When No Law is Better than a Good Law

Utpal Bhattacharya
(Indiana University)

Hazem Daouk
(Cornell University)

First version: June 2004

JEL Classification: G15, G18, K22, K42

*We thank Kazuhiko Ohashi and participants in the seminars at the Bank of Japan, Hitotsubashi University, Indiana University, MIT, University of Tokyo and Yokohama University for improving the paper.

WHEN NO LAW IS BETTER THAN A GOOD LAW

Abstract

This paper argues, both theoretically and empirically, that sometimes no security law may be better than a good security law that is not enforced. The first part of the paper formalizes the sufficient conditions under which this happens for any law. The second part of the paper shows that a specific security law – the law prohibiting insider trading – may satisfy these conditions, which implies that our theory predicts that it is sometimes better not to have an insider trading law than to have an insider trading law but not enforce it. The third part of the paper takes this prediction to the data. We revisit the panel data set assembled by Bhattacharya and Daouk (2002), who showed that enforcement, not the mere existence, of insider trading laws reduced the cost of equity in a country. We find that the cost of equity *actually rises* when a country introduces an insider trading law, but does not enforce it.

WHEN NO LAW IS BETTER THAN A GOOD LAW

The first country to enact a law against insider trading was the United States, and it was also the first country to enforce an insider trading law (Bhattacharya and Daouk (2002)). Yet, insider trading regulation in the U.S. has avoided definition and rule-making in favor of open-ended standards (Langevoort (1999)), and has evolved with some important U.S. Supreme Court decisions (Bainbridge (2000)). Ironically, the phrase "insider trading" does not even exist in Rule 10b-5 of Section 10(b) of the U.S. Securities Exchange Act of 1934, on which the insider trading law is based. This rule reads: "It shall be unlawful for any person, directly or indirectly, by the use of any means or instrumentality of interstate commerce, or of mails, or of any facility of any national securities exchange, to employ any device, scheme, or artifice to defraud, to make any untrue statement of a material fact or to omit to state a material fact necessary in order to make the statements made, in the light of the circumstances under which they were made, not misleading, or to engage in any act, practice, or course of business which operates or would operate as a fraud or deceit upon any person, in connection with the purchase or sale of any security."

Pakistan, like 80% of emerging markets, has a law prohibiting insider trading, but like 70% of emerging markets who have the insider trading law, did not enforce the law as of the end of 1998 (Bhattacharya and Daouk (2002)). Ironically, the prohibition against insider trading in Pakistan is unambiguous. Part 3(i) in Chapter II of the Listed Companies (Prohibition of Insider Trading) Guidelines reads: "No person who is or has been, at any time during the preceding six months associated with a company shall either on his own behalf or on behalf of any other person, deal in securities of a company listed on a stock exchange on the basis of any unpublished price sensitive information;..."

The purpose of this paper is to argue, both theoretically and empirically, that sometimes no security law may be better than a good law that is not enforced. This is an important issue because a number of emerging markets have adopted securities laws, but many of them have not enforced these securities laws.[1]

There are a couple of reasons why many emerging markets have adopted securities laws, and they are both related. The first reason is that theoretical and empirical results from the law and finance literature – results like the finding that investors provide less capital and demand a higher return if their interests are not protected – have been very influential.[2] The second reason is that transnational institutions like the World Bank, the International Monetary Fund (IMF), the Organization for Economic Cooperation and Development (OECD), the European Union (EU), and the International Organization of Securities Commissions (IOSCO) are asking or advising their members to adopt securities laws. McGee (2004) points out that the OECD Principles of Corporate Governance, which includes a prohibition against insider trading, have been endorsed by the World Bank, the IMF, and IOSCO. On the other hand, many reasons could explain why the enforcement of securities laws in emerging markets is lacking: lack of political will, poorly funded and incapable regulatory institutions, high burden of proof, or unfriendly courts.

Given that there are so many countries that have adopted securities but have not enforced them, if our thesis about no security law being sometimes better than a good unenforced security law is correct, then the implication of this paper is that it is sometimes better not to have a security law at all than to enact a security law that will not or cannot be enforced. In other words, the "cut and paste" approach to securities law promoted by transnational organizations may sometimes be dangerous.

