Insider Trading Restrictions and Top Executive Compensation

David J. Denis* and Jin Xu**

* Katz Graduate School of Business, University of Pittsburgh, Pittsburgh, PA 15260, U.S. A. djdenis@katz.pitt.edu.

**Krannert School of Management, Purdue University, 403 West State Street, West Lafayette, IN 47907-2056, U.S.A. xu68@purdue.edu.

We thank an anonymous referee, Leonce Bargeron, John Core, Melanie Cao, Martijn Cremers, Diane Denis, Mara Faccio, Seoyoung Kim, Ken Lehn, David Lesmond, Tim Loughran, John McConnell, Darren Roulstone, and Shawn Thomas for helpful discussions and comments. In addition, the paper has benefited from comments from workshop participants at Carnegie Mellon University, Hong Kong University of Science and Techonology, Nanyang Technological University, National University of Singapore, Penn State University, Singapore Management University, Temple University, Tulane University, the 2009 Northern Finance Association meetings, the 2009 State of Indiana Finance Conference and the 2010 American Finance Association meetings for their helpful comments. Xu acknowledges the financial support from the Purdue University Center for International Business Education and Research. Special thanks are due to Luis Marques for part of the data used in the paper. Clarke Bjarnason provided able research assistance.

Insider Trading Restrictions and Top Executive Compensation

Abstract

Executive compensation is significantly higher and the use of equity incentives is significantly greater in countries with stronger insider trading restrictions. These findings are robust to alternative definitions of insider trading restrictions and enforcement, and to panel regressions with country fixed effects. We also find significant increases in top executive pay and the fraction of pay comprised of equity-based incentives in the period immediately following the initial enforcement of insider trading laws. We conclude that insider trading is an implicit form of compensation and that variation in restrictions on insider trading across countries explains a significant amount of the cross-country variation in the structure of executive pay and incentives.

JEL Classification: G18, G32, G34

Keywords: Insider trading restrictions, executive compensation, insider ownership

Insider Trading Restrictions and Top Executive Compensation

1. Introduction

Recent studies document substantial cross-country variation in both the level of executive compensation and the use of equity-based pay for top executives [e.g. Murphy (1999)]. However, the underlying factors contributing to these observed differences remain the topic of active investigation. For example, Fernandes, Ferreira, Matos, and Murphy (2010) analyze cross-country differences in the use of equity-based compensation, but find little evidence that agency-theoretic factors explain the greater use of equity-based pay by U.S. firms. They conclude that "differences across countries are largely driven by country-specific economic, legal, and environmental factors."

We investigate one country-specific factor that plausibly contributes to the variation in executive pay practices; namely, cross-country differences in restrictions on insider trading. Our study is motivated by a literature that dates back at least to Manne (1966). Because insider trading allows insiders to profitably exploit private information [e.g., Damodoran and Liu (2003), Fidrmuc, Goergen, and Renneboog (2006), Meulbroek (1992), and Seyhun (1986)], a competitive wage-setting process implies that the level of compensation will be positively associated with restrictions on the ability of top executives to trade in their own shares. Similarly, if insider trading represents an efficient form of providing incentives to top executives, as argued in Manne (1966) and Carlton and Fischel (1983), we expect firms to make greater use of other forms of equity incentives when there are greater restrictions on insider trading.

Our primary sample consists of 468 non-U.S. firms with American Depository Receipts (ADRs) from 40 different countries, and 1,852 U.S. firms in 2006. The primary virtue of analyzing compensation in foreign firms with ADRs is that such firms are required to file Form

20-F with the SEC. Thus, we are able to obtain complete, standardized compensation data at the firm level for all of our sample firms. By contrast, most prior cross-country compensation studies have been forced to rely upon survey-based and country-aggregate compensation data.[1] A possible limitation of our data, however, is that firms with ADRs are not representative of the population of firms in that country. We later address this potential limitation.

We measure insider trading restrictions in two ways. First, following Du and Wei (2004), we use an insider trading restriction (ITR) index that is based on global executive opinion surveys about the extent of insider trading restrictions in individual countries. Second, we use an insider trading law (ITL) index from Beny (2006) that captures differences in the strength of insider trading laws. Importantly, for our purposes, both ITR and ITL exhibit substantial cross-country variation. Moreover, we report evidence consistent with the view that our measures of insider trading restrictions capture meaningful reductions in insider trading profits.

Our analysis indicates that the level of pay, the fraction of that pay that is equity-based, and overall equity incentives are all positively related to insider trading restrictions. These findings are robust to the inclusion of a variety of firm-level and country-level control variables, such as firm size, leverage, R&D, growth opportunities, board structure, shareholder protection, and country GDP. The implied impact of insider trading restrictions on executive pay is also economically important. A one unit increase in the ITR index (approximately one standard deviation) is associated with a 38.5% increase in total compensation (approximately $0.23 million), an increase in the percentage of equity-based pay of about twenty-two percentage points, and an increase in overall equity incentives of over 200%.

[1] Examples include Abowd and Bognanno (1995), Abowd and Kaplan (1999), and Murphy (1999) who rely on Towers Perrin's Worldwide Total Remuneration reports.

Although these findings are consistent with the hypothesis that firms increase both the level of pay and the proportion of incentive compensation when insider trading is more restricted, it is possible that our regressions omit potentially important factors that explain both executive pay and insider trading restrictions. To address this possibility, we conduct several additional tests. First, we exploit time-series variation in insider trading restrictions to estimate panel regressions with country and year fixed effects. These models allow us to control for omitted, but time-invariant country-level determinants of executive pay, as well as time-dependent macroeconomic factors that affect both executive pay and insider trading restrictions. The results continue to indicate that greater restrictions on insider trading are associated with significant increases in the proportion of pay that is equity-based.

Second, we analyze changes in compensation around the dates of initial enforcement of insider trading laws. Following Bushman, Piotroski, and Smith (2005), we partial out time trends and control for fixed country effects. Consistent with our main findings, we find that both the level of total executive compensation and the extent to which equity-based pay is used increase significantly following the initial enforcement of insider trading laws.

Although it is difficult to ever completely rule out alternative explanations that are based on correlated omitted variables, we interpret these additional tests as providing strong support for the view that insider trading is a substitute for explicit executive compensation. To provide further evidence on this view, we conduct an ancillary test by analyzing whether the observed link between executive compensation and insider trading restrictions is associated with the level of insider ownership. Because higher levels of inside ownership reduce the need for incentive pay and are associated with lower insider trading profits, on average [Fidrmuc et al. (2006)], we

conjecture that the link between insider trading restrictions and executive pay will be weaker in firms with higher insider ownership. Our findings support this conjecture.

Overall, therefore, we conclude that the most plausible explanation for our findings is that insider trading serves as an implicit form of compensation. When such compensation is restricted through enforced insider trading laws, firms substitute other forms of compensation. In this sense, our findings complement and extend those of Roulstone (2003), who finds that self-imposed insider trading restrictions in U.S. firms are related to higher executive compensation and a greater level of incentive compensation. Perhaps more importantly, our findings contribute to the international executive compensation literature by identifying a factor that explains a substantial amount of the cross-country variation in both the level and the form of executive pay.[2]

Our findings also contribute to a broader law and finance literature that studies the impact of insider trading regulations on firms. Prior research documents that insider trading law and enforcement have significant impacts on the cost of equity [Bhattacharya and Daouk (2002)], equity ownership structure [Beny (2005)], stock market liquidity [Bhattacharya and Daouk (2002), Beny (2005)], stock return volatility [Du and Wei (2004)], and analyst following [Bushman et al. (2005)]. We extend this strand of literature by documenting that insider trading also affects executive compensation policies.

The remainder of the paper is organized as follows. In Section 2, we provide background on the literature that hypothesizes a link between insider trading and compensation. Section 3 describes our sample selection process and describes our primary data. Section 4 reports the results of our cross-sectional regressions. In Section 5, we report the results from a series of

[2] See also Abowd and Bognanno (1995), Conyon and Schwalbach (1997), and Fernandes, Ferreira, Matos, and Murphy (2010).

additional tests that explore alternative explanations for our findings. Section 6 reports the results of sensitivity and robustness checks and Section 7 concludes.

2. Insider Trading, Compensation Levels and Managerial Incentives

A large body of academic literature reports that insider trading allows insiders to profitably exploit their private information and realize significant trading profits.[3] In Baiman and Verrechia (1995, 1996), there is a substitution between managerial compensation levels and insider trading profits. That is, when managers can trade profitably based on their private information, shareholders can compute the expected amount of this redistribution from traders and deduct it from the manager's explicit compensation. Thus, these models predict a positive association between insider trading restrictions and equilibrium compensation levels.

In addition, the ability to trade is valuable to insiders to the extent that they need to trade for reasons unrelated to private information. For example, Roulstone (2003) observes that insiders who receive a significant fraction of their compensation in the form of equity may periodically sell this equity for purposes of consumption. Moreover, insiders may wish to sell shares following equity grants in order to hedge the risk of their personal portfolio [Ofek and Yermack (2000)]. Because insider trading restrictions limit the ability of insiders to sell their shares, this diminishes the value of any equity-based forms of compensation [Baiman and Verrecchia (1996), Core and Guay (2001)].

The ability to trade shares at their discretion is thus valuable to top executives. Consequently, if wages are set competitively and the level of compensation can be measured as the sum of explicit compensation and insider trading profits, we expect the level of explicit

[3] See, for example, Damodaran and Liu (2003), Fidrmuc, Goergen, and Renneboog (2006), Meulbroek (1992), and Seyhun (1986).

compensation to be positively related to restrictions on the ability of insiders to trade freely in their own shares.

In addition to insider trading restrictions affecting the level of compensation, there are several reasons why such restrictions might also impact the use of equity incentives in the compensation contract. First, both Carlton and Fischel (1983) and Manne (1966) hypothesize that because insider trading allows insiders to profit from their innovation and effort, it represents an efficient means for providing incentives to top executives. Although Fama (1980) contends that *ex post* salary renegotiations based on observed effort and output are alternatives to *ex ante* incentives such as those provided by insider trading, Carlton and Fischel (1983) argue that allowing insider trading is more efficient in that it avoids frequent and costly renegotiations. Thus, if insider trading is restricted, firms will need to make greater use of other forms of incentive compensation in order to maintain optimal incentive levels.

Second, because (as noted above) insider trading enhances the ability of insiders to sell their shares for purposes of consumption or hedging, insider trading increases the value of equity-based compensation. This again suggests that if insider trading is restricted, firms will need to make greater use of other forms of incentive compensation in order to maintain optimal incentive levels.

Third, because risk-averse insiders have an incentive to avoid risky projects, insider trading can mitigate these distortions in project selection by aligning the incentives of insiders with those of shareholders [Bebchuk and Fershtman (1994)]. If insider trading is restricted, firms will need to make greater use of other forms of equity-based compensation in order to provide insiders the appropriate incentive to undertake risky projects.

Fourth, in Baiman and Verrechia's (1995) model, insider trading gives managers the ability to influence share price and, therefore, the level of their equity-based compensation. Consequently, the optimal compensation contract places less weight on stock price when managers have greater ability to trade on their private information. Their model thus implies a positive association between equity-based compensation and insider trading restrictions.

Finally, in Baiman and Verrechia (1996), a reduction in insider trading reduces the amount of information about managerial effort that is impounded into share price, thereby increasing agency problems. To counteract this effect, the model predicts greater use of equity-based compensation contracts when there is less opportunity for insider trading.

The above arguments all suggest that restrictions on insider trading will lead firms to substitute other types of incentive compensation. Critics argue, however, that insider trading can create perverse incentives as well. For example, several studies point out that because insider trading allows executives to benefit from bad news as well as good news, managers may be less willing to exert effort to increase firm value, and may even take actions that create unfavorable news.[4] This argument suggests that when insider trading is allowed, firms should make greater use of incentive compensation in order to counteract the perverse incentive effects of insider trading.

