*CAPX*) scaled by lagged total assets. Scaling *CAPX* by lagged property, plant, and equipment (*PPE*) or not scaling *CAPX* does not change the results qualitatively. We measure Δq by the lagged industry returns of the US-listed firms, where the industry is defined according to Fama and French's (1997) 48-industry classification. This design choice is based on two assumptions. First, there exist common global industry-specific shocks to growth opportunities (Fisman and Love, 2004). Second, such shocks are best measured by the industry returns of US-listed firms because of the well-developed financial market institutions in the US (Rajan and Zingales, 1998; Fisman and Love, 2007).[11] As a robustness test, we also measure Δq by the firm-specific change in Tobin's *Q* and find qualitatively similar results. Δcf is the change in the logarithm of one plus operating cash flow scaled by total assets, where operating cash flow is defined as net income before extraordinary items plus depreciation and amortization. *SIZE* is defined as the logarithm of the book value of total assets. *MB* is defined as the logarithm of the market value of equity plus the book value of total assets minus the book value of equity, scaled by the book value of total assets. GDP is the logarithm of per capita GDP in US dollars. See the Appendix for detailed variable definitions. **H1** predicts a positive coefficient on the interaction term of $\Delta q \times ITENF$, i.e., $\lambda_1 > 0$.

3.2. Data, sample selection, and summary statistics

The data of the adoption and the initial enforcement of insider trading laws come from Bhattacharya and Daouk (2002), who obtained the data from surveys sent to the stock exchanges and national regulators of 103 stock markets. The first enforcement of insider trading laws signals

[11] Controlling for the interactions between Δq and GDP and country fixed effects also helps to mitigate the potential errors in measuring Δq which are correlated with economic development (Fisman and Love, 2004).

to the markets that the probability of future prosecution of insider trading has had a discrete jump up (Bhattacharya and Daouk, 2002). The data have been widely used in the literature to measure a shock to insider trading regulation (e.g., Bushman et al., 2005; Fenandes and Ferreira, 2009; Edmans et al., 2017).

Consistent with Fernandes and Ferreira (2009), we collect all firm-year observations between 1982 and 2003 from Worldscope. Following the literature, we delete firms in financial industries (SIC codes between 6000 and 6999). We also remove firms with total assets or market value of equity below US$10 million. Finally, we delete observations lacking information on investment growth ($\Delta lnCAPX$), firm size (*SIZE*), market-to-book ratios (*MB*), or operating cash flow growth (Δcf). Our final sample consists of 143,266 firm-year observations from 22,188 firms in 45 countries. Among these observations, 123,343 (involving 17,924 firms) come from 23 developed markets, and 19,923 (involving 4,264 firms) come from 22 emerging markets.

Table 1 shows the sample distribution across countries. Table 1 also shows the year in which insider trading laws were first adopted and the year of initial enforcement in each country as obtained from Bhattacharya and Daouk (2002). Table 2 presents the summary statistics for the main variables used in this study. The mean (median) value of $\Delta ln(CAPX)$ is -0.069 (-0.044), and the inter-quartile range is 0.758. These statistics are comparable to those reported in Bushman et al. (2011). The mean and median of the industry return of US-listed firms (Δq) are 0.081 and 0.093, respectively.

[Insert Table 1 and Table 2 here]

4. Empirical Results

4.1. Baseline regressions

Table 3 presents the results of the pooled sample regressions. Column (1) reports the results of our baseline regression. The results provide strong support to our hypothesis (**H1**). The coefficient of $\Delta q \times ITENF$ is 0.253 and significant at the 1% level (t-stat = 2.93). The results suggest that capital allocation efficiency, as measured by the sensitivity of investment growth to return, is significantly higher in the post-enforcement period than in the pre-enforcement period after controlling for the country and year fixed effects on sensitivity. The coefficient is also economically significant. The coefficient of $\Delta q \times ITENF$ from the baseline regression (0.253) suggests that the investment growth associated with a one-standard-deviation increase in shocks to investment opportunities (Δq, 0.229 from Table 2) is about 6% higher in the post-enforcement period than in the pre-enforcement period ($e^{0.253 \times 0.229} - 1 = 0.06$).

Regarding the control variables, we find a highly significant coefficient of Δcf (coeff. = 0.878*;* t-stat = 8.11). The coefficient of $\Delta q \times SIZE$ is negative (coeff. = -0.016*;* t-stat = -3.03). Bushman et al. (2011) also find a negative though insignificant effect of firm size on the sensitivity of investment growth to return. The coefficient of $\Delta q \times MB$ is positive though insignificant (coeff. = 0.033*;* t-stat = 1.29), and so is the coefficient of $\Delta q \times GDP$ (coeff. = 0.172*;* t-stat = 0.93).[12] The coefficient of *SIZE* is negative (coeff. = -0.006*;* t-stat = -2.86) and that of *MB* is positive (coeff. = 0.04*;* t-stat = 4.34). This suggests that large firms tend to have lower unconditional investment

[12] This result is not inconsistent with prior literature which has found more efficient capital allocation in countries with higher GDP (e.g., Wurgler, 2000; Bushman et al., 2011). Prior studies typically compute average GDP over a period for each country and measure GDP in a particular year. We have controlled for the interactions between Δq and country fixed effects, which takes away the effect of cross-country variation in GDP on sensitivity. If we drop the interactions between Δq and country fixed effects, the coefficient of $\Delta q \times GDP$ becomes significantly positive (results not reported).

growth and firms with high market-to-book tend to have higher unconditional investment growth. The coefficient of *GDP* is negative (coeff. = -0.371; *t*-stat = -6.39).[13]

Column (2) of Table 3 considers the effect of the existence of insider trading laws (*ITEXIST*) by adding *ITEXIST* and Δ*q*×*ITEXIST* to the regression. *ITEXIST* is a dummy variable that equals one for the years after the adoption of insider trading laws, and zero otherwise. This specification aims at examining whether it is the mere existence or the actual enforcement of insider trading laws that affects managers' investment decisions. Consistent with the prior literature suggesting that insider trading laws are not effective unless they are enforced, the coefficient of Δ*q*×*ITEXIST* is insignificant (coeff. = 0.088; *t*-stat = 0.92). The coefficient of Δ*q*×*ITENF* remains positive and significant (coeff. = 0.217; *t*-stat = 2.15).

Column (3) further allows enforcement to affect the sensitivity of investment growth to the growth in operating cash flow. In particular, we interact Δ*cf* with *ITENF* and the fixed effects of country, industry, and year. Thus, the coefficient of Δ*cf*×*ITENF* measures the treatment effect of enforcement on the sensitivity of investment growth to the growth in operating cash flow. The coefficient of Δ*q*×*ITENF* continues to be significantly positive (coeff. = 0.253; *t*-stat = 2.91). The coefficient of Δ*cf*×*ITENF* is negative, although insignificant (coeff. = -0.338; *t*-stat = -0.72).[14]

[Insert Table 3 here]

[13] Again, since we control for the country fixed effect, this coefficient does not measure cross-country association between per capita GDP and investment growth. This coefficient becomes insignificant if we drop the country fixed effect.

[14] We also conduct a robustness check by adding the firm fixed effect in the baseline regression. The results are qualitative similar. The coefficient of Δ*q*×*ITENF* remains significantly positive (coeff. = 0.251; *t*-stat = 2.64). This is not surprising as our baseline model is already a first-difference model and has removed the time-invariant heterogeneity at the firm level.

4.2. Separating developed and emerging markets

Prior studies have shown that the economic consequences of enforcing insider trading laws can differ across developed versus emerging markets. Bhattacharya and Daouk (2002) find a more pronounced decrease in the cost of equity in emerging markets. Bushman et al. (2005) document a more pronounced increase in analyst activity after enforcement in emerging markets. In contrast, Fernandes and Ferreira (2009) find that enforcement only increases price informativeness in developed markets. Zhang and Zhang (2014) find a more pronounced increase in financial reporting quality after enforcement. We therefore examine whether the effect of enforcement on capital allocation efficiency differs between the two types of markets.

The results are presented in Table 4. We find that the effect of enforcement on capital allocation efficiency is significant only in the developed markets. Column (1) shows that the coefficient of $\Delta q \times ITENF$ is significant and positive (coeff. = 0.336; *t*-stat = 4.43) when we include only observations in the developed markets.[15] In contrast, the coefficient is negative and insignificant when the baseline regression is estimated using the emerging markets observations (coeff. = -0.201; *t*-stat = -1.20). A formal test shows that the coefficient of $\Delta q \times ITENF$ is significantly different between the two subsamples (*p*-value = 0.003). In Column (3) we use the full sample and interact an indicator variable for the emerging markets (*Emerging Market*) with *ITENF* and $\Delta q \times ITENF$. *Emerging Market* equals one for firms from the emerging markets, and zero otherwise. The results are qualitatively the same. The coefficient of $\Delta q \times ITENF$ is significantly positive (coeff. = 0.317; *t*-stat = 4.13), and the coefficient of $\Delta q \times ITENF \times Emerging$

[15] Regarding the economic significance, the coefficient estimate of $\Delta q \times ITENF$ based on the developed markets sample (0.336) suggests that the investment growth associated with a one-standard-deviation increase in shocks to investment opportunities (0.229) is about 8% higher in the post-enforcement period than in the pre-enforcement period ($e^{0.336 \times 0.229} - 1 = 0.08$).

Market is significantly negative (coeff. = -0.462*;* *t*-stat = -3.48). The sum of the coefficients of $\Delta q \times ITENF$ and $\Delta q \times ITENF \times Emerging\ Market$ is insignificant (p-value = 0.233).[16]

As discussed at the outset, Christensen et al. (2016) argue that the effect of regulations could either be weaker or stronger in countries with weaker institutions before regulation. On one hand, the regulation effect can be stronger in countries with weak prior institutions because regulation effectively reduces the existing differences between countries. On the other hand, in countries with weak institutions and inefficient bureaucracies, new regulations are more likely to be abused (Djankov, Glaeser, La Porta, Lopez-de-Silanes and Shleifer, 2003; Shleifer, 2005). Moreover, a country's track record of implementing regulations is likely to reveal its political willingness to induce socially desirable behavior. As developed countries have stronger institutions and are also likely to have better track records of enforcing regulations, our results appear to be consistent with the latter view.