The first part of the paper formalizes the conditions under which no law is better than a good law that is not enforced. Our conditions are general; they apply to any good law, not just a good security law. We show that we need two sufficient conditions. The first condition is that the motivation to enact the law should be to solve a prisoner's dilemma problem. This means that if there is no law, everyone is stuck in the bad equilibrium;

---

[1] 25 new Codes of Best Practice for corporate governance were published during the past 5 years. There are currently 39 codes operating in Europe. Most firms, unfortunately, do not comply (*Financial Times*, April 8, 2002). Bhattacharya and Daouk (2002) found that 70% of emerging markets have not enforced their insider trading laws.

[2] Many authors have contributed to this literature, but, according to our view, the most influential have been a series of papers by La Porta, Lopez-de-Silanes, Shleifer and Vishny. Their 1998 paper provides a good overview.

if there is a law and it is enforced, the good equilibrium results. The second condition is that there are some agents who will follow the law even if it is not enforced. If these assumptions hold, if a law is enacted but not enforced, only some will follow the law; the ones who do not follow the law will deviate with greater intensity in equilibrium, thereby causing law abiders more harm than they were incurring when there was no law.

The intuition for the first part of the paper is succinctly captured by the following bumper sticker: "When you outlaw guns, the outlaws will win." If there are no gun laws, everyone has guns, and it is the Wild West. Everyone is worse off than in a situation where there are gun laws that are strictly enforced, and no one has guns. However, if there are gun laws that are not enforced, law abiders will not have guns. The outlaws will have more guns because they know that the law abiders do not have guns, and so the law abiders will be worse off than when everyone had guns.

The second part of the paper asks whether insider trading laws satisfy the above conditions. Our hunch is that they do, because inside information is like guns in some aspects. It has a negative externality (causes adverse selection problems for others), but it has a positive internality (it protects the owner from adverse trades). Our formal answer is that insider trading sometimes satisfy the above conditions. This happens when corporate insiders have very imperfect information, if the cost of acquiring perfect information is not too high nor too low, and if there are many who will not follow the insider trading law if the insider trading law is not enforced. The intuition for these results is as follows. Whenever there is no insider trading law, all corporate insiders will trade. However, as their information is very imperfect, the adverse selection problem will be low. Moreover, as all insiders trade and compete away their rents, their insider trading revenues are low, and this does not cover the cost of acquiring perfect information if the cost is bounded below. So they will not acquire perfect information. When there is an insider trading law but not enforced, some corporate insiders will not trade. The revenues of the ones who do trade will rise, and this will cover the cost of acquiring perfect information if the cost is bounded above. So they will acquire perfect information. This, plus the fact that many are trading with inside information, increases adverse selection.

We take our theories to the data in the last part of the paper. We ask whether the cost of equity rises when a country enacts an insider trading law, but does not enforce it. Here we revisit the panel data set assembled by Bhattacharya and Daouk (2002), who showed that enforcement, not the mere existence, of insider trading laws reduced the cost of equity in a country. We follow the Bhattacharya and Daouk (2002) approach in first risk-adjusting country equity returns, and second regressing risk-adjusted country equity returns on insider trading variables and other control variables (like liberalization, liquidity, and foreign exchange risk) to check whether insider trading variables have any effect. We differ from Bhattacharya and Daouk (2002) in one important aspect: we model insider trading law and insider trading enforcement as endogenous, not exogenous, variables. This explicitly addresses the criticism that it may be that changes in the cost of equity may lead to changes in insider trading laws or enforcement, not the other way around.

We find that, indeed, insider trading law and insider trading enforcement are endogenous variables. However, after correcting for this endogeneity, we still find that the cost of equity *actually rises* when a country introduces an insider trading law, but does not enforce it. This is direct empirical evidence that, at least from the point of view of corporations who raise equity in stock markets, it is better not to have an insider trading law, than to have an insider trading law, but not enforce it.[3]

Our paper is organized as follows. In section I, we lay out the two sufficient conditions that ensure that no law is better than a good law that is not enforced. Section II tells us that when a particular security law – the law prohibiting insider trading – follows these conditions. If so, we show the cost of equity is lower when there is no insider trading law than when there is an insider trading law that is not enforced. The empirical research design is laid out in Section III. We execute the empirical research design in Section IV on data. We find that, indeed, the cost of equity rises on an average when a country enacts an insider trading law but does not enforce it. We conclude in Section V.