The impact of insider trading restrictions on both the level and the form of compensation is thus an empirical issue. To date, however, there has been only limited, indirect evidence. Trapani (1990) finds no relation between insider trading profits and the level of cash compensation for executives. If greater insider trading profits are a proxy for fewer restrictions

[4] See, for example, Bagnoli and Khanna (1992), Levmore (1992), and Schotland (1967). Carlton and Fischel (1983) contend that these adverse incentive effects of insider trading are of second-order importance because of limits on short-selling as well as reputation and litigation concerns.

on insider trading, these findings contradict the view that firms treat explicit cash compensation and insider trading as substitute forms of compensation.

Roulstone (2003) provides additional evidence by studying the link between compensation and self-imposed insider trading restrictions. He finds that firms with such restrictions exhibit higher levels of compensation and make greater use of incentive compensation. Although these findings are consistent with the view that insider trading plays a role in rewarding and motivating employees, they are also subject to potential sample selection bias if firm-level insider trading restrictions are endogenously related to compensation. For example, stronger boards of directors might be inclined to impose greater insider trading restrictions and use more incentive compensation. Roulstone (2003) adopts Heckman's two-stage procedure to account for the possibility of endogeneity; however, it is difficult to rule out the possibility of a correlated omitted variable. An additional potential concern is that Roulstone measures insider trading restrictions by observing the proportion of insider trades that occur during the 20 trading days following earnings announcements. This measure is based on the observation in Bettis, Coles, and Lemmon (2000) that the majority of firms that impose trading restrictions on insiders do so by restricting trading to a period immediately following earnings announcements. Because there are other reasons why insiders might concentrate their trades in the period following major information events like earnings announcements, Roulstone's measure is likely to be a noisy proxy for insider trading restrictions.

We complement and extend these studies by providing more direct evidence on the association between insider trading restrictions and executive compensation. By exploiting cross-country differences in the extent of insider trading restrictions and their time-series changes, we are able to circumvent some of the endogeneity concerns noted above. This allows

us to provide fresh evidence on the joint hypothesis that (i) insider trading plays a role in rewarding and motivating top executives; and (ii) cross-country differences in executive compensation can be explained in part by variation in insider trading restrictions.[5]

3. Sample Selection and Data Description

In this section, we describe the executive compensation data that we use in our empirical analysis as well as our primary measures of insider trading restrictions. We then report summary statistics for the sample.

3.1. Executive Compensation Data

Foreign companies issuing ADRs in the U.S. markets are required to file Form 20-F reports with the Securities and Exchange Commission (SEC). This form contains information on the board of directors, the compensation of executives and directors, the location of the business, the company's industry sector, and other miscellaneous items.[6] From the 20-F reports, we collect compensation data for the top executives of all foreign firms issuing ADRs. Compensation data for executives of U.S. firms is obtained from ExecuComp.

We begin with a list of all Level 2 and Level 3 ADRs as of May 2008 from the JPMorgan ADR Group website. We then supplement this set of firms by examining the list of all ADRs from 1961 to 2007 downloaded from CRSP. We exclude Level 1 and Rule 144A ADRs because they are either traded over the counter or are private placements, making them exempt from SEC

[5] Baiman and Verrecchia (1996) also suggest that the analysis of international data could be useful for addressing whether higher levels of executive compensation in the U.S. is related to differences in insider trading: "The greater diffuseness of U.S. capital markets and the consequent less profitable opportunities for insider trading by managers may provide a partial explanation for the observed higher level of direct compensation received by U.S. CEOs." (p. 2-3).

[6] See Bryan, Nash and Patel (2006) for a detailed description of this source of compensation data.

reporting requirements. For the resulting set of ADRs, we search SEC's *EDGAR* database for 20-F filings in 2006. If a sample firm does not have a 20-F filing in 2006, we obtain the relevant data from either its 2005 or 2007 filing, where available.

There is some variation in the level of detail with which executive compensation data is available. In some filings, information on compensation of individual executives (typically the most highly-paid executives) can be obtained from summary executive compensation tables. In other cases, the compensation tables report only the aggregate compensation for all executives (and directors). For each firm, we construct firm-level compensation variables that capture the level and structure of compensation for the average executive in that firm. Whenever available, we use the individual executive-level data to construct our firm-level measures. Otherwise, we use the aggregate firm-level data to construct average values per top executive. In later tests, we report results at the individual executive level for the subsample of firms for which we have data for the top executive, i.e., firms with U.S. style reporting.

The compensation data contain various components: salary, bonus, equity-based compensation such as restricted stock awards and option grants, and other compensation such as pensions and perquisites. Our analysis focuses on two measures of the incremental flow of compensation: (i) the dollar amount of total compensation (Total Pay); and (ii) the fraction of total compensation that is comprised of equity-based incentive pay (Equity Pay Ratio). Total compensation is defined as the sum of salary, bonus, equity incentive compensation (including restricted stock awards and option grants) and other compensation.[7] The Equity Pay Ratio is measured as the ratio of the total grant-date value of restricted stock awards and option grants to Total Compensation. When stated in local currencies, Total Compensation is converted into

[7] For both restricted stock awards and option grants, we use the grant's market value at the time of the award. The grant date fair value of options granted is used in the calculation, which is largely made available in the 20-F, following the International Financial Reporting Standards 2 (IFRS2).

U.S. dollars using year-average exchange rates in corresponding data years as the conversion rate. All total pay values are stated in 2006 real dollar terms.

In addition, because some of the theory discussed in Section 2 predicts an association between insider trading restrictions and the level of equity incentives, we construct a measure of the overall sensitivity of executive wealth to a 1% change in the firm's stock price (Equity Incentives). Because this measure requires data at the individual executive level, tests using this measure are conducted on the subset of firms with U.S. style reporting. Nonetheless, because we do not have complete data on the details of outstanding options (e.g., maturity, exercise price, etc.), these sensitivities are estimated based on fully diluted shares outstanding; i.e., assuming that all outstanding options are exercised. The definitions for these and other variables can be found in Appendix A.

A possible concern with our sample is that, because the ADR firms are listed in the U.S., the insider trading restrictions that apply to them are different from those that apply to the general population of firms in their home country. For example, perhaps by listing in the U.S., ADR firms are subject to U.S. insider trading regulation. However, because of the SEC's long-standing policy goal of facilitating access of foreign issuers to U.S. capital markets, ADR firms are provided with a variety of exemptions to U.S. insider trading rules. For example, the Exchange Act Rule 3a12-3(b)[8] exempts foreign private issuers from the Commission's proxy rules[9], and from the insider stock trading reports and short-swing profit recovery provisions under Section 16[10] of the Exchange Act.[11] Regulation FD, which limits private communications

[8] Also referred to as 17 CFR 240.3a12-3(b).

[9] 17 CFR 240.14a-1 et seq.

[10] 15 U.S.C. 78p.

of material information, also exempts foreign private issuers from its coverage.[12] Foreign private issuers would be subject to the pension blackout trading restriction (Regulation BTR), a clarification to Section 306(a) of the Sarbanes-Oxley Act of 2002, but only under a certain condition.[13] Thus, ADR firms are not subject to the same level of insider trading regulation as U.S. firms. Moreover, because the majority of ADR firms are also listed on their domestic exchange, they are required to follow domestic insider trading laws. Finally, even if ADR firms are affected primarily by U.S. insider law and enforcement, this will bias our tests against finding any association between compensation and our measures of insider trading restrictions.

A related concern is that because ADR firms tend to be larger and more profitable than the typical firm in their home country, our findings are subject to a sample selection bias. It is important to point out, however, that any such selection bias applies to all of the countries that make up our sample. Thus, it is unlikely to bias our estimates of the cross-sectional association between compensation and insider trading restrictions.

Nonetheless, to provide further evidence on this issue, we compare our data with compensation data in Appendix A.1 of Fernandes, Ferreira, Matos, and Murphy (2009). For the twenty-three countries that are common to both studies, our compensation measures, Total Pay and Equity Pay Ratio, both have correlation coefficients of around 0.55 (significant at the 1% level) with similar measures in Fernandes et al. (2009). These high correlations imply that,

---

[11] See, for example, Ownership Reports and Trading by Officers, Directors and Principal Security Holders, RIN 3235-AI62, Final Rule, Securities and Exchange Commission, footnote 12. Alternatively, see Foreign Issuer Reporting Enhancements, RIN 3235-AK03, Final Rule, Securities and Exchange Commission, footnote 37.

[12] Selective Disclosure and Insider Trading, RIN 3235-AH82, Final Rule, Securities and Exchange Commission.

[13] Insider Trades During Pension Fund Blackout Periods, RIN 3235-AI71, Final Rule, Securities and Exchange Commission. According to the rule, foreign private issuers are only subject to Reg BTR if the blackout were to affect at least 50% of the pension plan beneficiaries located within the U. S. and such persons represented more than 15% of all participants and beneficiaries under all individual account plans of the issuer.

despite potential differences between ADR firms and their local counterparts, the cross-sectional variation in pay practices among ADR firms is similar to that among local firms. Moreover, within the empirical analyses, we control for firm characteristics such as firm size, profitability, market-to-book ratio, financial leverage, board size and board independence to account for differences in these characteristics across firms. Finally, in addition to the ADR compensation data, we later report robustness tests that utilize alternative data sources.

3.2. Insider Trading Measures

Our primary measure of insider trading restrictions comes from the 1999 Global Competitiveness Report. This Report records responses from approximately 4,000 executives in 59 countries to the following survey question regarding the likelihood of insider trading in their respective countries:

> *3.15 [Insider trading] Insider trading is not common in the domestic market (1=strongly disagree, 7=strongly agree)*

We record the average score for all executive responses in a given country and use this as that country's Insider Trading Restriction (*ITR*) index. Larger values of ITR correspond with a more restrictive insider trading environment in that country. [14]

To supplement the survey-based insider trading measure, we also construct an alternative measure based exclusively on countries' statutory insider trading laws. Specifically, the Insider Trading Law (*ITL*) index is the sum of three binary variables, *Tippee*, *Tipping* and *Criminal*,

[14] This index is also available in years 1996 and 1998. We use the most recent year's index as the insider trading restriction index, though our results do not change if other years' indices or their average are used. Note that there is a seven-year lag between the measurement of ITR and the measurement of our compensation variables. Thus, it is possible that during the intervening seven years, countries could initiate changes in insider trading laws. If so, this additional noise in the data will bias our tests against finding any association between insider trading restrictions and executive compensation. We later construct and examine panel datasets in which compensation and insider trading are measured in adjacent years.

compiled by Beny (2004, 2006). These three variables represent the primary elements of the law. *Tippee* equals 1 if tippees (i.e., a corporate outsider receiving inside information from an insider) are subject to insider trading regulation and 0 otherwise. *Tipping* equals 1 if an insider can be held liable for tipping outsiders and 0 otherwise. *Criminal* is 1 if violation of the insider trading law is a criminal offense and 0 otherwise. The ITL index is available for thirty-three of the forty-one countries in the sample.

Because ITR has the potential to capture the joint impact of insider trading laws, their enforcement, and other factors such as culture and information environment, it is arguably a more complete measure of insider trading restrictions than ITL. However, because ITR is based on survey data, it is subject to biases related to the subjective judgments of the responders. Our ITL measure, therefore, provides a useful robustness check. In later tests, we provide another robustness test that makes use of dates of initial prosecution under insider trading laws.

3.3. Summary Statistics

Panel A of Table 1 reports the sample distribution by country, as well as summary measures of each country's insider trading restrictions. Our international data consists of 468 ADR firms from forty different countries for the year 2006, which we supplement with 1,852 U.S. firms in the 2006 dataset. On average, there are 12 ADR firms in each country. However, this average masks considerable variation across countries. Several countries (e.g., Brazil, China, and the U.K.) have more than 30 firms while others (e.g., Austria, Belgium, Colombia, Hungary, Turkey and Venezuela) have just one observation.