In addition, Morck et al. (2000) argue that the protection of property rights might have to reach a critical threshold in order to motive market participants to engage in informed risk arbitrage which would contribute to price efficiency. Fernandes and Ferreira (2009) argue that in emerging markets, when enforcement eliminates the contribution of insider trading to price informativeness, outside informed participants cannot make up for the information lost. Furthermore, Bushman and Smith (2001) and Stulz (2005) suggest that the mechanisms that restrict managers' rent-seeking behavior and reduce the cost of external financing may have limited benefits when the government shows little respect for property rights. Consistent with this view, Durnev et al. (2009) find that corporate transparency (including price informativeness) is less able to improve capital allocation

[16] Greece and Portugal are classified as emerging markets in Bhattacharya and Daouk (2002) and Bushman et al. (2005), but as developed markets in Fernandes and Ferreira (2009). Our results are the same for either classification.

efficiency in countries with a weaker protection of property rights. Our results also appear to be consistent with the arguments and findings in these papers. As shown in Table 1, the developed and emerging markets are split into two clusters with respect to how much respect the government has for property rights (*GOODGOV*), which is defined as the sum of the following three indexes from La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998): (1) government corruption, (2) the risk that the government will expropriate private property, and (3) the risk that the government will repudiate contracts.[17]

As the effect of enforcement on capital allocation efficiency is only significant in the developed markets, we focus on these markets in the following analysis.[18]

[Insert Table 4 here]

4.3. Testing the robustness of the identification strategy

One limitation of the above pooled sample analysis is that the sample includes data in the periods long after the initial enforcement and allows other confounding factors to take effect. Alternatively, the interaction terms between Δq and year fixed effects may not be able to sufficiently control for possible trends of the sensitivity of investment growth to Δq. To address these concerns, we conduct two robustness tests for our identification strategy. First, we examine the change in the sensitivity of investment growth to return within a relatively short window around the enforcement year. If we again find a significant increase in sensitivity, we can be more confident that the increase is attributed to enforcement. Second, we randomly assign a year as the

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[17] Only three countries in the developed markets (Greece, Portugal, and Italy) have a *GOODGOV* value lower than the maximum value in the emerging markets (Taiwan, 25.13).

[18] We also notice that our sample is similar to those of Fernandes and Ferreira (2009) and Zhang and Zhang (2014), but is quite different from those of Bhattacharya and Daouk (2002) and Bushman et al. (2005) in terms of how many countries in the emerging markets are covered. It is possible that our emerging markets sample is not powerful enough to detect the effect of the enforcement on capital allocation efficiency. Thus, we refrain from making strong conclusions based on the results in emerging markets.

pseudo enforcement year for each firm in countries that started enforcing their insider trading laws before our sample period or in countries that did not enforce their insider trading laws until after our sample period. We then compare the change in capital allocation efficiency around the true enforcement year against that around the pseudo enforcement year. If the improvement in capital allocation efficiency is driven by enforcement, then we should observe a significant change in capital allocation efficiency only around the true enforcement year but not around the pseudo enforcement year. We explain the design in detail and present the results for the two robustness tests below.

4.3.1. The change in capital allocation efficiency around the enforcement year

We modify the baseline regression model and replace *ITENF* with a series of indicators for event years relative to the enforcement year (i.e., year 0). Specifically, we define *D*[-2, 0] as a dummy variable that equals one for years [-2,0] relative to the enforcement year, and zero otherwise. *D*[+1, +3] is defined as a dummy variable that equals one for years [+1,+3] relative to the enforcement year and zero otherwise. *D*[>+3] is defined as a dummy variable that equals one for the period starting in year +4 and beyond, and zero otherwise. Thus, the benchmark period is the period prior to year -2 relative to the enforcement year.

The results are presented in Panel A of Table 5. We find a significant increase in the sensitivity of investment growth to return in the relatively short period around the enforcement year. The coefficient of $\Delta q \times D[-2,0]$ ($\lambda^{D[-2,0]}$) is negative but insignificant (coeff. = -0.115; *t*-stat = -1.00), suggesting no significant change in sensitivity right before the enforcement year. The coefficient of $\Delta q \times D[+1, +3]$ ($\lambda^{D[+1, +3]}$) is positive and significant at the 5% level (coeff. = 0.238; *t*-stat = 2.52). A formal test shows that $\lambda^{D[+1, +3]} – \lambda^{D[-2, 0]}$ is significantly positive (*p*-value = 0.015), suggesting a significant improvement in capital allocation efficiency right after enforcement. The coefficient of

$\Delta q \times D[> +3]$ ($\lambda^{D[> +3]}$) is also significantly positive (coeff. = 0.334; *t*-stat = 4.83) and higher than $\lambda^{D[+1, +3]}$, although the difference is not statistically significant (*p*-value = 0.310). Overall, the results increase our confidence that the improvement in capital allocation efficiency in the developed markets is attributed to enforcement. Furthermore, the results suggest that the effect of enforcement is long-lasting.

[Insert Table 5 here]

4.3.2. The change in capital allocation efficiency around the true enforcement year versus that around the pseudo enforcement year

To conduct the second robustness test, we first separate the countries into two groups. We refer to the countries that started enforcing their insider trading laws within our sample period (i.e., from 1982 to 2003) as the *treatment* countries. We denote all other countries as the *control* countries. We independently assign a random year as the *pseudo enforcement year* for each firm in the control countries.[19] For observations in the treatment country, we define *TrueITENF* as a dummy variable that equals one for the period after the *true* enforcement year, and zero otherwise. *TrueITENF* is set to zero for all observations in the control countries. For observations in the control countries, we defined *PseudoITENF* as a dummy variable that equals one for the period after the randomly assigned *pseudo* enforcement year, and zero otherwise. *PseudoITENF* is set to zero for all observations in the treatment countries. We then modify the baseline regression model by replacing *ITENF* with *TrueITENF* and *PseudoITENF*, and $\Delta q \times ITENF$ with $\Delta q \times TrueITENF$ and $\Delta q \times PseudoITENF$.

[19] More specifically, we randomly pick a year from the list of true enforcement years (i.e., 1988, 1989, 1990, 1993, 1994, 1995, 1996, and 1998) of the treatment countries for each firm in the control countries. Randomly picking a year from 1982 to 2003 does not change the inference.

We repeat the random sampling 1,000 times. The summary statistics for the 1,000 regressions using the developed markets sample are reported in Panel B of Table 5. Column (1) shows that the mean coefficient of $\Delta q \times TrueITENF$ (λ^{True}) is 0.323, close to the coefficient of $\Delta q \times ITENF$ reported in Column (1) of Table 4 (0.336). In addition, Column (2) shows that λ^{True} is positive and significant at the 5% level in all 1,000 regressions, and Column (3) shows that none of the 1,000 regression produces a significantly negative coefficient. The mean coefficient of $\Delta q \times PseudoITENF$ (λ^{Pseudo}) is -0.020, which is close to zero. Moreover, only 5 out of the 1,000 regressions show a significant and positive coefficient of λ^{Pseudo}, and 50 out of the 1,000 regressions generate a significant and negative coefficient λ^{Pseudo}. The mean value of $\lambda^{True} - \lambda^{Pseudo}$ is 0.343, and a formal test shows that $\lambda^{True} - \lambda^{Pseudo}$ is positive and significant at the 5% level in all 1,000 regressions.

4.4. Other robustness tests

We also conduct a battery of other sensitivity tests to check the robustness of our baseline results for the developed markets. The results are reported in Table 6.

4.4.1. Alternative measures of investment and investment opportunities

We first test whether our results are sensitive to alternative measures of capital investment or investment opportunity shocks. First, we measure investment growth as the change in the logarithm of capital expenditures plus R&D expenditures, scaled by lagged total assets (*CAPXRD*), or the change in the logarithm of one plus total assets growth (*TAG*).[20] The results are reported in Columns (1) and (2) of Table 6, and are not qualitatively changed. Second, we measure the

[20] Using the change in asset growth generates qualitatively similar results.

investment opportunity shock as the change in the logarithm of Tobin's *Q* in the previous year. The coefficient of $\Delta q \times ITENF$ is positive and significant (coeff. = 0.264; *t*-stat = 4.12), as shown in Column (3) of Table 6.

[Insert Table 6 here]

4.4.2. Further controls for other determinants of investment growth

Lang, Ofek, and Stulz (1996) find a negative association between investment growth and leverage (*LEV*). Lamont (2000) finds that investment growth is related to its lagged value. Wurgler (2000) documents a positive association between investment elasticity to value added and financial development (*FD*) (Beck, Levine, and Loayza, 2000). We thus check whether our baseline results are robust to controlling for these variables. The results are reported in Column (4) of Table 6 and again are qualitatively similar to the findings in Column (1) of Table 4.[21] The coefficient of $\Delta q \times ITENF$ is 0.278 (*t*-stat = 2.39). Consistent with the findings in prior literature (e.g., Wurgler, 2000) that financial development facilitates efficient resource allocation, the coefficient of $\Delta q \times FD$ is positive and significant (coeff. = 0.310; *t*-stat = 3.18). Also consistent with Lang et al. (1996) and Lamont (2000), investment growth is negatively associated with leverage (coeff. = -0.250; *t*-stat = -5.73) and lagged investment growth (coeff. = -0.245; *t*-stat = -15.21).

4.4.3. Country-level analysis

We also repeat the analysis using country-year as the unit of observation. The tests are performed in two steps. In the first step, we estimate the following regression models to obtain country-year-specific estimates of the sensitivity of investment growth to return.