[3] Durnen and Nain (2004) find that insider trading restrictions increase earnings opacity in countries where controlling shareholders can expropriate firm wealth. They interpret this as the unanticipated consequences of insider trading restrictions: controlling shareholders now find other ways to expropriate resources.

I. The General Case

The goal of this section is to formalize the conditions under which no law is better than a good law that is not enforced. We detail below two sufficient conditions that will deliver this result.

A. The good law is created to solve a prisoner's dilemma situation

There may be many motives for enacting a law. One such motive may be to solve a prisoner's dilemma situation. We explain what we mean by reproducing the payoffs in a simple prisoner's dilemma matrix from a graduate text book in game theory (Fudenberg and Tirole (1991)).

		Agent 1	
		Obey law	Do not obey law
Agent 2	Obey law	U_h , U_h	U_h^+, U_l^-
	Do not obey law	U_l^-, U_h^+	U_l , U_l

If both agents obey the law, they each receive a utility of U_h. This is higher than U_l , the utility they receive when both do not obey the law. However, it is apparent from the payoffs in the above matrix that "both obeying the law" is not a non-cooperative equilibrium. It is in an agent's interest to deviate and break the law if he conjectures that the other agent is obeying the law, because then his utility improves from U_h to U_h^+ . So the only non-cooperative equilibrium that will occur in the above simple one-shot prisoner's dilemma problem is that both break the law, and both are worse off. Such a sad situation can be prevented if deviations from obeying the law are not allowed or, to put it differently, the law is strictly enforced. In that case, both will obey the law because they have no choice, and both will be better off.

To summarize, our first sufficient condition is that the motivation to enact the law should be to solve a prisoner's dilemma problem. This means that if there is no law, everyone is stuck in the bad equilibrium; if there is a good law and it is enforced, the good equilibrium results. We go to our second sufficient condition.

B. Some agents will obey a law even if it is not enforced

As the above is a crucial assumption, it needs justification. There are quite a few ways to justify the above assumption. One way is to appeal to individual morals. Good guys never break the law, whereas bad guys break the law when it is in their interest to do so. These attitudes are hard-wired into their utility functions. A second way is to appeal to different non-pecuniary costs of being caught breaking the law. Such non-pecuniary costs may be interpreted as the social sanction against breaking a law. Some people live in a social circle where the social sanctions against breaking a law are high, and so they never break the law, whereas some people live in a social circle where the social sanctions against breaking a law are low, and so they break the law when it is in their interest to do so.[4] A third way is to appeal to different risk-aversion parameters. If there exists pecuniary penalties for breaking the law, but enforcement of the law is probabilistic, some people will not break the law if they are very risk-averse, whereas the not so risk-averse will break the law if it is in their interest to do so.

Assume that agent 1 will obey a law even if it is not enforced, whereas agent 2 will obey a non-enforced law only if it is in his interest to do so. Now let us analyze a situation where a law is enacted, but it is not enforced. In this situation, agent 1 will obey the law by assumption. Agent 2 will break the law because his utility improves from U_h to U_h^+ if he deviates from obeying the law to breaking the law. Therefore, the equilibrium that will result is that agent 1 obeys the law whereas agent 2 breaks the law. The utilities of agents 1 and 2 in this equilibrium are U_l^- and U_h^+ respectively. Notice that the utility of agent 1 in this case is U_l^-, which is lower than U_l, his utility in the case where no one was obeying the law. So agent 1 is better under a lawless situation than he is under a situation where there is an unenforced good law.

To summarize, if both these assumptions hold, if a law is enacted but not enforced, only some will follow the law; the ones who do not follow the law will deviate with greater intensity, thereby causing law abiders more harm than they were incurring when there was no law.

Notice that we have just demonstrated that in this situation law abiders are better off when there is no law than when there is a law but no enforcement. We have not demonstrated whether society as a whole is better

[4] We are indebted to Kazu Ohashi for this suggestion.

of when there is no law than when there are unenforced laws. For us to demonstrate that, we need to put weights on how much society values both types of agents. Instead of doing that, we turn to analyze the case of insider trading, where there exists a clear metric to measure whether corporations are better or worse off when there is no law against insider trading than when there is an unenforced law against insider trading – the metric of the cost of equity (the return shareholders expect for holding equity in corporations).