The data in Panel A also indicate that there is substantial cross-country variation in the degree of insider trading restrictions. The ITR index ranges from 3.18 (Taiwan) to 6.22

(Luxembourg) with an average of 4.48 and a standard deviation of 0.91. The ITL index varies between 1 and 3 with an average of 2.5. As of 2006, insider trading laws had been in existence for an average of 20 years (2006 minus 1986) and had been enforced for an average of 15 years (2006 minus 1991). Interestingly, some countries have never enforced existing insider trading legislation (e.g. China, Colombia) while others have had a long history of enforcement (e.g. France, U.S.).

Consistent with common perception, the U.S. appears to have among the most restrictive insider trading laws, with an ITR index of 5.64 (only Luxembourg and the UK are higher). At the other end of the spectrum is Mexico with an ITR of 3.54, ITL of 1, and no evidence that its existing laws have ever been enforced.

Finally, the bottom row of Panel A shows that our survey based measure of insider trading restrictions, ITR, is significantly correlated with ITL, IT laws existence and IT laws enforcement. This implies that corporate executives perceive insider trading as being more restricted in countries with stricter insider trading laws and where insider trading laws have existed or have been enforced for a longer time.

Panel B of Table 1 provides summary statistics for our compensation variables, as well as several firm and country-level control variables. Because U.S. firms substantially outnumber the ADR firms, we report firm- and executive-level variables for the U.S. and ADR firms separately to discern whether there are systematic differences between the two groups. We later report results in which U.S. firms are excluded.

The median total pay is around $500,000 U.S. dollars for ADR firms (Ln(Total Pay)=13.2) while that for U.S. firms is $1.6 million (Ln(Total Pay)=14.3). On average, ADR firms pay 17% of the total compensation in restricted stocks and options. By comparison, U.S.

firms pay 35% of the total compensation in equity. Finally, we note that overall equity incentives (as measured by the sensitivity of executive wealth to a 1% change in stock price) are substantially higher in U.S. firms than in the sample of ADR firms.

The median size of the sample firms is about $4.4 billion for ADR firms (Ln(Asset)=8.40) and $1.9 billion for U.S. firms (Ln(Asset)=7.54) in book value of assets. Broadly speaking, this observation is consistent with Pagano, Roell and Zechner (2002), who find that cross-listed firms tend to be larger. The median ADR firm has a lower market-to-book ratio than the average U.S. firm (1.22 compared with 1.63), a slightly higher debt-to-asset ratio (0.21 compared with 0.19) and slightly lower return-on-assets (0.11 compared with 0.12). Finally, the median ADR firm has a larger board consisting of fewer independent directors, and has a greater share of equity held by insiders (officers and directors) than the median U.S. firm. In untabulated results, we also observe that the industry profile (as measured by 1-digit SIC code) is similar to that of the U.S. sample, with the exception that the ADR sample contains relatively more firms in transportation and communications and fewer firms in wholesale and retail trades.

Finally, in the lower part of panel B, we report descriptive statistics for several potential country level determinants of executive compensation, including GDP per capita, the ratio of stock market capitalization-to-GDP, and the revised anti-director index of Djankov, La Porta, Lopez-de-Silanes and Shleifer (2008).[15] Not surprisingly, the U.S. has higher per capita GDP and stock market capitalization, as well as lower values for the anti-director index. We later control for these firm and country-level differences in our compensation regressions.

[15] Fernandes et al. (2009) find GDP per capita to be positively related to the incentive pay ratio, but find no relation between stock market capitalization and the incentive pay ratio.

4. The Association between Insider Trading Restrictions and Executive Compensation

In this section, we report our base analyses of the empirical association between insider trading restrictions and executive compensation using our sample of U.S. and ADR firms in 2006. We begin in Section 4.1 with the univariate association, and then estimate multivariate regressions of the relationships between insider trading restrictions and the level and structure of executive pay in Sections 4.2 and 4.3, respectively. Section 4.4 analyzes the association between insider trading restrictions and overall equity incentives.

4.1. Univariate Analysis

Figure 1 contains scatter plots of the univariate relationship between insider trading restrictions and top executive compensation/incentives. As depicted in Figure 1A, total compensation is highest for U.S. firms and ADR firms from European countries.[16] Within Europe, France, Germany, Switzerland and the U.K. pay relatively higher compensation than the rest of Europe. Pay levels are lowest in Peru, the Philippines and China. Notably, the scatter plot depicts a positive correlation between the level of executive pay and insider trading restriction: countries with high ITR exhibit higher compensation levels.

Figure 1B depicts the association between ITR and the Equity Pay Ratio. Consistent with prior literature, the U.S. and the U.K. are among the countries paying the highest fractions of equity-based compensation (34%-35%). Finland and China also stand out as countries using the most equity-based compensation. At the other end of the spectrum, several countries make no use of equity based compensation at all. Again, it is notable that there appears to be a strong

[16] At first glance, it is surprising that the U.S. firms do not appear to pay much higher compensation than some European countries, given prior evidence (e.g., Murphy (1999)). However, European ADR firms tend to be larger, on average than the typical U.S. firm. In the following multivariate analysis, we control for firm size and other firm characteristics and present results separately for ADR firms to avoid possible biases.

positive correlation between the ITR index and the Equity Pay Ratio. These results are consistent with the hypothesis that insider trading provides incentives similar to those in direct equity compensation.

Finally, Figure 1C depicts the univariate association between ITR and total equity incentives. Again the univariate association is positive. Those countries with stronger insider trading restrictions (e.g. U.S., U.K., Australia) tend to have greater equity incentives. Some countries (e.g. China and India) are notable outliers, however, in that they exhibit very high equity incentives with few country-level restrictions on insider trading.

4.2. Insider Trading Restrictions and Total Compensation

To provide more formal evidence, we estimate multivariate regressions in which the log of total compensation, the equity pay ratio, and the log of equity incentives are the dependent variables. In each regression model, we control for several firm characteristics that have been shown in prior studies to be associated with compensation levels. These include the log of the book value of total assets, the market-to-book ratio, debt-to-asset ratio, lagged return-to-asset ratio, lagged annual stock return, and the ratio of research and development expenditures (R&D) to total assets. [See, e.g., Aboody and Lev (2000), Bizjak, Lemmon and Naveen (2008), Ortiz-Molina (2007)]. In addition, because corporate governance has been shown to affect executive compensation [e.g., Chhaochharia and Grinstein (2009)], we include board size and board independence as independent variables. Finally, to control for country-level determinants of compensation, we include the logarithm of GDP per capita, the stock market capitalization-to-GDP ratio, and the anti-director index. We include industry fixed effects at the 2 digit SIC level

to control for unobserved industry-specific factors, and compute heteroskedasticity-robust standard errors that are clustered by country.

In columns (1) and (2) of Table 2 we report results in which the log of total compensation is the dependent variable. We report separate results for our two primary measures of the restrictions on insider trading: the Insider Trading Restriction index (*ITR*) and the Insider Trading Law index (*ITL*). Because the firm-level total pay variable is derived from the reported aggregate compensation given to executive officers or officers and directors, we also include a dummy variable indicating whether the total pay figure involves non-executive directors. This controls for any systematic difference in pay between non-executive directors and executive officers. Finally, to capture Conyon, Core, and Guay's (2011) argument that executives will demand a risk premium for holding greater equity incentives, we include the log of equity incentives as a separate independent variable in our total compensation regressions.

The results in columns (1) and (2) indicate a significant association between insider trading restrictions and total compensation. The coefficient on insider trading restrictions is significantly positive using either *ITR* or *ITL* as the measure of insider trading restrictions. Moreover, the economic magnitude of the coefficient on insider trading restrictions is substantial. For example, the ITR coefficient of 0.385 in column (1) implies that an increase of one unit in ITR corresponds to a 38.5% increase in Total Pay. Based on the mean value of the Ln(Total Pay) of 13.3 at the firm level, this change amounts to approximately $230,000 (U.S.).

One potential concern is that cross-country differences in the level of executive compensation can largely result from differences in equity incentives [Conyon, Core and Guay (2011)]. To assess this possibility, we also control for equity incentives in the total pay regressions. Because the equity incentives variable is only available for the subsample of

countries and firms with U.S. style reporting, we present the results separately in columns (3) and (4). We keep the compensation and incentive variables at the executive level and add an indicator for CEOs and executive age as controls. The results show a significantly positive correlation between equity incentives and total pay, consistent with Conyon et al. (2011). The coefficients on insider trading restrictions, though similar in magnitude to columns (1) and (2), become statistically insignificant. Thus, we cannot rule out the possibility that the observed association between insider trading restrictions and total pay is a byproduct of the relation between insider trading restrictions and equity incentives.

As for the control variables, consistent with prior literature, we find that level of pay is positively associated with firm size and information asymmetry (as measured by R&D-to-assets). In addition, total pay is positively associated with GDP per capita and (in some specifications) with board independence and the market-to-book ratio. Not surprisingly, total pay is significantly lower if both executive officers and non-executive directors are included in firm aggregate total pay. At the executive level and in the subsample with U.S. style reporting, total pay is negatively related to financial leverage and positively related to ROA and stock returns. Total pay is also higher for the CEO and for older executives.

4.3. Insider Trading Restrictions and Incentive Compensation

Models (5)-(8) of Table 2 report the results of similar regressions in which we test the association between insider trading restrictions and equity incentive pay. Because the ratio of equity pay-to-total pay is bounded by 0 and 1 and because we observe a clustering of observations at zero, an OLS specification would be misspecified. Therefore, we estimate these models using a Tobit specification.

The results indicate a significant positive association between insider trading restrictions and the proportionate use of equity-based incentive compensation. The coefficient on insider trading restrictions is statistically significant, regardless of whether ITR or ITL is used as the measure of insider trading restrictions. Moreover, the effect is economically large; a one-unit increase in ITR corresponds to a nearly 22 percentage point increase in the equity pay ratio (Model 5). This marginal impact is large relative to the unconditional average Equity Pay ratio of 0.17. Moreover, including equity incentives as a control does not mitigate the statistical significance of the effect and actually makes the coefficient economically larger (columns 7-8). These findings are consistent with the view that insider trading represents a substitute form of incentive compensation.

Some control variables are also significant in the Tobit models. Consistent with prior literature [e.g., Baker, Jensen and Murphy (1988) and Yermack (1995)], the relative use of equity incentives in total pay is positively related to firm size and to the firm's market-to-book ratio. In addition, the use of incentive compensation is positively related to R&D expenditures and to board independence. Furthermore, the positive coefficients on stock market capitalization indicate that incentive compensation is more common in developed economies. At the executive level and in the subsample with U.S. style reporting, the equity incentive pay ratio is also negatively correlated with ROA and stock returns and positively correlated with board size. Finally, the CEO and younger executives receive a higher fraction of equity incentive pay.

4.4. Insider trading restrictions and total equity incentives

Finally, in Models (9) and (10) of Table 2, we test the association between the log of total equity incentives and insider trading restrictions. Consistent with our results on the flow of

incentive compensation, these results indicate that the stock of equity incentives is positively related to both ITR and ITL. Again, the impact of insider trading restrictions is both statistically significant and economically meaningful. Specifically, a one-unit increase in ITR corresponds to an over 200% increase in total equity incentives (120% for ITL). In addition, total incentives are positively related to firm size, stock returns and R&D expenditures, and negatively related to leverage, per capita GDP, and the anti-director index. Total incentives are also greater for CEOs and for older executives. It is notable that the independent variables explain substantially less of the cross-sectional variation in total incentives (Models 9 and 10) than they do for the flow of compensation (models 1-8). A possible explanation for this is that a major component of total incentives is equity ownership, which is itself a function of many factors – e.g., private benefits of control, external equity funding needs, short-term liquidity needs, etc. - many of which are unrelated to incentive compensation considerations. As a result, our measure of the stock of incentives is much noisier. Nonetheless, we continue to find a positive association between equity incentives and insider trading restrictions.

5. Additional Tests

Although our findings to this point are consistent with the hypothesis that firms increase both the level of pay and the proportion of incentive compensation when insider trading is more restricted, it is possible that they are spurious because insider trading restrictions are correlated with other country factors that have been omitted from our regression models. Therefore, in this section, we conduct several additional tests to explore alternative explanations for our findings. Specifically, we conduct a panel data analysis on a portion of our sample, we investigate the impact of the initial enforcement of insider trading laws on compensation, and we analyze the

link between insider ownership percentages and the association between insider trading restrictions and compensation.