[21] Wurgler (2000) uses average financial development (*FD*) over a period of time. We have included country fixed effects and their interactions with Δq. Here we control for the country-year-specific measure of *FD*. We do not include *FD* in our baseline regression because it could be endogenous to enforcement.

$$\Delta ln(CAPX_{i,t}) = \sum_{k,t}\beta_{k,t}\mu_{k,t} + \sum_{k,t}\lambda_{k,t}\mu_{k,t}\times\Delta q_{j,t-1} + \beta_2 SIZE_{i,t-1} + \lambda_2\Delta q_{j,t-1}\times SIZE_{i,t-1} + \beta_3 MB_{i,t-1} + \lambda_3\Delta q_{j,t-1}\times MB_{i,t-1} + \beta_4 GDP_{k,t} + \lambda_4\Delta q_{j,t-1}\times GDP_{k,t} + \gamma\Delta cf_{i,t-1} + \sum_{j=1}^{44}\varphi_j v_j + \sum_{j=1}^{44}\phi_j v_j \times\Delta q_{j,t-1} + \varepsilon_{i,t}. \quad (5)$$

Essentially, we replace *ITENF* and the country (μ_k) and year (w_t) indictors and their interactions with Δq ($\Delta q\times ITENF$, $\mu_k\times\Delta q$, and $w_t\times\Delta q$) with country-year indictors ($\mu_{k,t}$) and their interactions with Δq ($\mu_{k,t}\times\Delta q$). In this way, we obtain country-year-specific estimates of the sensitivity of investment growth to return ($\hat{\lambda}_{k,t}$) after controlling for the effects of industry, firm size, market-to-book ratios, and per capita GDP on sensitivity.[22] In the second step, we regress $\hat{\lambda}_{k,t}$ on *ITENF* and control for country and year fixed effects.

$$\hat{\lambda}_{k,t} = \eta_1 ITENF_{k,t} + \sum_k \omega_k \mu_k + \sum_t \theta_t w_t + \varepsilon_{k,t}. \quad (6)$$

The results are reported in Column (5) of Table 6. The results are less significant than those obtained in the firm-level analysis but the inference is qualitatively similar. The coefficient of *ITENF* is positive and statistically significant (coeff. = 0.205; *t*-stat = 2.01).[23]

4.3.4. Are the results sensitive to specific countries or years?

Finally, we test whether the results are sensitive to exclusion of the Asian financial crisis period (1997–1998). The results (untabulated) are qualitatively the same as those of our baseline regression. We also test whether our results are driven by any specific country by repeating our

[22] We choose this specification so that we could retain a sufficient degree of freedom to control for the variation in the sensitivity of investment growth to return across industries and time-varying firm (*SIZE*, *MB*) and country-level (*GDP*) characteristics. Alternatively, we estimate the sensitivity of investment growth to return by regressing $\Delta lnCAPX$ on Δq and Δcf for each country-year with at least 20 observations. The results (unreported) are qualitatively similar.

[23] We also estimate a weighted least squares (WLS) regression and use the inverse of the square of the standard error of $\hat{\lambda}_{k,t}$ from the first-step regression as the weight (King, 1997). The results (unreported) are qualitatively similar.

baseline regression for the developed markets 23 times, dropping one country each time. The results (untabulated) show that the coefficient of $\Delta q \times ITENF$ is significantly positive in all 23 regressions.

5. Cross-sectional Variation in the Effect of Enforcement

To further substantiate our hypothesis, we examine the cross-sectional variation in the effect of enforcement on the sensitivity of investment growth to return in the developed markets. Finding empirical results consistent with the theoretical prediction would further reduce concerns about whether our baseline results are simply driven by omitted variables. Furthermore, these cross-sectional tests help highlight the mechanisms through which enforcement improves capital allocation efficiency.

5.1. The change in liquidity around the enforcement year (H2a)

If enforcement improves capital allocation efficiency by increasing the information efficiency of stock prices, the increase in the sensitivity of investment growth to return should be positively associated with the change in price informativeness around the enforcement year. We use liquidity as a proxy for price informativeness. Prior literature has suggested that restricting insider trading increases the liquidity of stock markets (Bhattacharya and Spiegel, 1991). Increased liquidity attracts informed investors and enhances price efficiency (Admati and Pfleiderer, 1988; Chordia et al., 2008). Following Amihud, Hameed, Kang, and Zhang (2015), we measure liquidity inversely using Amihud's (2002) measure of illiquidity (*ILLIQ*). This measure captures the daily price response associated with one dollar of trading volume, and thus serves as a rough proxy for the price impact in Kyle (1985). Fong, Holden, and Trzcinka (2014) find that *ILLIQ* is highly correlated with the Kyle's price impact measure.

We compute Amihud's (2002) measure of illiquidity over the two years before (i.e., years -2 and -1, denoted as $ILLIQ_{[-2,-1]}$) and after (i.e., years +1 and +2, denoted as $ILLIQ_{[+1,+2]}$) the enforcement year. We calculate the relative change in *ILLIQ* around the enforcement year as $ILLIQ_{[+1,+2]}/ILLIQ_{[-2,-1]}$. To reduce skewness, we define the change in liquidity around the enforcement year ($\Delta LIQUID$) as minus one multiplied by the natural logarithm of $ILLIQ_{[+1,+2]}/ILLIQ_{[-2,-1]}$. See the Appendix for the detailed definition. Consistent with the notion that enforcement enhances liquidity and findings in prior studies (Bhattacharya and Daouk, 2002; Fernandes and Ferreira, 2009), Table 2 shows that the mean and median of $\Delta LIQUID$ are positive.

We then interact $\Delta LIQUID$ with *ITENF* and $\Delta q \times ITENF$ in the baseline model.[24] The regression results are reported in Table 7. Since we require the firms in the treatment countries to have both pre-enforcement and post-enforcement observations in the test, the sample size is reduced to 91,246. The coefficient of $\Delta q \times ITENF \times \Delta LIQUID$ for the developed markets is positive and significant at the 1% level (coeff. = 0.075; *t*-stat = 2.70). The evidence lends support to **H2a**.

[Insert Table 7 here]

5.2. Earnings opacity before enforcement (H2b)

We consider several earnings attributes employed in prior studies to measure information environment opacity (Leuz, et al. 2003; Bhattacharya et al., 2003; Burgstahler, Hail, and Leuz, 2006). More specifically, for each country-year, we follow Leuz et al. (2003) and Bhattacharya et al. (2003) to measure (1) the tendency of firms to avoid small losses (*AVOID*); (2) earnings aggressiveness (*AGGR*), (3) earnings smoothness (*SMOOTH*), and (4) discretion in reported earnings (*DISC*). We then convert the four country-year individual measures into decile ranks

[24] We only compute $\Delta LIQUID$ for observations in the treatment countries, i.e., the countries whose enforcement occurred within our sample period (from 1982 to 2003). For observations in other countries, we set $\Delta LIQUID$ to zero.

within our sample. We define earnings opacity for each country-year as the mean ranks across the decile ranks of the four individual earnings attributes. The opacity of information environments before enforcement (*OPACITY*) is measured as the average earnings opacity for each treatment country over years -3 to -1 before the enforcement year. See the Appendix for the detailed definition.

We then interact *OPACITY* with *ITENF* and $\Delta q \times ITENF$ in the baseline model. The regression results are reported in Table 8. The results are consistent with our prediction. The coefficient of $\Delta q \times ITENF \times OPACITY$ is positive and significant at the 1% level (coeff. = 0.071; *t*-stat = 3.22). The results are consistent with **H2b** that the effect of enforcement is more pronounced for countries with more opaque information environments before enforcement.

[Insert Table 8 here]

5.3. Product market competition (H3)

H3 predicts a more pronounced effect of enforcement on capital allocation efficiency for firms operating in more competitive product markets. We measure competition in product markets by the Herfindahl index of sales for each country, 2-digit SIC industry, and year.[25] We then partition the sample into three groups of equal size for each country-year based on the Herfindahl index. We test **H3** by estimating the baseline regression within each group and comparing the coefficient of $\Delta q \times ITENF$ across groups.

The results are reported in Table 9. The coefficients of $\Delta q \times ITENF$ appear to decline monotonically as the Herfindahl index increases. The largest coefficient of $\Delta q \times ITENF$ (coeff. = 0.562; *t*-stat = 6.39) is observed in firms operating in the most competitive markets (i.e., those with

[25] We also use US data to compute the Herfindahl index and the results are qualitatively similar.

the lowest Herfindahl index), and the smallest coefficient (coeff. = 0.316; *t*-stat = 3.14) is observed in the least competitive industries (i.e., those with the highest Herfindahl index). For firms with a medium Herfindahl index, the coefficient of $\Delta q \times ITENF$ also lies in between (coeff. = 0.360; *t*-stat = 3.75). A formal test shows that the difference in $\Delta q \times ITENF$ between the most and least competitive industries is significant at the 10% level (*p*-value = 0.0761). This evidence supports the notion that enforcement improves capital allocation efficiency by providing information to guide managers' decision-making.

[Insert Table 9 here]

5.4. Financing constraints (H4)

If enforcement improves capital allocation efficiency by relaxing financing constraints, then the effect is expected to be more pronounced in firms with a higher level of financial constraints. We measure financial constraints by the Whited and Wu (2006) index (WW index for short).[26] We separate firms into three groups of equal size for each country-year. We then estimate the baseline regression within each group and compare the coefficient of $\Delta q \times ITENF$ across groups.

The results are reported in Table 10 and are consistent with **H4**. The coefficients of $\Delta q \times ITENF$ monotonically increase with the WW index. The coefficient is 0.207 (*t*-stat = 2.37) for firms with the lowest WW index (least constrained), and is 0.453 (*t*-stat = 5.01) for firms with the highest WW index (most constrained). The coefficient lies in between (coeff. = 0.329; *t*-stat = 3.63) for firms with a medium WW index. The difference in the coefficient of $\Delta q \times ITENF$ between the highest and lowest WW index groups is significant at the 1% level (*p*-value = 0.005).