II. A Specific Case – Insider Trading Regulations

A. A Toy Model

Assets

There are a large number of identical firms in the economy. Their value is normalized to zero. Corporate insiders in these firms raise money for new investments by selling equity to outside shareholders. These new investments are risky. The terminal payoff of each share in this new investment is equally likely to be +1 or -1. Firms want the selling price of their equity to be as high as possible.

Agents

There are a continuum of infinitesimal corporate insiders belonging to the above corporations. Corporate insiders own a fraction θ of their firm's equity. The total mass of these corporate insiders is γ. A fraction (1-f) of them always obey insider trading laws, whereas the rest obey the law only when the law is enforced. Corporate insiders, by virtue of their position within the corporation have inside information about the future payoffs of new corporate investments, but their inside information is not perfect.

Imperfect inside information is modeled as follows. Corporate insiders get a signal, which could be a good signal or a bad signal. The probability of getting a good signal if the terminal payoff is +1 is q, which is also the probability of getting a bad signal if the terminal payoff is -1. $q > 0.5$. Corporate insiders, however, can make their signal perfect (i.e., make q=1) by expending a personal cost, c.

Corporate insiders are risk-neutral. They obtain their utility from net profits made from insider trading and from the revenue that is raised when equity is sold to outside shareholders. The objective of a mass (1-f)γ of corporate insiders is to maximize their utility, subject to the constraint that they will not do any thing illegal. The objective of the rest of the corporate insiders, who are of mass fγ, is to maximize their utility without any such constraints. Corporate insiders get to choose whether to acquire perfect inside information and their insider trading strategies.

There are a continuum of infinitesimal noise traders, whose total mass is 1. They trade because of liquidity reasons, and they are equally likely to buy or sell. The logic for making this assumption of noise traders is now standard (see, for example, Grossman and Stiglitz (1980)). Without noise traders, the corporate insider's trade would fully reveal his private information, and thus there would be no incentive to collect costly information to trade.

There is a risk-neutral market maker who commits himself to offer a liquidity supply schedule. The details of this market are inspired by the extensive form introduced in Glosten and Milgrom (1985).[5] The market maker commits himself to offer share prices that are conditioned on his observation of order flows. He allows only two order flows: a specific quantity of buy orders and a specific quantity of sell orders. We exogenously restrict the size of the order flows, as did Glosten-Milgrom (1985), to prevent infinite orders from risk-neutral traders. Share prices are set such that the market maker's conditional expected profit in this competitive market is zero. In other words, the share price equals the conditional expected value of the firm, a conditioning that is done with respect to the market maker's information set. The market maker's information set is his observation of order flow.

Timing

At t=0, corporate insiders are endowed with imperfect information about the future payoff of a new corporate investment. At a personal cost, c, they may choose to make this information perfect. A Glosten-Milgrom market maker offers an ask price A (a bid price B) if a trader wants to buy shares from (sell shares to) the market maker. At t=1, trade with the market maker takes place at the posted prices. The trader could

[5] The Kyle (1985) model gives the same results in our binary framework. Krishnan (1992) uses a binary framework to show the equivalence between Glosten-Milgrom (1985) and Kyle (1985), given identical parametric assumptions.

be a noise trader or a corporate insider. At t=2, the firm raises money by selling equity. Given our assumptions, only a fixed quantity of shares can be sold. At t=3, the payoff of the risky assets are realized. All portfolios are consumed, and utilities are realized.

B. Analysis of the Model

Insider Trading Laws Exist and Are Enforced

When insider trading laws exist and are strictly enforced, corporate insiders will abstain from trading. This means that order flows contain no information. In this case, the market maker's expectation of the firm's value will not be conditional on order flows. So we obtain

$$\text{Ask price} = \text{Bid price} = 0.5(+1) + 0.5(-1) = 0 \quad (1).$$

The utility of the corporations, U_C , because the selling price of their equity is the bid price, is given as

$$U_C = 0 \quad (2).$$

The utility of the corporate insiders, U_I , as they make no insider trading profits, but do get revenue from equity sales, is

$$U_I = \theta\,(\text{Bid Price}) = 0 \quad (3).$$

Note that corporate insiders will not expend personal cost, c, to obtain perfect private information in this case. Why invest c to obtain perfect private information when you cannot use it?

The case where insider trading laws exist and are enforced correspond to the case when "both obey the law" in our prisoner's dilemma situation. Here both get U_h equal to zero.