5.1. Panel Data Analysis

Our regression models omit country factors that are potentially correlated with both insider trading restrictions and compensation. As one approach to testing whether the exclusion of these factors influences our results, we exploit within-country, time-series variation in insider trading restrictions to provide further evidence on the link between insider trading restrictions and compensation. Recall that the ITR index is available from the Global Competitiveness Reports for three years: 1996, 1998 and 1999. Over these three years, some countries exhibit large changes in insider trading restrictions. For example, the ITR index for Italy is 2.92 in 1996, and then increases to 3.88 in 1998, and to 4.38 in 1999. Italy's increases in ITR occurred with its corporate governance law reform in early 1998 that strengthened insider trading regulation.[17] These types of within-country changes allow for identification in panel regressions in which we include country fixed effects to capture any time-invariant country factors and year fixed effects to capture common macroeconomic influences on compensation.

Unfortunately, EDGAR contains relatively few 20-F reports in the 1990s making it difficult to achieve a sample size sufficiently large to estimate panel regressions.[18] Therefore, we extract information on incentive pay from the Global Competitiveness Reports of 1996, 1998 and 1999. The 1996 survey asks about non-wage incentives: "Non-wage incentives (such as profit

[17] See Chapter IV, Unauthorized use of inside information and manipulation involving financial instruments, under Title I in Part V of the Italian Legislative decree 58 of 24 February 1998: Consolidated law on financial intermediation. Source: European Corporate Governance Institute.

[18] Specifically, our matching of the 20-F compensation data with the ITR index data yields only 88 ADR firms from 25 different countries.

sharing and stock purchase plans) are used effectively to motivate employees (1=strongly disagree, 6=strongly agree)". The 1998 and 1999 surveys both ask about performance pay: "Compensation policies link pay closely with job performance (1=strongly disagree, 7=strongly agree)". Although answers to these questions do not speak directly to the relative amount of equity-based incentives in executive pay, we assume that the answers are correlated with the company's use of incentive compensation. This data is available for a broader set of countries, ranging from 49 in 1996 to 59 in 1999. Appendix B lists the ITR index for each country during the three years spanning our panel dataset.

Table 3 reports the results from two sets of regressions. In the first, we estimate regressions of the survey-based Incentive Pay Measure (IPM) on ITR, country GDP per capita and stock market capitalization to GDP.[19] This first set of regressions contains both country and year fixed effects. In the second set of regressions, we estimate the association between annual changes in IPM and changes in ITR. Because these are change regressions, country fixed effects are not included. Note also that, because all variables are country level, no firm characteristics are included as controls.

The results in Columns (1)–(2) of Table 3 indicate that, controlling for country and year fixed effects, the incentive pay measure is significantly associated with insider trading restrictions. Moreover, as indicated in Columns (3)-(4), changes in the incentive pay measure are significantly associated with changes in insider trading restrictions. These findings provide further confidence that our main findings are not being driven by some correlated omitted variable at the country level. Taken at face value, the results imply that firms adjust their executives' pay structures in response to changes in their country's insider trading environment.

[19] Note that although our baseline regressions in Table 2 include the anti-director index, we exclude that index from our panel regressions because there is just one observation on the index for each country.

5.2. Evidence from Initial Enforcement of Insider Trading Laws

Our findings to this point establish an association between executive compensation and either perceptions of insider trading restrictions (ITR) or an index of the country's statutory restrictions (ITL). As shown in Table 1, however, countries differ in when they enforce the statutory insider trading laws in the court of law for the first time. Prior literature finds that the dates of initial enforcement mark meaningful changes in insider trading regimes around the world. That is, insider trading becomes more restricted following initial enforcement of insider trading laws [Bhattacharya and Daouk (2002), Bushman et al. (2005) and Bekaert, Harvey and Lundblad (2001)]. Because the initial enforcement of insider trading laws represents a discrete change in insider trading restrictions, tests of changes in compensation around the dates of initial enforcement can thus provide additional evidence of the link between insider trading restrictions and executive compensation.

Unfortunately, as noted earlier, compensation data from ADR 20-F reports is available for only a limited time period. Thus, for this analysis, we rely on the Worldwide Total Remuneration reports published by Towers Perrin for the executive pay data. This data covers 25 countries between 1994 and 2001 comprising 182 country-year observations, and contains information about total CEO pay and the structure of CEO pay. We construct an *IT Enforce* indicator variable that takes the value of 1 for the year of and years following the initial enforcement and 0 otherwise. We then estimate panel regressions of total compensation and the equity pay ratio on *IT Enforce* and the country-level control variables (GDP per capita and stock market capitalization). In the total compensation regressions, we also include the equity pay ratio as an imperfect control for the possibility that executives demand a risk premium for

holding greater equity incentives.[20] In these models, therefore, the coefficient on *IT Enforce* captures the differences in executive compensation between country-years prior to enforcement and country-years following enforcement of insider trading laws.[21] Appendix C lists the availability of data for each country.

Panel A of Table 4 summarizes the variables for subsamples divided by *IT Enforce*. There are 43 pre-enforcement country-years and 139 post-enforcement country-years. Both total pay and the equity pay ratio are higher in the years following initial enforcement of insider trading laws. Assuming independent observations, the increases are highly statistically significant (P-values are less than 0.001).

The increases in total pay and the equity pay ratio observed in Panel A can originate from three sources: (i) an increase following enforcement within the same country (the time series effect), (ii) a cross-sectional difference between enforced and non-enforced countries (the cross sectional effect), or (iii) a general increasing time trend independent of enforcement (the time trend). In the regression analysis, we adopt two strategies to eliminate the time trend. First, we include year dummy variables in the regressions. Second, similar to Bushman et al. (2005), we de-trend the data by subtracting the yearly average from each raw variable. We also examine country-adjusted variables, which are constructed by subtracting country averages from the raw variables. For each raw variable, its country average is the average over all years for that country.

Panel B of Table 4 reports the regression results. Columns (1)-(3) report results in which the log of total pay is the dependent variable, while columns (4)-(6) report results in which the

[20] Due to the limitations of the Towers Perrin data, we are unable to include a direct measure of total equity incentives.

[21] Because there are only four country-years in the sample prior to the initial enactment of insider trading laws, we do not examine the initial enactment dates.

equity pay ratio is the dependent variable. Tests based on the raw variables (columns 1 and 4) indicate that, controlling for GDP per capita and stock market capitalization, the equity pay ratio is significantly higher in the country-years after initial enforcement of insider trading laws. More importantly, Columns (2) and (5) indicate that both country-adjusted total pay and equity pay ratio are significantly larger following initial enforcement of insider trading laws (t statistics for the *IT Enforce* coefficients are 2.38 and 2.51, respectively). Within a country, total pay increases by an average of 13.6% and the fraction of equity incentive pay in total pay increases by 1.2 percentage points after initial insider trading law enforcement. Using de-trended data yields very similar results (columns 3 and 6).

Overall, therefore, the findings in Table 4 provide additional support for the view of insider trading as a form of compensation. Following initial enforcement of insider trading laws that plausibly reduce the ability of insiders to trade in their own shares, firms appear to respond by increasing the level of compensation and the proportion of that compensation that comes in the form of equity-based incentives.

5.3. Insider ownership and the association between ITR and compensation

To provide further ancillary support for the role of insider trading as a form of compensation, we analyze the link between insider ownership and the association between insider trading restrictions and compensation. As noted in Kyle (1985), insider trading is a wealth transfer from uninformed traders to informed traders (insiders). Therefore, insider trading profits will be a decreasing function of the relative number of insiders. Consistent with this prediction, Fidrmuc et al. (2006) find that higher levels of inside ownership are associated with lower insider trading profits. If so, we expect that restrictions on insider trading will have less

impact on compensation arrangements in firms with higher inside ownership since insider trading is less effective as a substitute for compensation. Moreover, because the incentives of executives with high inside ownership are already well-aligned with those of shareholders, using insider trading as a form of incentive compensation [e.g., Carlton and Fischel (1983) and Manne (1966)] will be less important.

The above arguments imply that the association between insider trading restrictions and both the level of pay and the proportion of incentive pay will be weaker in firms with higher insider ownership. By contrast, under the view that our primary results are driven by a correlated omitted variable, we expect the level of insider ownership to have no impact on the association between insider trading restrictions and executive compensation.

To test these predictions, we measure insider ownership for ADR firms as the fractional equity ownership (both direct and indirect) of all executive officers and directors as reported in the 20-F filings. For U.S. firms, insider ownership reflects the ownership of the five most highly paid executives. We then include insider ownership and the interaction of insider ownership with insider trading restrictions in our compensation regressions. In the results reported in Table 5, we measure insider ownership in two ways: (i) a continuous insider ownership variable; (ii) a binary variable equal to one when insider ownership > 1%. The indicator variable accounts for the possibility that the incentive effects of insider ownership are non-linear [Morck, Shleifer and Vishny (1988), McConnell and Servaes (1990)].[22] The models are estimated with the full set of

[22] Our results are similar if we define the binary variable to equal one when insider ownership is greater than 10%. Similarly, we repeat the analysis using an adjusted insider ownership measure, defined as the difference between the firm's insider ownership and that of the median firm in that country. After this adjustment, country differences in insider ownership are eliminated and any results are entirely due to within-country variation in insider ownership and how it relates to the effect of insider trading restrictions on compensation. Our results are robust to this measure of adjusted insider ownership.

control variables from Table 2 as well as industry fixed effects. However, for conciseness, these coefficient estimates are not reported in the table.

The results in Models (1)-(4) of Table 5 indicate that insider ownership weakens the association between insider trading and total pay. In each model, the coefficient of the interaction term between insider trading restrictions and insider ownership is negative, and it is statistically significant at at least the 0.05 level. The results are even stronger in the incentive compensation regressions in Models (5)-(8). The coefficient on the interaction term is negative and highly significant in all regressions of the equity incentive pay ratio. Consistent with our expectations, therefore, these findings imply that high insider ownership and the managerial incentive it encompasses reduce the effect of insider trading restrictions on incentive pay.

6. Sensitivity and Robustness Tests

In this section, we report on the results of sensitivity and robustness tests that analyze (i) the extent to which our measures of insider trading restrictions are correlated with insider trading profits; and (ii) the extent to which our findings are robust to alternative sampling criteria. For purposes of brevity, some of these results are not reported in a separate table.

6.1. Do insider trading restrictions reduce insider trading profits?

An important assumption in our tests is that our measures of insider trading restrictions, *ITR* and *ITL*, are correlated with actual reductions in the benefits that accrue to insiders from trading in their own shares. Unfortunately, outside of the U.S. and U.K., we are unaware of any systematic data on insider transactions or the profitability of insider trading. As noted earlier, however, there are several pieces of indirect evidence that support the view that our measures of

insider trading are associated with lower insider trading profits. Specifically, prior studies by Bhattacharya and Daouk (2002), Beny (2005) and Bushman, Piotroski and Smith (2005) report that insider trading laws and their enforcement have a significant impact on the cost of equity, stock market liquidity, equity ownership and analyst following. These findings are consistent with the view that insider trading laws and their enforcement have a meaningful impact on informed insider trading.

To provide further evidence that our measures of insider trading restrictions are associated with diminished insider profits, we analyze the run-up in stock prices prior to acquisition announcements in each of our sample countries. Prior studies find that pre-acquisition announcement price run-ups are attributable to informed trading by insiders. For example, Meulbroek (1992) reports significantly positive abnormal returns of target firms' stocks on illegal insider trading days prior to takeover announcements and shows that these returns account for nearly half of the total price run-ups before takeover announcements. Arshadi and Eyssell (1991) also show a significantly positive association between net insider purchase volume and abnormal returns for target firms prior to tender offer announcements. Taken together, these findings imply that the size of the run-up prior to acquisition announcements is correlated with the extent of informed insider trading and, hence, insider profits.