[26] We also use a modified SA index developed by Hadlock and Pierce (2010), i.e. the HP index, and the KZ index developed by Kaplan and Zingales (1997) to measure financial constraints. We obtain qualitatively the same results using the HP index. When we use the KZ index, we continue to find a higher coefficient of $\Delta q \times ITENF$ in the highest KZ group than in the lowest KZ group, although the difference is not statistically significant.

[Insert Table 10 here]

5.5. Agency problems (H5)

If enforcement improves capital allocation efficiency also by mitigating agency problems, we would expect to find a more pronounced increase in the sensitivity of investment growth to return after enforcement for firms with more severe agency conflicts between insiders and outside shareholders. We measure the agency problem by the wedge (*WEDGE*) between the control rights and cash flow rights of the controlling shareholder.[27] We partition the sample into two groups based on *WEDGE*. The first group includes all firms with a *WEDGE* less than or equal to zero, and the second group contains all firms with a positive *WEDGE*. Firms whose shares are widely held are placed in the first group. The existing literature suggests that firms with a positive *WEDGE* have higher incentives to expropriate minority shareholders and hence have more severe agency problems (Claessens et al., 2002). Firms with a positive *WEDGE* are also more financially constrained (Lin, Ma, and Xuan, 2011). We then estimate the baseline regression separately for these two groups and compare the coefficient of $\Delta q \times ITENF$. We predict a larger coefficient of $\Delta q \times ITENF$ for firms with a positive *WEDGE*.

The results are reported in Table 11 and are also consistent with our prediction. The regressions are estimated with all firm-year observations in the developed markets that have *WEDGE* data. For firms with zero *WEDGE*, we find an insignificant positive coefficient of $\Delta q \times ITENF$ (coeff. = 0.187; *t*-stat = 1.35). For firms with a positive *WEDGE*, the coefficient of $\Delta q \times ITENF$ is greater and more significant (coeff. = 0.522; *t*-stat = 4.54). A formal test shows that

[27] The data are obtained from Claessens et al. (2002) and Faccio and Lang (2002). We assume that *WEDGE* does not change over our sample period.

the difference in the two coefficient estimates is statistically significant (p-value = 0.006). The evidence supports **H5**.

[Insert Table 11 here]

To summarize, the evidence presented in Tables 7 to 11 is consistent with the notion that enforcement improves capital allocation efficiency by enhancing price efficiency. This in turn provides more precise information to guide managerial decisions, relaxes financing constraints and alleviates agency problems.

6. Enforcement and Future Accounting Performance

If the increase in the sensitivity of investment growth to return after enforcement reflects improved capital allocation efficiency, future operating performance should also improve after enforcement. In addition, this improvement should be positively correlated with the increase in sensitivity. We thus employ the following regression model to investigate the effect of enforcement on firm operating performance:

$$\begin{aligned} ROA_{i,t+1} = {} & a_1 ITENF_{k,t-1} + a_2 ITENF_{k,t-1} \times \Delta EFFICIENCY_k + b_1 lnSALE_{i,t} \\ & + b_2 MB_{i,t} + b_3 WW_{i,t} + b_4 HERF_{j,k,t} + \mu_k + v_j + w_t + \varepsilon_{i,t+1}, \end{aligned} \tag{7}$$

where subscripts k, j, i, and t are indicators for country, industry, firm, and year, respectively; and μ_k, v_j, and w_t are country, industry, and year fixed effects, respectively. *ROA* is return on assets, measured as operating income scaled by lagged total assets. *lnSALE* is the natural logarithm of sales revenue, *WW* is the Whited and Wu (2006) index of financial constraints, *MB* is the market-to-book ratio, and *HERF* is the Herfindahl index. $\Delta EFFICIENCY_k$ is the incremental change in the sensitivity of investment growth to return after enforcement for country *k*. We measure Δ*EFFICIENCY* as the estimate of λ_k^* from the following regression:[28]

$$\begin{aligned}\Delta \ln(CAPX_{i,t}) = &\sum_{k=1}^{26}\beta_k^*\mu_k \times ITENF_{k,t-1} + \sum_{k=1}^{26}\lambda_k^*\mu_k \times \Delta q_{j,t-1} \times ITENF_{k,t-1} + \beta_2 SIZE_{i,t-1} + \\ &\lambda_2 SIZE_{i,t-1} \times \Delta q_{j,t-1} + \beta_3 MB_{i,t-1} + \lambda_3 MB_{i,t-1} \times \Delta q_{j,t-1} + \beta_4 GDP_{k,t} + \lambda_4 GDP_{k,t} \times \Delta q_{j,t-1} + \gamma \Delta cf_{i,t-1} \\ &+ \sum_{k=1}^{45}\varpi_k\mu_k + \sum_{k=1}^{45}\omega_k\mu_k \times \Delta q_{j,t-1} + \sum_{j=1}^{44}\varphi_j v_j + \sum_{j=1}^{44}\phi_j v_j \times \Delta q_{j,t-1} + \sum_{t=1982}^{2003}\vartheta_t w_t + \sum_{t=1982}^{2003}\theta_t w_t \times \Delta q_{j,t-1} + \varepsilon_{i,t}.\end{aligned} \quad (8)$$

Regression (7) is estimated using observations in the developed markets and the results are reported in Table 12. Column (1) does not include the interaction term *ITENF*×Δ*EFFICIENCY* and shows a significant and positive coefficient of *ITENF* (coeff. = 0.019; *t*-stat = 2.55). This result suggests that on average accounting performance improves after enforcement in the developed markets. In Column (2), we interact *ITENF* with Δ*EFFICIENCY*. The coefficient of *ITENF*×Δ*EFFICIENCY* is positive and significant (coeff. = 0.058; *t*-stat = 2.59). This result suggests that the degree of improvement in accounting performance after enforcement is positively associated with the degree of improvement in capital allocation efficiency.[29] This evidence further supports our hypothesis that enforcement improves capital allocation efficiency.

[Insert Table 12 here]

7. Conclusion

We hypothesize that the initial enforcement of insider trading laws enhances capital allocation efficiency by increasing the information efficiency of prices, which expands the information available for managers to make decisions, relaxes financing constraints, and alleviate agency problems. Based on a difference-in-differences approach, we find a significant increase in the

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[28] Equation (8) is derived from Equation (4) by multiplying the indicator for the 26 treatment countries to *ITENF* and Δ*q*×*ITENF*. As Δ*EFFICIENCY* is estimated for each country and we have included the country fixed effect in Regression (7), we do not include Δ*EFFICIENCY* per se in the regression.

[29] Alternatively, we use rank of Δ*EFFICIENCY* and find qualitatively similar results (unreported).

efficiency of capital allocation, as measured by the sensitivity of investment growth to lagged industry returns of US-listed firms, after the initial enforcement of insider trading laws. The increase in capital allocation efficiency after enforcement is concentrated in the developed markets, however, and is not significant in the emerging markets. The changes in the sensitivity of investment growth to return also occur shortly after the enforcement year.

Cross-sectional analysis on the developed markets shows that the improvement in capital allocation efficiency is positively associated with the increase in price efficiency around the enforcement year as measured by the increase in liquidity around the that year. The improvement is also more pronounced for countries with more opaque information environments before enforcement (i.e., where the benefit of the increase in price efficiency is larger).

Further analysis demonstrates that the improvement in capital allocation efficiency is more pronounced for firms operating in more competitive product markets, firms that are more financially constrained, and firms with more severe agency problems. Finally, we also find evidence that firms in the developed markets have better accounting performance after enforcement, and the increase in accounting performance is positively associated with the improvement in capital allocation efficiency.

Overall, our evidence supports the hypothesis that the initial enforcement of insider trading laws improves capital resource allocation efficiency.

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Appendix: Variable definitions

Variable name	Definition	Source
	Country-level variables	
ITENF	Dummy variable that equals one for the years after the year of initial enforcement of insider trading laws, and zero otherwise.	Bhattacharya and Daouk (2002)
ITEXIST	Dummy variable that equals one for the years after the year when insider trading laws were first instituted, and zero otherwise.	Bhattacharya and Daouk (2002)
GOODGOV	An index that measures the extent to which a country's government respects private property rights, defined as the sum of (1) government corruption, (2) the risk that the government will expropriate private property, and (3) the risk that the government will repudiate contracts. A low value of *GOODGOV* indicates less respect for private property rights and higher risk of expropriation by the government.	La Porta et al. (1998)
OPACITY	Composite earnings opacity index based on four individual earnings attributes used in Leuz et al. (2003), Bhattacharya et al. (2003), and Burgstahler et al. (2006). For each country-year in our sample period (i.e., from 1982 to 2003), we compute the following four individual earnings attributes: (1) earnings smoothing (*SMOOTH*), (2) earnings aggressiveness (*AGGR*), (3) loss avoidance (*AVOID*), and (4) earnings discretion (*DISC*). *SMOOTH* = minus one times corr(ΔACCR, ΔCFO) *AGGR* = median of ACCR; *AVOID* = (#small_pos – #small_neg)/(#small_pos + #small_neg); *DISC* = median of |ACCR|/|CFO|, where ACCR is accruals scaled by lagged total assets. Accruals is defined as the change in non-cash working capital plus the change in short-term debt (set to zero if missing) in the current liabilities and the change in income tax payable (set to zero if missing), minus depreciation. CFO is operating cash flows scaled by lagged assets, defined as operating income scaled by lagged assets, minus ACCR. ΔACCR and ΔCFO are the change in ACCR and the change in CFO, respectively. corr(ΔACCR, ΔCFO) is cross-sectional correlation between ΔACCR and ΔCFO within each country-year. #small_pos (#small_neg) is the number of firms with small positive (negative) earnings. A firm is defined as having small positive (negative) earnings if its net income scaled by lagged assets is within the range [0, 0.01] ([-0.01, 0)). We require at least 30 observations to compute the four earnings attributes for each country-year. We convert *SMOOTH*, *AGGR*, *AVOID*, and *DISC* into decile ranks. We define the aggregate earnings opacity measure for each country-year as the average value of the decile ranks of *SMOOTH*, *AGGR*, *AVOID*, and *DISC*. We define *OPACITY* for each treatment country (i.e., countries whose enforcement occurred between 1982 and 2003) as the mean aggregate earnings opacity measure over the three years (i.e., [-3, -1]) before the enforcement year. We set *OPACITY* to zero for other countries.	Worldscope
FD	The financial development index for a country-year observation, defined as the sum of stock market capitalization to GDP and private and nonfinancial public domestic credit to GDP.	Beck et al. (2000)