Insider Trading Laws Do Not Exist

We will assume that the market maker conjectures that every corporate insider will do insider trading by giving a buy order of one share or a sell order of one share, but none will obtain perfect private information. Later on, we will show that these conjectures will be upheld in equilibrium if certain restrictions on exogenous parameters are upheld. Given these conjectures, the proportion of traders who are insiders are $\gamma/(1+\gamma)$.

We will now follow the logic used by Glosten-Milgrom (1985) to determine the ask price. The ask price is the price that the market maker offers when a trader wants to buy one share. This equals, as we have mentioned before, the expected value of a share conditional on the order flow being a buy order. A buy order could come from a noise trader with probability $1 - \{\gamma/(1+\gamma)\}$. A noise trader has no inside information, and so the market maker's expected value of the firm remains at 0 if the trader is a noise trader. A buy order could come from a corporate insider with probability $\{\gamma/(1+\gamma)\}$. This corporate insider has imperfect information. His signal has to be good for him to be giving a buy order. The expected value of the firm condition on it being a good signal (GS) is

$$-1 \text{ Prob } (v = -1 | \text{Signal} = GS) + 1 \text{ Prob } (v = +1 | \text{Signal} = GS)$$

$$= -1 \text{ Prob } (v = -1 \text{ and Signal} = GS) / \text{ Prob } (\text{Signal} = GS) + 1 \text{ Prob } (v = +1 \text{ and Signal} = GS) / \text{Prob } (\text{Signal}=GS)$$

$$= -1 \{0.5(1-q)\}/\{0.5q + 0.5(1-q)\} + 1 \{0.5q\}/\{0.5q + 0.5(1-q)\} = 2q-1$$

This gives us the ask price set by the market maker in the situation when there are no insider trading laws:

Ask price = E (v| noise trader) X Prob (Noise Trader) + E (v| corporate insider) X Prob (Corporate insider).

$$\text{So ask price} = 0[1 - \{\gamma/(1+\gamma)\}] + \{2q-1\}[\{\gamma/(1+\gamma)\}] = \{2q-1\}\{\gamma/(1+\gamma)\} \qquad (4).$$

By symmetry, the bid price set by the market maker in the situation when there are no insider trading laws:

$$\text{Bid price} = - \{2q-1\}\{\gamma/(1+\gamma)\} \qquad (5).$$

The utility of the corporations, U_C , as the selling price of their equity is the bid price, is given as

$$U_C = - \{2q-1\}\{\gamma/(1+\gamma)\} \qquad (6).$$

As U_C is negative in (6) but 0 in (2), corporations are always worse off when all insiders trade (there is no insider trading law) than when insiders do not trade (there is an insider trading law and it is enforced). The reason for this is that when insiders trade, corporations wishing to sell their equity to the public have to compensate shareholders for the adverse selection problem by pricing the equity low or, alternatively, give shareholders a higher return on equity.

The utility of the corporate insiders, U_I , as they now make insider trading profits, as well as get revenue from equity sales, is

$$U_I = \text{Prob } (\text{Signal}=GS) [E(v|\text{Signal}=GS) - \text{Ask Price}] + \text{Prob } (\text{Signal}=BS)[\text{Bid Price} - E(v|\text{Signal}=BS)]$$

+ θ (Bid Price)

$$\text{i.e., } U_I = [\{2q-1\}\{1- \gamma/(1+\gamma)\}] - [\theta \{2q-1\}\{\gamma/(1+\gamma)\}] \qquad (7).$$

Notice that U_I is negative if $\gamma\theta > 1$. Henceforth, to make this situation analogous to a prisoner's dilemma situation, we will assume that this restriction on exogenous parameters hold. This will give us $U_l = U_I$ (when no one obeys the law) < 0 = $U_h = U_I$ (when everyone obeys the law). In other words, corporate insiders are worse off when all of them trade (there is no insider trading law) than when none of them trade (there is an insider trading law and it is enforced). The reason is that in this situation, their insider trading profits cannot compensate for the low revenue that equity sales obtains. This happens when there are too many insiders, and so prices are quite informative (notice that $\gamma/(1+\gamma)$ approaches 1), and so the expected insider trading profits are low, as is the bid price. This also happens when inside ownership of the firm is large, because then the low bid price is a large penalty for insider trading.