Following this logic, therefore, we conduct similar tests in our sample countries by estimating regressions of the abnormal price run-up in the month prior to takeover announcements on our measures of insider trading restrictions, ITR and ITL, and a series of control variables. Specifically, we first download from *SDC Platinum* all completed tender offers announced between 1978 and 2011 that involve target firms in countries for which we have insider trading restriction data. We require the transaction value to be at least $10 million

and include only transactions in which 100% of the target firm's ownership is transferred. This process results in a sample of 3,007 takeover events in 31 different countries.

For each target firm and its local stock market index, we obtain daily stock return data from *Datastream*. We compute daily abnormal stock returns for each firm as the difference between the stock return of the target firm and the return of the local stock market index on the same day. Following prior literature (e.g., Jarrell and Poulsen, 1989; Keown and Pinkerton, 1981; Meulbroek, 1992), we define pre-takeover announcement price run-up as the ratio of the cumulative abnormal return during the 30 days ending one day prior to the takeover announcement date to the cumulative abnormal return from 30 days prior to announcement through one day following the announcement date.[23] The average run-up in the sample is 0.51, but exhibits substantial cross-sectional variation (standard deviation = 0.95).

Columns (1)-(4) of Table 6 report estimates from cross-sectional regressions of the pre-takeover announcement price run-up on our insider trading restriction measures and a set of other potential determinants of the run-up, including country characteristics (GDP per capita, stock market capitalization and the revised anti-director index), takeover deal characteristics (transaction value, payment method, hostility and the solicitation status), as well as industry and year fixed-effects. The first two columns report estimates from regressions using the entire sample and the ITR and ITL index, respectively, as a measure of insider trading restrictions. Consistent with insider trading restrictions curtailing actual insider trading, the results indicate a significant negative association between the price run-up and insider trading restrictions. In economic terms, a one unit increase in the ITR index corresponds to a decline in the one month

[23] Our results are not sensitive the length of the pre-announcement period. We obtain similar results with six-month, two-month, and one-week pre-announcement windows.

price run-up of about 9 percentage points, which approximately equals 20% of the average level of the run-up and 10% of its standard deviation.

To ensure that over-represented countries are not driving the results, we also exclude countries with 100 observations or more (Australia, Canada, U.K., and U.S.) and re-estimate the regression model from column (1). The results, presented in column (3), are highly consistent with the other models. Because the ITR index is measured in 1999, we conjecture that it should be most relevant to the price run-ups in years surrounding 1999. Therefore, in column (4), we restrict our sample to the 1996-2002 period and repeat the analysis. Consistent with our conjecture, the ITR index has an unambiguously greater and statistically significant coefficient than in all other columns. Finally, we examine the change in price run-ups around initial enforcement dates of insider trading laws and present the results in column (5). This supplementary analysis allows us to include country fixed-effects in addition to industry and year fixed effects, thereby controlling for country-specific components of price run-ups. Although the power of this test is weakened by the fact that over 90% of the sample years are after the enforcement dates, the insider trading enforcement dummy nonetheless has a negative coefficient (t-stat = -1.74), suggesting that pre-takeover announcement run-ups are significantly reduced following initial insider trading law enforcement.

Collectively, therefore, the evidence in Table 6 supports the view that our measures of insider trading restrictions capture meaningful reductions in actual insider trading.

6.2. Sub-sample analysis

We conduct a number of other robustness checks that, for purposes of brevity, are not reported in a separate table. First, we test whether our main findings differ between developed

and lesser developed countries. Consistent with the view that law enforcement is less effective in LDCs, we find that the association between insider trading restrictions (as measured by ITL) and executive compensation is virtually non-existent in LDCs.[24] Second, to rule out the possibility that a small set of countries drive the results, we exclude from the analysis those countries with more than 30 firms in the sample (Brazil, China, U.K., and U.S.). Our findings are robust to the exclusion of these firms. Third, because executive compensation might differ in regulated industries, we exclude both utilities (SIC codes 4900 to 4949) and financial firms (SIC codes 6000 to 6999). Again, our results are qualitatively unchanged. Fourth, we limit the sample to the set of CEOs only and continue to find a significant positive association between both *Equity Pay Ratio* and *Equity Incentives* and insider trading restrictions.

7. Summary and Conclusions

Insider trading has long been hypothesized to be a form of implicit compensation for top executives. At the same time, however, there is substantial cross-country variation in the restrictions placed on the ability of insiders to trade in their own shares. We exploit this variation in insider trading restrictions to investigate the link between insider trading and executive compensation.

Our results indicate that the level of top executive compensation is significantly higher and contains a greater fraction of equity incentives in countries with stronger insider trading restrictions. Moreover, total equity incentives are greater in countries with stronger insider trading restrictions. These findings are robust to the inclusion of possible country-level and firm-level omitted variables, to panel data specifications, to alternative definitions of insider trading restrictions/enforcement, and to alternative sampling criteria. We also find significant

[24] We follow Bhattacharya and Daouk (2002) to define developed and less developed countries.

increases in top executive pay and the fraction of pay comprised of equity-based incentives in the period immediately following the initial enforcement of insider trading laws.

We interpret these findings as providing strong support for the view that insider trading is an implicit form of compensation and that variation in restrictions on insider trading across countries explains a significant amount of the cross-country variation in both the level and the form of explicit executive pay. In this sense, our findings contribute to the debate on why executives in some countries (most notably the U.S.) receive much greater total compensation and a greater proportion of their pay in the form of equity-based incentives than in other countries. Although prior studies [e.g., Fernandes et al. (2009); Conyon and Schwalbach (1997)] hint at country-level institutional determinants of compensation structure, identification of the precise institutional channels for cross-country variation in pay practices has been elusive. Our findings identify insider trading restrictions as one (though certainly not the only) such channel.

Our findings also complement and extend the large literature on law and finance. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) conclude that laws related to investor protection and their enforcement have an important influence on the distribution of ownership structures across countries. Our findings highlight another important influence of law on finance. In competitive labor markets, laws restricting insider trading affect both the equilibrium level and the structure of top executive compensation. One caveat, however, is that our results do not address the efficiency of such laws, nor do we attempt to explain why some countries impose more stringent restrictions on insider trading than do others. These issues await further study.

References

Aboody, David, and Baruch Lev, 2000, Information Asymmetry, R&D and Insider Gains, *Journal of Finance* 55, 2747-2766.

Abowd, John M., and Michael L. Bognanno, 1995, International Differences in Executive and Managerial Compensation, in R. Freeman, and L. Katz, ed., *Differences and Changes in Wage Structures*, Chicago: The University of Chicago Press, 67-103.

Abowd, John M., and David S. Kaplan, 1999, Executive Compensation: Six Questions That Need Answering, *Journal of Economic Perspectives* 13, 145-168.

Arshadi, Nasser, and Thomas H. Eyssell, 1991, Regulatory deterrence and registered insider trading: The case of tender offers, *Financial Management* 20, 30-39.

Bagnoli, Mark, and Naveen Khanna, 1992, Insider Trading in Financial Signaling Models, *Journal of Finance* 47(5), 1905-1934.

Baiman, Stanley, and Robert E. Verrecchia, 1996, The relation among capital markets, financial disclosure, production efficiency, and insider trading, *Journal of Accounting Research* 34, 1-22.

Baker, George P., Michael C. Jensen, and Kevin J. Murphy, 1988, Compensation and Incentives: Practice vs. Theory, *Journal of Finance* 43 (3), Papers and Proceedings of the Forty-Seventh Annual Meeting of the American Finance Association, July 1988, 593-616.

Bekaert, Geert, Harvey, Campbell R., and Lundblad, Christian T., 2001, Emerging Equity Markets And Economic Development, *Journal of Development Economics* 66(2), 465-504.

Bebchuk, Lucian A., and Chaim Fershtman, 1994, Insider trading and the managerial choice among risky projects, *Journal of Financial and Quantitative Analysis* 29(1), 1-14.

Beny, Laura Nyantung, 2004, A comparative empirical investigation of agency and market theories of insider trading, working paper, University of Michigan.

Beny, Laura Nyantung, 2005, Do insider trading laws matter? Some preliminary comparative evidence, *American Law and Economics Review* 7(1), 144-183.

Beny, Laura Nyantung, 2006, Do Investors Value Insider Trading Laws? International Evidence, working paper, University of Michigan.

Bettis, J. C., J. L. Coles, and M. L. Lemmon, Corporate policies restricting trading by insiders, *Journal of Financial Economics* 57(2), 191-220.

Bhattacharya, Utpal, and Hazem Daouk, 2002, The world price of insider trading, *Journal of Finance* 57 (1), 75-108.

Bizjak, John M., Michael L. Lemmon, and Lalitha Naveen, 2008, Does the Use of Peer Groups Contribute to Higher Pay and Less Efficient Compensation, *Journal of Financial Economics* 90(2), 152-168.

Bryan, Stephen H., Robert C. Nash, and Ajay Patel, 2006, The Structure of Executive Compensation: International Evidence from 1996-2004, http://ssrn.com/abstract=891207.

Bushman, Robert M., Joseph D. Piotroski, and Abbie Smith, 2005, Insider trading restrictions and analysts' incentives to follow firms, *Journal of Finance* 60(1), 35-66.

Carlton, Dennis W., and Daniel R. Fischel, 1983, The regulation of insider trading, *Stanford Law Review* 35, 857-895.

Chhaochharia, Vidhi, and Yaniv Grinstein, 2009, CEO compensation and board structure, *Journal of Finance* 64(1), 231-261.

Conyon, Martin J., and Joachim Schwalbach (1997), European Differences in Executive Pay and Corporate Governance, working paper, Warwick Business School.

Core, John, and Wayne Guay, 2002, Estimating the value of employee stock option portfolios and their sensitivities to price and volatility, *Journal of Accounting Research* 40, 613-630.

Damodaran, Aswath, and Crocker H. Liu, 1993, Insider trading as a signal of private information, *Review of Financial Studies* 6, 79-119.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2008, The Law and Economics of Self-Dealing, *Journal of Financial Economics* 88, 430-465.

Du, Julan, and Shang-Jin Wei, 2004, Does insider trading raise market volatility, *Economic Journal* 114, 916-942.

Fama, Eugene F., 1980, Agency problems and the theory of the firm, *Journal of Political Economy* 88(2), 288-307.

Fernandes, Nuno, Miguel A. Ferreira, Pedro Matos, and Kevin J. Murphy, 2009, The pay divide: (Why) are U.S. top executives paid more?, EFA 2009 Bergen Meetings Paper.

Fernandes, Nuno, Miguel A. Ferreira, Pedro Matos, and Kevin J. Murphy, 2010, The pay divide: (Why) are U.S. top executives paid more? (December 17, 2010), EFA 2009 Bergen Meetings Paper; AFA 2011 Denver Meetings Paper; ECGI - Finance Working Paper No. 255/2009. Available at SSRN: http://ssrn.com/abstract=1341639.

Fidrmuc, Jana P., Marc Goergen, and Luc Renneboog, 2006, Insider trading, news releases, and ownership concentration, *Journal of Finance* 61(6), 2931-2973.

Kyle, Albert, 1985, Continuous auctions and insider trading, *Econometrica* 53, 1315-1335.

La Porta, Rafael, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2006, What Works in Securities Laws?, *Journal of Finance* 61, 1-32.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny, 1998, Law and finance, *Journal of Political Economy* 106(6), 1113-1155.

Levmore, Saul, 1982, Securities and secrets: Insider trading and the law of contracts, *Virginia Law Review* 68 (1), 117-160.

Manne, Henry G., 1966, *Insider Trading and the Stock Market*, New York: Free Press.

Meulbroek, Lisa, 1992, An empirical analysis of illegal insider trading, *Journal of Finance* 47(5), 1661-1698.

Morck, Randall, Andrei Shleifer and Robert Vishny, 1988, Management Ownership and Market Valuation: An Empirical Analysis, *Journal of Financial Economics* 20, 293-316.