GDP	Natural logarithm of per capita GDP (in US$) for each country-year observation.	World bank
	Industry-level variables	
Δq	Natural logarithm of one plus the mean return of all US-listed firms in the same industry in year t. Industry is defined based on Fama and French's (1997) 48-industry classification.	CRSP
HERF	Herfindahl index, defined as the sum of squares of the share of sales revenue of all firms in each two-digit industry, each year and each country. We require at least three firms in each country, industry, and year to compute the Herfindahl index.	Worldscope
	Firm-level variables	
$\Delta ln(CAPX)$	Investment growth rate, measured as the change in the natural logarithm of capital expenditures scaled by lagged total assets.	Worldscope
$\Delta ln(CAPXRD)$	Change in the natural logarithm of capital expenditures plus R&D expenditures, scaled by lagged total assets.	Worldscope
$\Delta ln(TAG)$	Change in the natural logarithm of one plus the change in total assets, scaled by lagged total assets.	Worldscope
$\Delta LIQUID$	Change in liquidity around the enforcement year. We follow Amihud et al. (2015) to compute Amihud's (2002) measure of illiquidity (*ILLIQ*) during the two years before (i.e., [-2,-1]) and two years after (i.e., [+1,+2]) the enforcement year. $ILLIQ_{i,t} = \frac{1}{N_{i,t}} \sum_{d} \frac{\lvert r_{i,d,t} \rvert}{VOL_{i,d,t}}$, where $N_{i,t}$ is the number of trading days with volume data in period t (i.e., years [-2, -1] or [+1, +2]). $r_{i,d,t}$ is the daily stock return on day d in period t. $VOL_{i,d,t}$ is the (US) dollar trading volume on day d in period t. The relative change in liquidity ($\Delta LIQUID_i$) is defined as $\Delta LIQUID_i = -1 \times ln\left[\frac{ILLIQ_{i,[+1,+2]}}{ILLIQ_{i,[-2,-1]}}\right]$. We take logarithm to reduce skewness. This variable is only defined for firms in the treatment countries (i.e., countries whose enforcement occurred within our sample period, 1982-2003). For observations in other countries, $\Delta LIQUID$ is set to zero.	DataStream
SIZE	Natural logarithm of the book value of total assets.	Worldscope
MB	Natural logarithm of the market-to-book ratio, where the market-to-book ratio is defined as the market value of equity plus total assets minus the book value of total equity, divided by the book value of total assets.	Worldscope
Δcf	Growth of operating cash flows (*cf*), where *cf* is defined as the natural logarithm of one plus operating cash flow scaled by lagged total assets. Operating cash flow is measured as income before extraordinary items plus depreciation and amortization.	Worldscope
LEV	Leverage, defined as total debt scaled by the book value of total assets.	Worldscope
WW	The Whited and Wu (2006) index of financial constraints.	Worldscope

WEDGE	Difference between the control rights and the cash flow rights of the largest shareholder.	Claessens et al. (2002); Faccio and Lang (2002)
lnSALE	Natural logarithm of total sales revenue.	Worldscope
ROA	Operating income scaled by the lagged book value of total assets.	Worldscope

Table 1. Sample distribution and country-level variables

Country	N	IT enforcement year	IT existence year	*GOODGOV*	Country	N	IT enforcement year	IT existence year	*GOODGOV*
Developed markets					*Emerging markets*				
Australia (AUS)	2,835	1996	1991	26.50	Argentina (ARG)	224	1995	1991	16.84
Austria (AUT)	786		1993	27.86	Brazil (BRA)	1,231	1978	1976	20.24
Belgium (BEL)	987	1994	1990	27.93	Chile (CHL)	663	1996	1981	19.60
Canada (CAN)	5,589	1976	1966	28.63	Colombia (COL)	132		1990	18.97
Denmark (DNK)	1,446	1996	1991	28.98	Egypt (EGY)	25		1992	
Finland (FIN)	1,106	1993	1989	28.82	India (IDN)	993	1998	1992	18.44
France (FRA)	6,159	1975	1967	27.89	Indonesia (IND)	2,118	1996	1991	15.40
Germany (DEU)	5,556	1995	1994	28.60	Israel (ISR)	333	1989	1981	24.12
Greece (GRC)	168	1996	1988	21.01	Jordan (JOR)	12			
Hong Kong (HKG)	2,625	1994	1991	25.63	South Korea (KOR)	2,785	1988	1976	22.20
Ireland (IRL)	566		1990	27.15	Malaysia (MYS)	2,907	1996	1973	22.76
Italy (ITA)	1,921	1996	1991	24.65	Mexico (MEX)	750		1975	18.61
Japan (JPN)	18,114	1990	1988	27.88	Pakistan (PAK)	475		1995	13.47
Netherlands (NLD)	2,030	1994	1989	29.33	Peru (PER)	187	1994	1991	14.92
New Zealand (NZL)	495		1988	28.98	Philippines (PHL)	436		1982	12.94
Norway (NOR)	1,113	1990	1985	29.59	South Africa (ZAF)	2,018		1989	23.07
Portugal (PRT)	411		1986	24.85	Sri Lanka (LKA)	68	1996	1987	16.30
Singapore (SGP)	1,982	1978	1973	26.38	Taiwan (TWN)	2,440	1989	1988	25.13
Spain (ESP)	1,371	1998	1994	25.30	Thailand (THA)	1,633	1993	1984	20.17
Sweden (SWE)	1,806	1990	1971	28.98	Turkey (TUR)	390	1996	1981	18.13
Switzerland (CHE)	1,867	1995	1988	29.96	Venezuela (VEN)	70		1998	17.89
United Kingdom (GBR)	13,970	1981	1980	28.44	Zimbabwe (ZWE)	33			
United States (USA)	50,440	1961	1934	27.61					
Total	123,343				Total	19,923			
Mean				27.43					18.91
Min				21.01					12.94
Max				29.96					25.13

Note: This table shows the distribution of firm-year observations across the 45 countries included in this study and the country-level variables. *IT enforcement year* is the year in which insider trading laws were initially enforced. *IT existence year* is the year in which the insider trading laws were first instituted. Both variables are from Bhattacharya and Daouk (2002). N is the number of firm-year observations. *GOODGOV* is an index measuring how much respect the country's government has for private property rights from La Porta et al. (1998).

Table 2. Summary statistics

Variable	N	Mean	Std Dev	Percentiles 25%	50%	75%
$\Delta ln(CAPX_{i,t})$	143,266	-0.069	0.691	-0.437	-0.044	0.321
$\Delta ln(CAPXRD_{i,t})$	143,266	-0.049	0.646	-0.376	-0.026	0.297
$\Delta ln(TAG_{i,t})$	143,266	-0.006	0.225	-0.129	0.003	0.127
$\Delta ln(CAPX_{i,t-1})$	128,572	-0.097	0.699	-0.466	-0.061	0.303
$\Delta q_{j,t-1}$	143,266	0.081	0.229	-0.059	0.093	0.228
$HERF_{k,j,t-1}$	134,490	0.187	0.172	0.058	0.132	0.254
$\Delta cf_{i,t-1}$	143,266	0.006	0.060	-0.015	0.007	0.029
$SIZE_{i,t-1}$	143,266	5.721	1.719	4.446	5.534	6.835
$LEV_{i,t-1}$	143,262	0.248	0.185	0.093	0.228	0.370
$MB_{i,t-1}$	143,266	0.251	0.427	-0.036	0.167	0.471
$\Delta LIQUID_{i}$	16,226	0.141	1.599	-0.735	0.238	1.071
$WW_{i,t-1}$	140,739	-0.905	0.087	-0.966	-0.903	-0.843
$WEDGE_{i}$	35,509	0.041	0.077	0.000	0.000	0.051
$ROA_{i,t+1}$	131,181	0.07	0.088	0.021	0.063	0.117
$lnSALE_{i,t}$	131,181	5.792	1.666	4.575	5.643	6.861
$OPACITY_{k}$	51,259	6.062	1.422	4.917	5.917	7.667
$GDP_{k,t}$	143,266	9.880	0.865	9.820	10.128	10.391
$FD_{k,t}$	120,940	1.910	0.738	1.418	1.990	2.407

Note: *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. $\Delta ln(CAPX)$ is the growth rate of capital expenditure. $\Delta ln(CAPX)$ is the growth rate of capital expenditure plus R&D expenditures. $\Delta ln(TAG)$ is natural logarithm of total assets growth rate. Δq is the mean industry return of US-listed firms. Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *LEV* is leverage. *WW* is the Whited and Wu (2006) index of financial constraints. *WEDGE* is the wedge between the voting rights and cash flow rights of the largest shareholder. *ROA* is return on assets. *lnSALE* is the natural logarithm of sales revenue. *HERF* is the Herfindahl index of sales. *GDP* is the natural logarithm of per capita GDP. *FD* is the financial development index. For the treatment countries, i.e., countries whose enforcement occurred within our sample period (from 1982 to 2003), *OPACITY* is defined the earnings opacity index before the enforcement year. *OPACITY* is set to zero for other countries. For firms in the treatment countries, $\Delta LIQUID$ is defined as the change in liquidity around the enforcement year. $\Delta LIQUID$ is set to zero for firms in other countries. This table shows the summary statistics of *OPACITY* and $\Delta LIQUID$ for the treatment countries. See the Appendix for the detailed definitions of variables.

Table 3. The initial enforcement of insider trading laws and capital allocation efficiency

Independent variable	Baseline model (1)	Control for *ITEXIST* (2)	Interact Δcf with *ITENF* (3)
$ITEXIST_{k,t}$		0.024 (0.62)	
$ITENF_{k,t}$	-0.030 (-1.18)	-0.039 (-1.24)	-0.028 (-1.00)
$\Delta q_{j,t-1} \times ITEXIST_{k,t}$		0.088 (0.92)	
$\boldsymbol{\Delta q_{j,t-1} \times ITENF_{k,t}}$	**0.253***** **(2.93)**	**0.217**** **(2.15)**	**0.253***** **(2.91)**
$\Delta q_{j,t-1} \times SIZE_{i,t-1}$	-0.016*** (-3.03)	-0.016*** (-3.03)	-0.016*** (-3.14)
$\Delta q_{j,t-1} \times MB_{i,t-1}$	0.033 (1.29)	0.033 (1.32)	0.026 (1.06)
$\Delta q_{j,t-1} \times GDP_{k,t}$	0.172 (0.93)	0.167 (0.92)	0.175 (0.97)
$\Delta cf_{i,t-1}$	0.878*** (8.11)	0.878*** (8.10)	0.639*** (5.09)
$\Delta cf_{i,t-1} \times ITENF_{k,t}$			-0.338 (-0.72)
$SIZE_{i,t-1}$	-0.006*** (-2.86)	-0.006*** (-2.83)	-0.006*** (-2.79)
$MB_{i,t-1}$	0.040*** (4.34)	0.040*** (4.36)	0.039*** (4.38)
$GDP_{k,t}$	-0.371*** (-6.39)	-0.372*** (-6.30)	-0.364*** (-6.48)
$\Delta q_{j,t-1}$ × fixed effects of country, industry, and year	Yes	Yes	Yes
$\Delta cf_{i,t-1}$ × fixed effects of country, industry, and year	No	No	Yes
Fixed effects of country, industry, and year	Yes	Yes	Yes
Adjusted R^2	0.029	0.029	0.031
No. of Obs.	143,266	143,266	143,266

Note: *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. The dependent variable is the investment growth rate, $\Delta ln(CAPX_{i,t})$. Δq is the mean industry return of US-listed firms. Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *GDP* is the natural logarithm of per capita GDP. *ITENF* is a dummy variable that equals one in the years after the initial enforcement of insider trading laws, and zero otherwise. *ITEXIST* is a dummy variable that equals one in the period after the country instituted its insider trading laws, and zero otherwise. Industry fixed effects are defined based on Fama and French's (1997) 48-industry classification. See the Appendix for the detailed definitions of variables. No. of Obs. is the number of firm-year observations. The *t*-statistics are reported in parentheses and are based on standard errors adjusted for heteroscedasticity and clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 4. The initial enforcement of insider trading laws and capital allocation efficiency: Separating the developed and emerging markets

Independent variable		Developed market (1)	Emerging market (2)	Interaction model (3)
$ITENF_{k,t}$		-0.047	0.024	-0.042
		(-1.68)	(0.46)	(-1.61)
$ITENF_{k,t}$×*Emerging Market*				0.083
				(1.58)
$\Delta q_{j,t-1}\times ITENF_{k,t}$	**λ**	**0.336*****	**-0.201**	**0.317*****
		(4.43)	**(-1.20)**	**(4.13)**
$\Delta q_{j,t-1}\times ITENF_{k,t}$×*Emerging Market*	**λ^{EM}**			**-0.462*****
				(-3.48)
$\Delta q_{j,t-1}\times SIZE_{i,t-1}$		-0.018***	-0.011	-0.015***
		(-3.75)	(-0.52)	(-2.89)
$\Delta q_{j,t-1}\times MB_{i,t-1}$		0.028	0.115	0.029
		(1.02)	(1.60)	(1.15)
$\Delta q_{j,t-1}\times GDP_{k,t}$		0.168	0.756*	0.179
		(0.96)	(1.76)	(0.97)
$\Delta cf_{i,t-1}$		0.941***	0.411**	0.878***
		(10.34)	(2.29)	(8.10)
$SIZE_{i,t-1}$		-0.004	-0.027***	-0.007***
		(-1.62)	(-5.17)	(-2.91)
$MB_{i,t-1}$		0.038***	0.042**	0.040***
		(3.29)	(2.41)	(4.46)
$GDP_{k,t}$		-0.445***	-0.163***	-0.373***
		(-8.26)	(-3.04)	(-6.48)
$\Delta q_{j,t-1}$ × fixed effects of country, industry, and year		Yes	Yes	Yes
Fixed effects of country, industry, and year		Yes	Yes	Yes
Adjusted R^2		0.033	0.024	0.029
No. of Obs.		123,343	19,923	143,266
Hypothesis test		**$\lambda^{(1)}-\lambda^{(2)}=0$**		**$\lambda+\lambda^{EM}=0$**
p-value		[*0.003*]		[*0.233*]

Note: *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. The dependent variable is the investment growth rate, $\Delta ln(CAPX_{i,t})$. Δq is the mean industry return of US-listed firms. Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *GDP* is the natural logarithm of per capita GDP. *ITENF* is a dummy variable that equals one in the years after the initial enforcement of insider trading laws, and zero otherwise. *Emerging Market* is a dummy variable that equals one for firms in the emerging markets, and zero otherwise. Industry fixed effects are defined based on Fama and French's (1997) 48-industry classification. See the Appendix for the detailed definitions of variables. No. of Obs. is the number of firm-year observations. The *t*-statistics are reported in parentheses and are based on standard errors adjusted for heteroscedasticity and clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5. Robustness tests for the identification strategy

Panel A: The change in capital allocation efficiency around the enforcement year

Independent variable		Coefficient (*t*-stat)
$D[-2,0]_{k,t}$		0.041 (0.83)
$D[+1,+3]_{k,t}$		-0.028 (-0.84)
$D[>+3]_{k,t}$		-0.033 (-0.74)
$\Delta q_{j,t-1} \times D[-2,0]_{k,t}$	$\lambda^{D[-2,0]}$	**-0.115 (-1.00)**
$\Delta q_{j,t-1} \times D[+1,+3]_{k,t}$	$\lambda^{D[+1,+3]}$	**0.238** (2.52)**
$\Delta q_{j,t-1} \times D[>+3]_{k,t}$	$\lambda^{D[>+3]}$	**0.334*** (4.83)**
$\Delta q_{j,t-1} \times SIZE_{i,t-1}$		-0.017*** (-3.94)
$\Delta q_{j,t-1} \times MB_{i,t-1}$		0.028 (0.99)
$\Delta q_{j,t-1} \times GDP_{k,t}$		0.196 (1.07)
$\Delta cf_{i,t-1}$		0.942*** (10.37)
$SIZE_{i,t-1}$		-0.004 (-1.60)
$MB_{i,t-1}$		0.038*** (3.18)
$GDP_{k,t}$		-0.453*** (-8.01)
$\Delta q_{j,t-1}$ × fixed effects of country, industry, and year		Yes
Fixed effects of country, industry, and year		Yes
Adjusted R^2		0.033
No. of Obs.		123,343
p-value for hypothesis testing		
$\lambda^{D[+1,+3]} - \lambda^{D[-2,0]} = 0$:		[***0.015***]
$\lambda^{D\,[>+3]} - \lambda^{D\,[+1,+3]} = 0$:		[*0.310*]

Panel B: The change in capital allocation efficiency after the true enforcement year versus that after the pseudo enforcement year

Independent variable		Mean coefficient (1)	sig.+ % (2)	sig.– % (3)
$TrueITENF_{k,t}$		-0.044	0.000	0.001
$PseudoITENF_{i,t}$		0.004	0.021	0.001
$\boldsymbol{\Delta q_{j,t-1} \times TrueITENF_{k,t}}$	λ^{True}	0.323	1.000	0.000
$\boldsymbol{\Delta q_{j,t-1} \times PseudoITENF_{i,t}}$	λ^{Pseudo}	-0.020	0.005	0.050
$\Delta q_{j,t-1} \times SIZE_{i,t-1}$		-0.018	0.000	1.000
$\Delta q_{j,t-1} \times MB_{i,t-1}$		0.028	0.000	0.000
$\Delta q_{j,t-1} \times GDP_{k,t}$		0.168	0.000	0.000
$\Delta cf_{i,t-1}$		0.941	1.000	0.000
$SIZE_{i,t-1}$		-0.004	0.000	0.000
$MB_{i,t-1}$		0.038	1.000	0.000
$GDP_{k,t}$		-0.446	0.000	1.000
$\Delta q_{j,t-1}$ × fixed effects of country, industry, and year		Yes		
Fixed effects of country, industry, and year		Yes		
Adjusted R^2		0.033		
No. of Obs.		123,343		
Hypothesis testing				
$\lambda^{True} - \lambda^{Pseudo}$		0.343	1.000	0.000

Note: The sample includes only the developed markets. *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. The dependent variable is the investment growth rate, $\Delta ln(CAPX_{i,t})$. Δq is the mean industry return of US-listed firms. Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *GDP* is the natural logarithm of per capita GDP. *D*[-2,0] is a dummy variable that equals one for years [-2,0] around the enforcement year (i.e., year 0), and zero otherwise. *D*[+1, +3] is a dummy variable that equals one for years [+1, +3] around the enforcement year, and zero otherwise. *D*[>+3] is a dummy variable that equals one for the period starting in year +4 and beyond, and zero otherwise. *TrueITENF* a dummy variable that equals one for the period after the true enforcement year, and zero otherwise. *PseudoITENF* as a dummy variable that equals one for the period after the randomly assigned pseudo enforcement year, and zero otherwise. Industry fixed effects are defined based on Fama and French's (1997) 48-industry classification. See the Appendix for the detailed definitions of variables. The *t*-statistics are reported in parentheses and are based on standard errors adjusted for heteroscedasticity and clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Panel B reports the summary statistics for 1,000 regressions based on the 1,000 independent samplings. Column (1) reports the mean coefficient estimates of the 1,000 replications. Columns (2) and (3) report the portions of the 1,000 replications in which the corresponding coefficient estimates are respectively positive and negative and significant at the 5% level, based on standard errors adjusted for heteroscedasticity and clustering at the country level.