McConnell, John J., and Henri Servaes, 1990, Additional evidence on equity ownership and corporate value, *Journal of Financial Economics* 27, 595-612.

Murphy, Kevin J., 1999, Executive compensation, unpublished manuscript, University of Southern California.

Ofek, Eli, and David Yermack, 2000, Taking stock: Equity-based compensation and the evolution of managerial ownership, *Journal of Finance* 55(3), 1367-1384.

Ortiz-Molina, Hernan, 2007, Executive Compensation and Capital Structure: The Effects of Convertible Debt and Straight Debt on CEO Pay, *Journal of Accounting & Economics* 43(1), 69-93.

Pagano, Marco, Ailsa Roell, and Josef Zechner, 2002, The geography of equity listing: Why do companies list abroad? *Journal of Finance* 57(6), 2651-2694.

Perry, Tod, and Marc Zenner, 2001, Pay for performance? Government regulation and the structure of compensation contracts, *Journal of Financial Economics* 62(3), 453-488.

Roulstone, Darren T., 2003, The relation between insider-trading restrictions and executive compensation, *Journal of Accounting Research* 41(3), 525-551.

Schotland, Roy A., 1967, Unsafe at any price: A reply to Manne, Insider Trading and the Stock Market, *Virginia Law Review* 53, 1425-1478.

Seyhun, Nejat H., 1986, Insiders' Profits, Costs of Trading, and Market Efficiency, *Journal of Financial Economics* 16, 189-212.

Trapani, T., 1990, The relationship between CEO compensation and CEO trading profits, Ph.D. dissertation, The University of Kansas.

Yermack, David, 1995, Do corporations award CEO stock options effectively?, *Journal of Financial Economics* 39, 237-269.

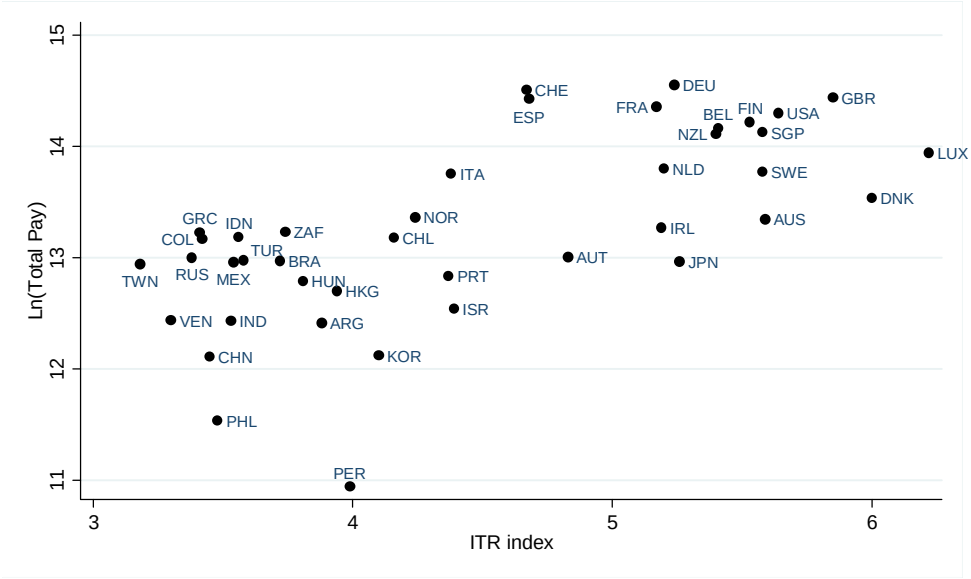
World Economic Forum and Harvard University, 1996, 1998, 1999, Global Competitiveness Report, Geneva: World Economic Forum.

Towers Perrin, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001-2002, Worldwide Total Remuneration.

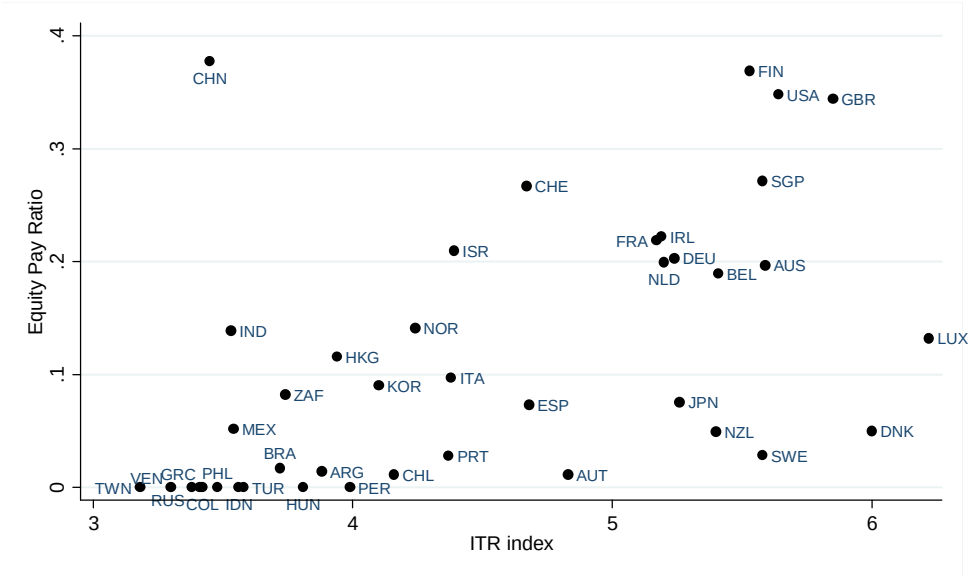
Figure 1: Insider Trading Restriction index and Executive Compensation, 2006

Scatter plots of country-level executive compensation variables against the Insider Trading Restriction (ITR) index are shown for the year of 2006. The country-level compensation variables are constructed from the equal-weighted averages of all firms for each country. Figure 1A corresponds to total pay in logarithms, Figure 1B corresponds to the equity pay ratio, and Figure 1C corresponds to equity incentives in logarithm.

A. Ln(Total Pay)



B. Equity Pay Ratio



C. Ln(Equity Incentives)

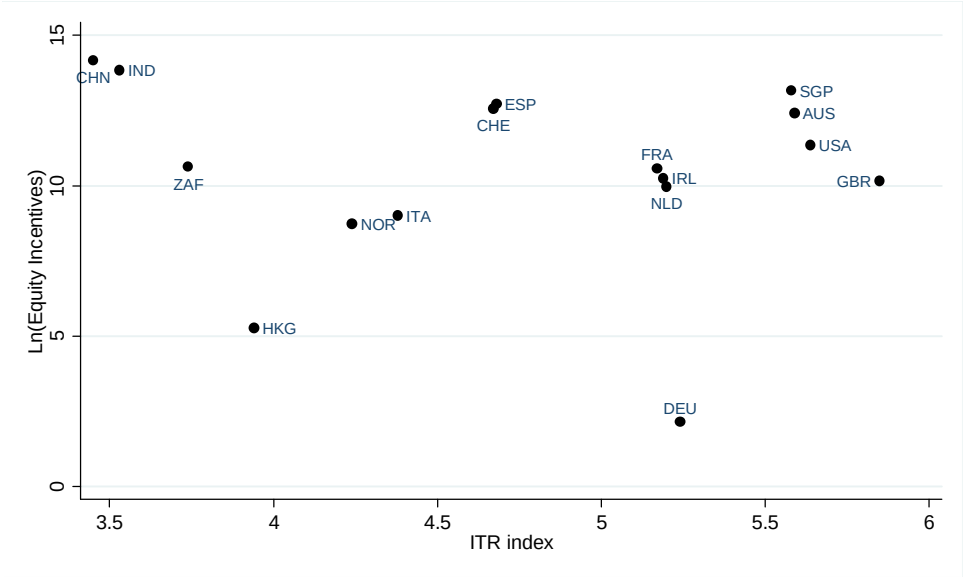


Table 1
Summary Statistics

Panel A reports the sample distribution and the insider trading variables by country. A firm is regarded as following U.S. style reporting if it reports some compensation data at the executive level. Panel B presents variable summary statistics, separately for ADR firms and U.S. firms. Variable definitions are in Appendix A.

Panel A: Sample description by country

Country	World Bank Code	# firms	# firms with U.S. style reporting	ITR index 99	ITL index	IT laws existence	IT laws enforcement
Argentina	ARG	14	0	3.88	2	1991	1995
Australia	AUS	18	18	5.59	3	1991	1996
Austria	AUT	1	0	4.83	2	1993	Never
Belgium	BEL	1	1	5.41	3	1990	1994
Brazil	BRA	32	0	3.72	2	1976	1978
Chile	CHL	15	2	4.16	-	1981	1996
China	CHN	63	10	3.45	-	1993	Never
Colombia	COL	1	0	3.42	-	1990	Never
Denmark	DNK	4	2	6	3	1991	1996
Finland	FIN	3	3	5.53	3	1989	1993
France	FRA	25	24	5.17	3	1967	1975
Germany	DEU	20	20	5.24	3	1994	1995
Greece	GRC	4	0	3.41	2	1988	1996
Hong Kong SAR	HKG	17	6	3.94	2	1991	1994
Hungary	HUN	1	0	3.81	-	1994	1995
India	IND	14	13	3.53	2	1992	1998
Indonesia	IDN	2	0	3.56	2	1991	1996
Ireland	IRL	10	7	5.19	3	1990	Never
Israel	ISR	8	1	4.39	2	1981	1989
Italy	ITA	11	7	4.38	3	1991	1996
Japan	JPN	26	0	5.26	2	1988	1990
Luxembourg	LUX	6	2	6.22	3	1991	Never
Mexico	MEX	21	0	3.54	1	1975	Never
Netherlands	NLD	19	18	5.2	3	1989	1994
New Zealand	NZL	2	1	5.4	2	1988	Never
Norway	NOR	6	5	4.24	1	1985	1990
Peru	PER	2	0	3.99	-	1991	1994
Philippines	PHL	2	0	3.48	2	1982	Never
Portugal	PRT	2	1	4.37	3	1986	Never
Russia	RUS	5	0	3.38	-	1996	Never
Singapore	SGP	2	2	5.58	3	1973	1978
South Africa	ZAF	8	7	3.74	2	1989	Never
South Korea	KOR	15	0	4.1	3	1976	1988
Spain	ESP	8	3	4.68	2	1994	1998
Sweden	SWE	8	6	5.58	3	1971	1990
Switzerland	CHE	11	7	4.67	3	1988	1995
Taiwan	TWN	8	2	3.18	3	1988	1989
Turkey	TUR	1	0	3.58	-	1981	1996
United Kingdom	GBR	51	49	5.85	3	1980	1981
United States	USA	1,852	1,852	5.64	3	1934	1961
Venezuela	VEN	1	0	3.3	-	1998	Never
Total		2,320	2,069				
Average				4.48	2.5	1986	1991
Standard deviation				0.91	0.6	10.91	8.42
Correlation with ITR				1	0.583	-0.254	-0.327
(P-value)					(0.001)	(0.110)	(0.037)

Panel B. Variable Summary Statistics

	ADRs				U.S. firms			
Variable	# obs	Mean	Median	Stdev	# obs	Mean	Median	Stdev
Executive Compensation Variables:								
Ln(Total Pay)	464	13.3	13.2	1.4	1,852	14.3	14.3	0.9
Indicator that total pay includes directors	468	0.45	0.00	0.50	1,852	0.00	0.00	0.00
Equity Pay Ratio	468	0.17	0.00	0.25	1,852	0.35	0.37	0.22
Ln(Equity Incentives)	127	10.7	10.8	3.5	1,566	11.4	11.5	2.4
Control variables:								
Firm control variables:								
Ln(Asset)	461	8.38	8.40	2.42	1,852	7.67	7.54	1.76
M/B	461	1.67	1.22	1.56	1,636	2.03	1.63	1.29
D/A	461	0.22	0.21	0.17	1,652	0.22	0.19	0.22
ROA	428	0.10	0.11	0.14	1,488	0.12	0.12	0.15
Stock return	353	0.14	0.14	0.32	1,488	0.18	0.16	0.27
Board size	466	10.69	10.00	4.12	1,323	9.47	9.00	2.38
Board independence	450	0.58	0.60	0.24	1,323	0.72	0.73	0.14
R&D-to-asset	461	0.028	0.000	0.069	1,852	0.024	0.000	0.061
Insider ownership	304	16.32	2.05	23.10	1,852	2.83	0.03	8.25
Country control variables:								
Ln(GDP per capita)	468	9.8	10.3	0.7	1,852	10.6	10.6	0.0
Stock Market Cap/GDP	468	1.18	0.91	0.88	1,852	1.48	1.48	0.00
Anti-director index	468	3.6	4.0	1.4	1,852	3.0	3.0	0.0

Table 2

Regression Analysis of the Relation between Insider Trading Restriction and Executive Compensation

This table presents results from OLS regressions of Ln(Total Pay) and Tobit regressions of Equity Pay Ratio and Ln(Equity Incentives) on insider trading restrictions measures and control variables. The regressions in columns 1, 2, 5 and 6 are conducted at the firm level for the full sample of ADR firms with U.S. firms. Columns 3, 4, 7-10 present regression results at the executive level for the subsample of firms with U.S. style reporting. All variable definitions can be found in Appendix A. Industry fixed effects are at the 2-digit SIC level. T-statistics based on standard errors clustered by country and robust to heteroskedasticity are reported in the parentheses below the estimated coefficients. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent Variable:	Ln(Total Pay)				Equity Pay Ratio				Ln(Equity Incentives)	
Sample	Firm level		Executive level, US style reporting		Firm level		Executive level, US style reporting		Executive level, US style reporting	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Insider Trading Restrictions Measure:										
ITR index	0.385***		0.208		0.218***		0.259***		2.203*	
	(4.00)		(0.77)		(5.91)		(3.27)		(1.85)	
ITL index		0.303*		0.353		0.164***		0.322***		1.208*
		(1.89)		(0.91)		(3.38)		(2.82)		(1.78)
Other incentives:										
Ln(Equity incentives)			0.069***	0.070***			-0.002	-0.001		
			(6.65)	(6.48)			(-0.94)	(-0.34)		
Firm Controls:										
Ln(Asset)	0.339***	0.362***	0.404***	0.403***	0.047***	0.048***	0.068***	0.067***	0.567***	0.570***
	(4.22)	(5.25)	(14.79)	(14.51)	(5.25)	(5.54)	(6.28)	(5.87)	(4.80)	(4.92)
M/B	0.071**	0.083*	-0.081	-0.082	0.034***	0.031***	0.045***	0.044***	0.326***	0.339***
	(2.03)	(1.77)	(-0.64)	(-0.65)	(3.44)	(2.77)	(8.09)	(8.77)	(2.92)	(3.13)
D/A	0.175	0.156	-0.226**	-0.224**	0.067*	0.043	-0.020	-0.017	-0.750***	-0.758***
	(1.24)	(1.13)	(-2.54)	(-2.49)	(1.74)	(1.53)	(-1.04)	(-0.76)	(-3.25)	(-3.36)
ROA	-0.324	-0.426	0.748*	0.772*	-0.121	-0.096	-0.140**	-0.128**	0.917	0.886
	(-1.17)	(-1.51)	(1.77)	(1.80)	(-1.37)	(-1.25)	(-2.44)	(-2.34)	(1.07)	(1.06)
Stock return	-0.119	-0.125	0.208***	0.216***	-0.050*	-0.022	-0.078***	-0.072***	0.325**	0.327**
	(-0.75)	(-0.64)	(4.49)	(5.20)	(-1.67)	(-0.69)	(-3.62)	(-4.03)	(2.23)	(2.24)
Board size	0.006	0.004	-0.011	-0.012	-0.004	-0.005	0.008***	0.008***	0.024	0.017
	(0.44)	(0.30)	(-0.43)	(-0.43)	(-1.30)	(-1.56)	(3.31)	(3.07)	(1.49)	(1.00)
Board independence	0.566**	0.294	0.488**	0.489**	0.117*	0.150***	0.247***	0.244***	-0.317	-0.247
	(2.12)	(1.38)	(2.38)	(2.28)	(1.95)	(3.80)	(8.03)	(8.36)	(-0.65)	(-0.40)
R&D-to-asset	1.461***	1.456**	1.103**	1.091**	0.595***	0.543***	0.313**	0.298*	2.559***	2.272***
	(2.79)	(2.60)	(2.55)	(2.58)	(3.63)	(2.97)	(2.24)	(1.94)	(2.82)	(2.72)
Country Controls:										
Ln(GDP per capita)	0.349**	0.453***	0.761**	0.815***	-0.056	0.202**	0.014	0.130	-3.626**	-1.774***
	(2.07)	(3.14)	(2.35)	(3.65)	(-0.96)	(2.09)	(0.14)	(1.48)	(-2.48)	(-3.43)
Stock Market Cap/GDP	0.080	0.101	0.040	0.026	0.105***	0.059*	0.192***	0.164***	0.584	0.207
	(1.13)	(1.18)	(0.24)	(0.17)	(4.31)	(1.90)	(3.64)	(2.64)	(0.60)	(0.22)

Anti-director index	-0.015	-0.084	0.049	0.073	-0.074***	-0.008	-0.079**	-0.045	-1.348***	-0.912***
	(-0.19)	(-1.01)	(0.64)	(1.20)	(-3.69)	(-0.32)	(-2.51)	(-1.45)	(-3.15)	(-2.90)
Indicator that total pay includes directors	-0.992***	-0.960***								
	(-9.22)	(-7.61)								
Executive Controls:										
CEO indicator			0.784***	0.785***			0.080***	0.078***	1.631***	1.612***
			(24.14)	(24.55)			(17.86)	(14.99)	(33.96)	(26.39)
Executive age			0.004***	0.003***			-0.003***	-0.003***	0.061***	0.061***
			(3.44)	(3.26)			(-7.04)	(-7.12)	(7.01)	(6.46)
Constant	5.534***	5.865***	0.717	0.025	0.229***	0.224***	0.280***	0.280***	2.046***	2.059***
	(3.49)	(3.87)	(0.32)	(0.02)	(9.96)	(11.93)	(136.90)	(121.97)	(18.02)	(16.39)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of country clusters	40	33	16	15	40	33	16	15	16	15
Number of observations	1,165	1,118	1,693	1,688	1,166	1,119	1,693	1,688	1,715	1,710
Adj./Pseudo R^2	0.586	0.572	0.577	0.571	0.639	0.652	0.337	0.329	0.096	0.093

Table 3

Panel Data Regressions of Executive Compensation on Insider Trading Restriction, 1996-1999

This table presents results from regressions of the survey-based Incentive Pay Measure (IPM) on the Insider Trading Restriction Index and control variables. For the change specification, the dependent variable is the year-on-year change of IPM and the independent variables are the year-on-year changes of their level counterparts. All variable definitions can be found in Appendix A. T-statistics based on standard errors clustered by country and robust to heteroskedasticity are reported in the parentheses below the estimated coefficients. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	Level Specification		Change Specification	
	(1)	(2)	(3)	(4)
ITR	0.474***	0.380**	0.229**	0.256**
	(6.38)	(2.19)	(2.67)	(2.16)
Ln(GDP per capita)		-0.915		-0.498
		(-0.62)		(-0.42)
Stock Market Cap/GDP		-0.008		-0.039
		(-0.06)		(-0.35)
Constant	2.114***	10.370	0.423***	0.459***
	(6.65)	(0.80)	(10.09)	(8.35)
Fixed Effects	No	Country, Year	No	Year
Number of country clusters	59	56	53	50
Number of observations	161	154	102	98
Adj. R^2	0.324	0.794	0.049	0.016

Table 4
Relation between Insider Trading Laws and Executive Compensation

This table presents variable summary statistics (Panel A) and results from regressions of the logarithmic Total Pay and the Equity Pay Ratio on *IT Enforce* and control variables (Panel B). *IT Enforce* is an indicator for the year of and years following the initial enforcement of insider trading laws. In columns 1 and 4, all variables are raw variables. In columns 2 and 5, all variables are country-adjusted and in columns 3 and 6, all variables are country-adjusted and de-trended. A country-adjusted variable is the raw variable adjusted by its country average. A de-trended variable is the raw variable adjusted by its year average. Year indicators are included in models 1, 2, 4 and 5. T-statistics based on standard errors clustered by country and robust to heteroskedasticity are reported in the parentheses below the estimated coefficients. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Panel A. Variable Summary Statistics

Variable (Raw)	Mean	Median	Stdev	Mean	Median	Stdev	Diff. in Means	P-value
	IT Enforce=0 (N=43)			*IT Enforce=1 (N=139)*				
Ln(Total Pay)	12.24	12.31	0.49	12.61	12.66	0.40	0.37	<0.001
Equity Pay Ratio	0.030	0.000	0.055	0.114	0.115	0.107	0.084	<0.001
Ln(GDP per capita)	8.81	8.61	0.77	9.79	9.96	0.62	0.98	<0.001
Stock Market Cap/GDP	0.53	0.34	0.52	1.03	0.88	0.72	0.50	<0.001

Panel B. Regressions

Dependent	Ln(Total Pay)			Equity Pay Ratio		
	Raw	Country-adjusted	De-trended, Country-adjusted	Raw	Country-adjusted	De-trended, Country-adjusted
	(1)	(2)	(3)	(4)	(5)	(6)
IT Enforce	0.058	0.136**	0.145**	0.068***	0.012**	0.012**
	(0.25)	(2.38)	(2.65)	(3.74)	(2.51)	(2.42)
Equity Pay Ratio	2.403***	0.715*	0.780*			
	(4.75)	(1.79)	(1.85)			
Ln(GDP per capita)	0.169	-0.295	-0.245	-0.006	-0.098**	-0.095**
	(1.42)	(-0.90)	(-0.74)	(-0.31)	(-2.12)	(-2.24)
Stock Market Cap/GDP	-0.045	0.025	0.041	0.031	-0.014	-0.014
	(-0.67)	(0.28)	(0.50)	(1.60)	(-0.85)	(-0.88)
Constant	10.786***	-0.109	-0.116**	0.052	-0.055***	-0.011**
	(9.95)	(-1.57)	(-2.24)	(0.29)	(-5.68)	(-2.47)
Year Fixed Effects	Yes	Yes	No	Yes	Yes	No
Number of observations	181	181	181	181	181	181
Adj. R^2	0.368	0.153	0.102	0.294	0.557	0.025

Table 5

Insider Ownership and the Association between Insider Trading Restriction and Executive Compensation

This table presents results of regressions of Ln(Total pay) (columns 1-4) and Equity Pay Ratio (columns 5-8) on insider trading restrictions, insider ownership, and their interaction, as well as the same set of firm and country control variables as in Table 2 except equity incentives (the coefficients of the control variables are omitted for brevity). The OLS model is used in the total pay regressions and the Tobit model is used in the equity pay ratio regressions. The regressions are run for the full sample of ADR firms with U.S. firms. All variable definitions can be found in Appendix A. 2-digit SIC industry fixed effects are included in all regressions. T-statistics based on robust standard errors clustered by country and robust to heteroskedasticity are reported in the parentheses below the estimated coefficients. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent Variable:	Ln(Total Pay)				Equity Pay Ratio			
InsOwn =	Insider ownership	Indicator: insider ownership ≥1%	Insider ownership	Indicator: insider ownership ≥1%	Insider ownership	Indicator: insider ownership ≥1%	Insider ownership	Indicator: insider ownership ≥1%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
InsOwn*ITR	-0.009***	-0.454***			-0.004***	-0.183***		
	(-3.11)	(-2.87)			(-5.05)	(-5.74)		
ITR	0.432***	0.652***			0.222***	0.315***		
	(4.67)	(4.61)			(5.72)	(7.91)		
InsOwn*ITL			-0.010**	-0.651***			-0.005***	-0.309***
			(-2.65)	(-3.42)			(-3.22)	(-6.15)
ITL			0.573**	0.800***			0.212***	0.332***
			(2.69)	(3.46)			(3.83)	(6.58)
InsOwn	0.045***	2.578***	0.023**	1.940***	0.018***	1.001***	0.011**	0.891***
	(2.95)	(2.90)	(2.41)	(3.26)	(4.28)	(5.54)	(2.49)	(5.84)
Firm and country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters	38	38	31	31	38	38	31	31
Number of observations	1,050	1,050	1,016	1,016	1,052	1,052	1,018	1,018
Adj./Pseudo R^2	0.630	0.636	0.616	0.618	0.727	0.724	0.754	0.751