Table 6. Additional robustness tests for the effect of the initial enforcement of insider trading laws on capital allocation efficiency in the developed markets

Independent variable	Investment growth defined as $\Delta ln(CAPXRD_{i,t})$ (1)	Investment growth defined as $\Delta ln(TAG_{i,t})$ (2)	Δq measured as change in firm-specific lnQ (3)	Further controlling for lagged $\Delta ln(CAPX)$, LEV, FD, and $\Delta q \times FD$ (4)	Country-level analysis (5)
$ITENF_{k,t}$	-0.046* (-1.80)	-0.020* (-1.79)	-0.011 (-0.53)	-0.061 (-1.31)	0.205** (2.01)
$\boldsymbol{\Delta q_{j,t-1} \times ITENF_{k,t}}$	0.287*** (4.60)	0.070** (2.32)	0.264*** (4.12)	0.278** (2.39)	
$\Delta q_{j,t-1} \times SIZE_{i,t-1}$	-0.022*** (-3.79)	-0.002 (-1.69)	0.024*** (2.16)	-0.011*** (-3.16)	
$\Delta q_{j,t-1} \times MB_{i,t-1}$	0.018 (0.73)	0.023 (0.87)	-0.082*** (-4.44)	-0.008 (-0.39)	
$\Delta q_{j,t-1} \times GDP_{k,t}$	-0.015 (-0.09)	-0.058 (-0.53)	0.393*** (2.82)	-0.312 (-1.69)	
$\Delta q_{j,t-1} \times FD_{k,t}$				0.310*** (3.18)	
$\Delta cf_{i,t-1}$	0.647*** (18.66)	-0.278*** (-5.42)	0.767*** (7.55)	1.182*** (22.24)	
$SIZE_{i,t-1}$	-0.006*** (-3.67)	-0.007*** (-5.59)	-0.006*** (-3.56)	0.002 (0.36)	
$MB_{i,t-1}$	0.041*** (3.47)	0.017** (2.79)	-0.015*** (-3.03)	0.046*** (4.48)	
$GDP_{k,t}$	-0.424*** (-8.63)	-0.280*** (-7.92)	-0.415*** (-10.32)	-0.596*** (-7.83)	
$FD_{k,t}$				0.041 (1.36)	
$LEV_{i,t-1}$				-0.250*** (-5.73)	
$\Delta ln(CAPX_{i,t-1})$				-0.245*** (-15.21)	
$\Delta q_{j,t-1}$ × fixed effects of country, industry, and year	Yes	Yes	Yes	Yes	n/a
Fixed effects of country, industry, and year	Yes	Yes	Yes	Yes	Country and year
Adjusted R^2	0.030	0.099	0.051	0.099	0.068
No. of Obs.	123,343	123,343	117,007	93,965	410

Note: *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. Columns (1) and (2) repeat the baseline regression and replace the dependent variables with $\Delta ln(CAPXRD)$ and $\Delta ln(TAG)$, respectively. Column (3) repeats the baseline regression and replaces Δq with the change in the logarithm of firm-specific Tobin's Q. Column (4) augments the baseline regression with lagged $\Delta ln(CAPX)$, LEV, FD, and $\Delta q \times FD$. The dependent variable in Column (5) is the country-year-specific measure of capital allocation efficiency ($\lambda_{k,t}$) estimated from the following regression:

$$\Delta ln(CAPX_{i,t}) = \sum_{k,t} \beta_{k,t}\mu_{k,t} + \sum_{k,t} \lambda_{k,t}\mu_{k,t} \times \Delta q_{j,t-1} + \beta_2 SIZE_{i,t-1} + \lambda_2 SIZE_{i,t-1} \times \Delta q_{j,t-1} + \beta_3 MB_{i,t-1} + \lambda_3 MB_{i,t-1} \times \Delta q_{j,t-1} +$$

$$\beta_4 GDP_{k,t} + \lambda_4 GDP_{k,t} \times \Delta q_{j,t-1} + \gamma \Delta cf_{i,t-1} + \sum_{j=1}^{44} \varphi_j v_j + \sum_{j=1}^{44} \phi_j v_j \times \Delta q_{j,t-1} + \varepsilon_{i,t},$$

where Δq is the mean industry return of US-listed firms except in Column (3). Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *GDP* is the natural logarithm of per capita GDP. *ITENF* is a dummy variable that equals one in the years after the initial enforcement of insider trading laws, and zero otherwise. v_j and $\mu_{k,t}$ are indicators for industry and country-year, respectively. See the Appendix for the detailed variable definitions. The *t*-statistics are based on standard errors adjusted for heteroscedasticity and clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 7. Mechanism test: association between the change in liquidity around the enforcement year and the change in capital allocation efficiency after enforcement in the developed markets

Independent variable	Coefficient (*t*-stat)
$ITENF_{k,t}$	-0.005 (-0.19)
$ITENF_{k,t} \times \Delta LIQUID_i$	-0.004 (-0.63)
$\boldsymbol{\Delta q_{j,t-1} \times ITENF_{k,t}}$	**0.261**** **(2.73)**
$\boldsymbol{\Delta q_{j,t-1} \times ITENF_{k,t} \times \Delta LIQUID_i}$	**0.075**** **(2.70)**
$\Delta q_{j,t-1} \times SIZE_{i,t-1}$	-0.020*** (-7.30)
$\Delta q_{j,t-1} \times MB_{i,t-1}$	0.015 (0.59)
$\Delta q_{j,t-1} \times GDP_{k,t}$	0.321 (1.68)
$\Delta cf_{i,t-1}$	0.978*** (11.60)
$SIZE_{i,t-1}$	-0.005** (-2.79)
$MB_{i,t-1}$	0.044*** (5.09)
$GDP_{k,t}$	-0.448*** (-5.48)
$\Delta q_{j,t-1}$ × fixed effects of country, industry, and year	Yes
Fixed effects of country, industry, and year	Yes
Adjusted R^2	0.040
No. of Obs.	91,246

Note: *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. The dependent variable is the investment growth rate, $\Delta ln(CAPX_{i,t})$. Δq is the mean industry return of US-listed firms. Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *GDP* is the natural logarithm of per capita GDP. *ITENF* is a dummy variable that equals one in the years after the initial enforcement of insider trading laws, and zero otherwise. Industry fixed effects are defined based on Fama and French's (1997) 48-industry classification. $\Delta LIQUID_i$ is the change in liquidity between years [-2, -1] and [+1, +2] for the firms in countries whose enforcement occurred within our sample period (i.e., from 1982 to 2003). For firms in other countries, $\Delta LIQUID$ is set as zero. See the Appendix for the detailed definitions of variables. No. of Obs. is the number of firm-year observations. The *t*-statistics are reported in parentheses and are based on standard errors adjusted for heteroscedasticity and clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 8. Earnings opacity and the change in capital allocation efficiency after the initial enforcement of insider trading laws in the developed markets

Independent variable	Coefficient (*t*-stat)
$ITENF_{k,t}$	0.025 (0.43)
$ITENF_{k,t-1} \times OPACITY_k$	-0.013 (-1.32)
$\Delta q_{j,t-1} \times ITENF_{k,t}$	**-0.051** **(-0.37)**
$\Delta q_{j,t-1} \times ITENF_{k,t} \times OPACITY_k$	**0.071***** **(3.22)**
$\Delta q_{j,t-1} \times SIZE_{i,t-1}$	-0.017*** (-3.68)
$\Delta q_{j,t-1} \times MB_{i,t-1}$	0.030 (1.07)
$\Delta q_{j,t-1} \times GDP_{k,t-1}$	0.157 (0.88)
$\Delta cf_{i,t-1}$	0.942*** (10.38)
$SIZE_{i,t-1}$	-0.004 (-1.70)
$MB_{i,t-1}$	0.037*** (3.12)
$GDP_{k,t-1}$	-0.444*** (-8.30)
$\Delta q_{j,t-1}$ × fixed effects of country, industry, and year	Yes
Fixed effects of country, industry, and year	Yes
Adjusted R^2	0.033
No. of Obs.	123,343

Note: *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. The dependent variable is the investment growth rate, $\Delta ln(CAPX_{i,t})$. Δq is the mean industry return of US-listed firms. Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *GDP* is the natural logarithm of per capita GDP. *ITENF* is a dummy variable that equals one in the years after the initial enforcement of insider trading laws, and zero otherwise. Industry fixed effects are defined based on Fama and French's (1997) 48-industry classification. For observations in countries whose enforcement occurred within our sample period (i.e., from 1982 to 2003), *OPACITY* is defined as earnings opacity before the enforcement year. For other countries, *OPACITY* is set as zero. See the Appendix for the detailed definitions of variables. No. of Obs. is the number of firm-year observations. The *t*-statistics are reported in parentheses and are based on standard errors adjusted for heteroscedasticity and clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 9. Product market competition and the change in capital allocation efficiency after the initial enforcement of insider trading laws in the developed markets

Independent variable		*Partitioning by the Herfindahl index (HERF)* Low (Most competitive) (1)	Medium (2)	High (Least competitive) (3)
$ITENF_{k,t}$		-0.090***	-0.057	-0.032
		(-5.17)	(-1.15)	(-1.02)
$\Delta q_{j,t\text{-}1}\times ITENF_{k,t}$	λ	**0.562*** **	**0.360*** **	**0.316*** **
		(6.39)	**(3.75)**	**(3.14)**
$\Delta q_{j,t\text{-}1}\times SIZE_{i,t\text{-}1}$		-0.009**	-0.033***	-0.010
		(-3.03)	(-3.50)	(-0.71)
$\Delta q_{j,t\text{-}1}\times MB_{i,t\text{-}1}$		0.025	-0.027	0.079
		(1.74)	(-0.48)	(1.50)
$\Delta q_{j,t\text{-}1}\times GDP_{k,t\text{-}1}$		0.476**	-0.073	0.234
		(3.14)	(-0.41)	(0.84)
$\Delta cf_{i,t\text{-}1}$		0.957***	0.955***	0.881***
		(34.74)	(4.04)	(17.41)
$SIZE_{i,t\text{-}1}$		-0.006	0.001	-0.004*
		(-1.76)	(0.33)	(-2.01)
$MB_{i,t\text{-}1}$		0.060***	0.040**	0.018
		(8.40)	(2.45)	(1.59)
$GDP_{k,t\text{-}1}$		-0.667***	-0.330***	-0.450***
		(-6.72)	(-6.75)	(-6.01)
$\Delta q_{j,t\text{-}1}$ × fixed effects of country, industry, and year		Yes	Yes	Yes
Fixed effects of country, industry, and year		Yes	Yes	Yes
Adjusted R^2		0.033	0.039	0.032
No. of Obs.		40,824	40,684	41,045
Hypothesis testing			**$\lambda^{(1)} - \lambda^{(3)} = 0$**	
p-value			[*0.076*]	

Note: *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. The dependent variable is the investment growth rate, $\Delta ln(CAPX_{i,t})$. Δq is the mean industry return of US-listed firms. Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *GDP* is the natural logarithm of per capita GDP. *ITENF* is a dummy variable that equals one in the years after the initial enforcement of insider trading laws, and zero otherwise. Industry fixed effects are defined based on Fama and French's (1997) 48-industry classification. *HERF* is the Herfindahl index of sales. A low value of *HERF* means more competitive product markets. See the Appendix for the detailed definitions of variables. No. of Obs. is the number of firm-year observations. The *t*-statistics are reported in parentheses and are based on standard errors adjusted for heteroscedasticity and clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 10. Financing constraints and the change in capital allocation efficiency after the initial enforcement of insider trading laws in the developed markets

Independent variable		*Partitioning by the WW index*		
		Low (Least constrained) (1)	Medium (2)	High (Most constrained) (3)
$ITENF_{k,t}$		-0.027	-0.046*	-0.074**
		(-0.89)	(-1.81)	(-2.14)
$\boldsymbol{\Delta q_{j,t-1} \times ITENF_{k,t}}$	λ	**0.207****	**0.329*****	**0.453*****
		(2.37)	**(3.63)**	**(5.01)**
$\Delta q_{j,t-1} \times SIZE_{i,t-1}$		-0.018	-0.007	-0.014
		(-1.30)	(-0.47)	(-0.42)
$\Delta q_{j,t-1} \times MB_{i,t-1}$		0.005	0.031	0.041
		(0.16)	(0.49)	(1.15)
$\Delta q_{j,t-1} \times GDP_{k,t-1}$		0.232	-0.043	0.268
		(1.26)	(-0.25)	(1.15)
$\Delta cf_{i,t-1}$		0.437***	0.935***	1.069***
		(3.25)	(7.96)	(14.73)
$SIZE_{i,t-1}$		0.002	-0.005	-0.026***
		(0.92)	(-0.87)	(-3.52)
$MB_{i,t-1}$		0.079***	0.033	0.019**
		(8.18)	(1.37)	(2.43)
$GDP_{k,t-1}$		-0.429***	-0.454***	-0.434***
		(-7.22)	(-8.48)	(-5.70)
$\Delta q_{j,t-1}$ × fixed effects of country, industry, and year		Yes	Yes	Yes
Fixed effects of country, industry, and year		Yes	Yes	Yes
Adjusted R^2		0.040	0.032	0.034
No. of Obs.		40,391	40,227	40,549
Hypothesis testing			$\boldsymbol{\lambda^{(3)} - \lambda^{(1)} = 0}$	
p-value			[*0.005*]	

Note: *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. The dependent variable is the investment growth rate, $\Delta ln(CAPX_{i,t})$. Δq is the mean industry return of US-listed firms. Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *GDP* is the natural logarithm of per capita GDP. *ITENF* is a dummy variable that equals one in the years after the initial enforcement of insider trading laws, and zero otherwise. Industry fixed effects are defined based on Fama and French's (1997) 48-industry classification. The *WW index* is the Whited and Wu (2006) index of financial constraints. A higher index implies tighter financial constraints. See the Appendix for the detailed definitions of variables. No. of Obs. is the number of firm-year observations. The *t*-statistics are reported in parentheses and are based on standard errors adjusted for heteroscedasticity and clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 11. Agency problem and the change in capital allocation efficiency after the initial enforcement of insider trading laws in the developed markets

Independent variable		*Partitioning by WEDGE* Wedge<=0 (1)	Wedge>0 (2)
$ITENF_{k,t}$		-0.085**	-0.096**
		(-2.36)	(-2.69)
$\Delta q_{j,t-1} \times ITENF_{k,t}$	**λ**	**0.187**	**0.522*** **
		(1.35)	**(4.54)**
$\Delta q_{j,t-1} \times SIZE_{i,t-1}$		0.023**	-0.004
		(2.37)	(-0.39)
$\Delta q_{j,t-1} \times MB_{i,t-1}$		0.001	-0.021
		(0.01)	(-0.20)
$\Delta q_{j,t-1} \times GDP_{k,t-1}$		-0.882**	-0.540
		(-2.42)	(-1.43)
$\Delta cf_{i,t-1}$		0.776***	0.801***
		(6.82)	(7.92)
$SIZE_{i,t-1}$		-0.006***	-0.008*
		(-3.70)	(-2.08)
$MB_{i,t-1}$		0.034**	0.059***
		(2.85)	(6.64)
$GDP_{k,t-1}$		-0.376***	-0.493***
		(-4.41)	(-4.82)
$\Delta q_{j,t-1}$ × fixed effects of country, industry, and year		Yes	Yes
Fixed effects of country, industry, and year		Yes	Yes
Adjusted R^2		0.041	0.04
No. of Obs.		18,112	13,273
Hypothesis testing		**$\lambda^{(1)} - \lambda^{(2)} = 0$**	
p-value		[*0.006*]	

Note: *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. The dependent variable is the investment growth rate, $\Delta ln(CAPX_{i,t})$. Δq is the mean industry return of US-listed firms. Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *GDP* is the natural logarithm of per capita GDP. *ITENF* is a dummy variable that equals one in the years after the initial enforcement of insider trading laws, and zero otherwise. Industry fixed effects are defined based on Fama and French's (1997) 48-industry classification. *WEDGE* is the wedge between the voting rights and cash flow rights of the largest shareholder. See the Appendix for the detailed definitions of variables. No. of Obs. is the number of firm-year observations. The *t*-statistics are reported in parentheses and are based on standard errors adjusted for heteroscedasticity and clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 12. The change in firm accounting performance after the initial enforcement of insider trading laws in the developed markets

Independent variable	(1)	(2)
$ITENF_{k,t}$	**0.019****	-0.003
	(2.55)	(-0.29)
$ITENF_{k,t}\times\Delta EFFICIENCY_k$		**0.058****
		(2.59)
$lnSALE_{i,t}$	-0.012***	-0.012***
	(-3.33)	(-3.32)
$MB_{i,t}$	0.080***	0.080***
	(9.34)	(9.59)
$WW_{i,t}$	-0.384***	-0.383***
	(-9.51)	(-9.51)
$HERF_{k,j,t}$	-0.001	-0.001
	(-0.27)	(-0.24)
Fixed effects of country, industry, and year	Yes	Yes
Adjusted R^2	0.302	0.303
No. of Obs.	117,120	116,564

Note: *i*, *j*, *k*, and *t* are subscripts for firm, industry, country, and year. The dependent variable in the regressions is $ROA_{i,t+1}$. *lnSALE* is the logarithm of sales. *MB* is the market-to-book ratio. *WW* is the Whited and Wu (2006) index of financial constraints. *HERF* is the Herfindahl index of sales. $\Delta EFFICIENCY_k$ is the estimate of the effect of enforcement on capital allocation efficiency for firms in country *k* (*k* = 1 to 26 for the 26 countries whose initial enforcement of insider trading laws occurred between 1982 and 2003), i.e., the estimate of coefficient λ_k^* in the following regression:

$$\Delta \ln(CAPX_{i,t}) = \sum_{k=1}^{26} \beta_k^* \mu_k \times ITENF_{k,t} + \sum_{k=1}^{26} \lambda_k^* \mu_k \times \Delta q_{j,t-1} \times ITENF_{k,t} + \beta_2 SIZE_{i,t-1} + \lambda_2 SIZE_{i,t-1} \times \Delta q_{j,t-1} + \beta_3 MB_{i,t-1} +$$
$$\lambda_3 MB_{i,t-1} \times \Delta q_{j,t-1} + \beta_4 GDP_{k,t} + \lambda_4 GDP_{k,t} \times \Delta q_{j,t-1} + \gamma \Delta cf_{i,t-1} + \sum_{k=1}^{45} \varpi_k \mu_k + \sum_{k=1}^{45} \omega_k \mu_k \times \Delta q_{j,t-1} +$$
$$\sum_{j=1}^{44} \varphi_j v_j + \sum_{j=1}^{44} \phi_j v_j \times \Delta q_{j,t-1} + \sum_{t=1982}^{2003} \vartheta_t w_t + \sum_{t=1982}^{2003} \theta_t w_t \times \Delta q_{j,t-1} + \varepsilon_{i,t},$$

where μ_k, v_j, and w_t are dummy variables for country, industry, and year. Δq is the mean industry return of US-listed firms. Δcf is the growth rate of operating cash flows. *SIZE* is firm size. *MB* is the market-to-book ratio. *GDP* is the natural logarithm of per capita GDP. *ITENF* is a dummy variable that equals one in the years after the initial enforcement of insider trading laws, and zero otherwise. Industry fixed effects are defined based on Fama and French's (1997) 48-industry classification. See the Appendix for the detailed definitions of variables. The *t*-statistics are reported in parentheses and are based on standard errors adjusted for heteroscedasticity and clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.