Table 6

Target Firm Stock Price Run-ups before Takeover Announcements

The dependent variable is "one month price run-up", defined as the ratio of the cumulative abnormal stock return of the target firm in the 1 month prior to the takeover announcement and the cumulative abnormal stock return from 1 month prior to announcement through 1 day after the announcement. Abnormal stock return is defined as the difference in the stock return of a target firm and the return of its local stock market index during the same day. *IT Enforce* is an indicator for the year of and years following the initial enforcement of insider trading laws. Column 3 excludes countries with more than 100 observations in the sample. The country control variables in regressions 1-4 come from Djankov et al. (2008) while GDP per capita in regression 5 comes from World Bank and is measured yearly. All other variable definitions can be found in Appendix A. All regressions include year fixed-effects and industry fixed-effects at the 2-digit SIC level except in column 3, which includes industry fixed effects at the 1-digit SIC level. T-statistics based on robust standard errors clustered by country and robust to heteroskedasticity are reported in the parentheses below the estimated coefficients. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	All Country-years (1)	All Country-years (2)	Excl. Over-represented, All Years (3)	Years 1996 to 2002 (4)	All Country-years (5)
ITR index	-0.093**		-0.126**	-0.246***	
	(-2.22)		(-2.21)	(-3.66)	
ITL index		-0.102**			
		(-2.75)			
IT Enforce					-0.180*
					(-1.74)
Ln(GDP per capita)	0.111	-0.007	0.060	0.443**	0.145
	(1.17)	(-0.06)	(0.49)	(2.62)	(0.13)
Stock Market Cap/GDP	-0.035	-0.022	-0.048**	-0.015	
	(-1.35)	(-0.79)	(-2.35)	(-0.42)	
Anti-director index	0.052**	0.022	0.007	0.134***	
	(2.69)	(1.07)	(0.17)	(4.30)	
Ln(Deal value)	0.018**	0.018*	0.017	0.016	0.020**
	(2.07)	(2.01)	(0.69)	(0.90)	(2.43)
Stock bid	0.053***	0.054***	-0.021	0.090	0.049**
	(2.84)	(2.91)	(-0.22)	(1.54)	(2.66)
Hostile	-0.185***	-0.185***	0.232	-0.085	-0.204***
	(-5.32)	(-5.31)	(0.88)	(-1.03)	(-6.67)
Unsolicited	0.103**	0.106**	-0.381*	0.013	0.110**
	(2.20)	(2.29)	(-1.85)	(0.15)	(2.42)
Fixed Effects	Industry, Year	Industry, Year	Industry, Year	Industry, Year	Industry, Country, Year
Number of country clusters	31	28	27	25	31
Number of observations	3,007	3,003	382	1,396	3,007
R^2	0.033	0.033	0.085	0.051	0.039

Appendix A: Variable definitions

Executive compensation variables

Total Pay = salary + bonus + other annual (including perquisites and severance pay) + other compensation (primarily pension) + restricted stock awards (value at time of award) + option grants (Black-Scholes value at time of grant). Total Pay is in U.S. Dollars. Ln(Total Pay) is the natural logarithm of Total Pay.

Equity Pay Ratio = (restricted stock awards + option grants) / Total Pay

Equity Incentives is the change in the value of executive share ownership as reported when the stock price changes by 1%. The reported share ownership is based on fully diluted shares, i.e., assuming all options outstanding are exercised.

Note: For most analyses in the paper, firm-level pay variables are used. To construct the firm-level pay variables, we follow the algorithm detailed below:

When data is available at the executive level, a firm-level compensation variable is the equally-weighted average of the executive-level variable for the top five highest-paid executives or all executives with available compensation data (if there are fewer than five executives with available data).

When only firm-level aggregate data is available, firm-level compensation variables are derived from the aggregate data. Firm-level Total Pay is the firm aggregate compensation, divided by the number of executives (and directors) included in the aggregate compensation figure. Firm-level Equity Pay Ratio is the ratio of aggregate stock and option awards to total pay.

Insider trading restriction variables

ITR Index is the Insider Trading Restriction Index obtained from the 1996, 1998 and 1999 Global Competitiveness Report based on the following question: "Insider trading is not common in the domestic market (1=strongly disagree, 7=strongly agree)".

ITL Index is drawn from Beny (2004, 2006) and is the sum of three binary variables summarizing insider trading laws in place in 36 countries as of 1994, namely, Tippee, Tipping, and Criminal. Tippee equals 1 if tippees (i.e., a corporate outsider receiving inside information from an insider) are subject to insider trading regulation and 0 otherwise. Tipping equals 1 if an insider can be held liable for tipping outsiders and 0 otherwise. Criminal is 1 if violation of the insider trading law is a criminal offense and 0 otherwise.

Control variables

Ln(Asset) is the logarithm of the total book value of assets. Asset is in millions of US Dollars.

M/B is the ratio of the market value of assets (market value of equity plus book value of debt) over the book value of assets.

D/A is the ratio of the book value of debt (long-term debt plus debt in short-term liabilities) over the book value of assets.

ROA is the ratio of operating income before depreciation and amortization over the book value of assets, lagged by one year.

Stock return is the annual stock return including dividends, lagged by one year.

Board size is the number of board of directors. Source: 20-F reports.

Board independence is the fraction of independent directors on the board. Both board size and board independence variables are collected from the 20-F filings. Following the Riskmetrics' (formerly IRRC's) definition, an independent director is someone who is not an officer or a former officer, who does not provide (or does not work for an employer that provides) professional services to the company, and who is not a major customer, or family member of a director or executive. Source: 20-F reports.

Insider ownership is the total share ownership by all officers and directors, including both their direct ownership in the firm and indirect ownership through their close relatives or another company as revealed in the 20-F filing.

Indicator that total pay includes directors: A dummy variable that is 0 if firm aggregate pay only includes executive officers (regardless of whether she is on the board), and is 1 if it includes both executive officers and non-executive directors.

CEO is a dummy variable that is 1 if the executive is the Chief Executive Officer.

Age is the age of the executive.

Ln(GDP per capita) is the Logarithmic of per capita Gross Domestic Product (in U.S. dollars). Source: World Development Indicators by the World Bank

Stock Market Cap/GDP is the Average of the ratio of stock market capitalization to gross domestic product. Source: World Development Indicators by the World Bank.

Anti-director Index is the Revised Anti-director Index from Djankov, La Porta, and Lopez-de-Silanes (2008). Available for 72 countries, this index is constructed based on laws and regulations applicable to publicly traded firms in May 2003, and summarizes the protection of minority shareholders in the corporate decision-making process.

Additional variables used in panel datasets

Incentive Pay Measure (IPM) is the mean score of the responses to the following survey questions in the Global Competitiveness Reports. "Non-wage incentives (such as profit sharing and stock purchase plans) are used effectively to motivate employees (1=strongly disagree, 6=strongly agree)" (1996). "Compensation policies link pay closely with job performance (1=strongly disagree, 7=strongly agree)" (1998 and 1999).

Total Pay is Total Remuneration for CEO in U.S. Dollars, converted to 1982-1984 real terms. Source: Worldwide Total Remuneration reports by Towers Perrin.

Equity Pay Ratio is the fraction of Long-term Incentives in Total Remuneration. Long-term Incentives capture the annual expected value of stock options, stock grants and other long-term incentive awards. Source: Worldwide Total Remuneration reports by Towers Perrin.

IT Enforce is an indicator for the year of and years following the initial enforcement of insider trading laws. Source: Bhattacharya and Daouk (2002).

Variables used in takeover price run-up tests

Ln(Deal value) is the natural logarithm of the transaction value of the takeover in $mil.

Stock bid is an indicator that is 1 if the method of payment of the takeover contains stock and 0 otherwise.

Hostile is an indicator that is 1 if the takeover is identified as "Hostile" in SDC.

Unsolicited is an indicator that is 1 if the bid is identified as "Unsolicited" by managers in SDC.

Appendix B: ITR indexes in 1996-1999

Country	ITR index 96	ITR index 98	ITR index 99
Argentina	3.21	4.05	3.88
Australia	5.04	5.27	5.59
Austria	4.5	4.8	4.83
Belgium	4.36	5	5.41
Bolivia	.	.	3.86
Brazil	3.14	3.8	3.72
Bulgaria	.	.	3.47
Canada	4.45	5.03	5.55
Chile	4.56	4.56	4.16
China	3.47	3.31	3.45
Colombia	3.36	3.97	3.42
Costa Rica	.	.	3.87
Czech Republic	2.9	2.86	2.9
Denmark	5.27	5.79	6
Ecuador	.	.	3.5
Egypt	3.42	3.81	3.77
El Salvador	.	.	3.7
Finland	4.58	5.26	5.53
France	3.87	4.69	5.17
Germany	4.35	5.8	5.24
Greece	3.46	3.5	3.41
Hong Kong	4.17	4.32	3.94
Hungary	3.36	4.04	3.81
Iceland	3.89	4.53	4
India	2.49	3.42	3.53
Indonesia	2.82	3.33	3.56
Ireland	4.4	5.58	5.19
Israel	3.48	4.08	4.39
Italy	2.92	3.88	4.38
Japan	4.85	5.05	5.26
Jordan	3.37	3.58	3.78
South Korea	3.81	3.73	4.1
Luxembourg	5.5	5.5	6.22
Malaysia	3.69	3.65	3.42
Mauritius	.	.	3.68
Mexico	3.14	3.49	3.54
Netherlands	4.63	4.62	5.2
New Zealand	5.3	5.52	5.4
Norway	4.08	4.67	4.24

Peru	3.61	3.79	3.99
Philippines	2.79	3.32	3.48
Poland	3.46	4.48	3.88
Portugal	3.71	4.52	4.37
Russia	2.35	3.36	3.38
Singapore	5.1	5.54	5.58
Slovakia	.	3.25	3.47
South Africa	3.76	3.87	3.74
Spain	3.64	4.42	4.68
Sweden	4.35	5.48	5.58
Switzerland	4.8	5.3	4.67
Taiwan	3.1	3.42	3.18
Thailand	4.24	3.25	3.29
Turkey	3	4.26	3.58
Ukraine	.	3.9	4.56
United Kingdom	4.47	5.64	5.85
United States	4.63	5.13	5.64
Venezuela	2.81	3.04	3.3
Vietnam	.	5.92	6.77
Zimbabwe	.	3.93	3.8

Appendix C: Sample Distribution by Country for the Insider Trading Law Enforcement Test

Country	# years	First year of data	Last year of data
Argentina	8	1994	2001
Australia	8	1994	2001
Belgium	8	1994	2001
Brazil	8	1994	2001
Canada	8	1994	2001
China	2	2000	2001
France	8	1994	2001
Germany	8	1994	2001
Hong Kong	8	1994	2001
Italy	8	1994	2001
Japan	8	1994	2001
Malaysia	5	1997	2001
Mexico	8	1994	2001
Netherlands	8	1994	2001
New Zealand	7	1995	2001
Singapore	8	1994	2001
South Africa	7	1995	2001
South Korea	7	1995	2001
Spain	8	1994	2001
Sweden	8	1994	2001
Switzerland	8	1994	2001
Taiwan	2	2000	2001
United Kingdom	8	1994	2001
United States	8	1994	2001
Venezuela	8	1994	2001
Total	182		
Average		1995	2001
Standard deviation		1.7	0