Finally, to prove that this indeed is an equilibrium, we need to show that the conjecture of the market maker – all corporate insiders trade and none collect perfect private information – is upheld. The first is easy to show. Given a quoted bid and ask price, a person with an endowment of inside information will prefer trading on that information than not trading on that information because insider trading is profitable. Notice that the first term in (7) is positive. So corporate insiders will always trade. To show the second, we need a restriction on an exogenous parameter. To be specific, we need to show that the cost of collecting perfect information is bounded below; otherwise the corporate insiders will always collect perfect private information. So the following inequality has to be satisfied:

$$[\{2q-1\}\{1- \gamma/(1+\gamma)\}] - [\theta \{2q-1\}\{\gamma/(1+\gamma)\}] > [1-\gamma(2q-1)/(1+\gamma)\}] - [\theta\{\gamma(2q-1)/(1+\gamma)\}] - c \qquad (8).$$

The first term in (8) is the utility the insider gets with imperfect information. This is the same as (7). The second term in (8) is the utility the insider gets with perfect information. Notice that the bid and ask prices remain the same because the market maker does not know about this deviation. Inequality (8) can be simplified to get the lower bound for c:

$$c > 2(1-q) \qquad (9).$$

To summarize this section, we have shown a situation where corporations and corporate insiders are worse off when all corporate insiders trade (there is no insider trading law) than when none of them trade (there is an insider trading law and it is enforced). However, as insider trading is individually profitable, corporate insiders always trade, and end up in the "bad" equilibrium. This is the classic prisoner's dilemma.

Insider Trading Laws Exist, But Are Not Enforced

We will assume that the market maker conjectures that some corporate insiders will not do insider trading, but the ones who do will obtain perfect private information. The market maker also conjectures that the insiders who trade give a buy order of two shares or a sell order of two shares. Later on, we will show that these conjectures will be upheld in equilibrium if certain restrictions on exogenous parameters are upheld. Given these conjectures, the proportion of traders who are insiders are $f\gamma/(1+f\gamma)$.

The determination of bid and ask prices follows the same logic as in the previous section. As a matter of fact, there are only two differences. First, the proportion of insiders was $\gamma/(1+\gamma)$ before, but now it is $f\gamma/(1+f\gamma)$. Second, the quality of inside information of the corporate insiders who trade was imperfect before $(0.5 < q < 1)$, but now it is perfect $(q=1)$.

So, from (4), the ask price set by the market maker now becomes

$$\text{Ask price} = f\gamma/(1+\gamma) \qquad (10),$$

whereas, from (5), the bid price set by the market maker now becomes

$$\text{Bid price} = - f\gamma/(1+f\gamma) \qquad (11).$$

The utility of the corporations, U_C , because the selling price of their equity is the bid price, is now given as

$$U_C = - f\gamma/(1+f\gamma) \qquad (12).$$

The utility of the corporate insiders, U_I , is:

$$U_I = 2[\{1- f\gamma/(1+f\gamma)\}] - 2[\theta\, f\gamma/(1+f\gamma)] - c \qquad (13).$$

Finally, to prove that this indeed is an equilibrium, we need to show that the conjecture of the market maker – only some corporate insiders trade, and they trade with perfect private information – is upheld. The first is easy to show. By assumption, some corporate insiders do not trade. The corporate insiders who can trade do so, because, like before, insider trading is always profitable. To show the second, we need to show that the cost of collecting perfect information is bounded above; otherwise the corporate insiders who can trade will never collect perfect private information. So the following inequality has to be satisfied:

$$2[\{1- f\gamma/(1+f\gamma)\}] - 2[\theta\ f\gamma/(1+f\gamma)] - c > 2[\{2q-1\}- f\gamma/(1+f\gamma)\}] - 2[\theta\ f\gamma/(1+f\gamma)] \qquad (14).$$

The first term in (14) is the utility the insider gets with perfect information. This is the same as (13). The second term in (14) is the utility the insider gets with imperfect information. Notice that the bid and ask prices remain the same because the market maker does not know about this deviation. Inequality (14) can be simplified to get the upper bound for c:

$$c < 4(1-q) \qquad (15).$$

When No Insider Trading Law is Better than an Unenforced Insider Trading Law

We answer this from the point of view of the corporation. Corporations get a lower price for their equity or, alternately, have to pay a higher return to their shareholders if (6) > (12). This inequality simplifies to

$$f > \{2q-1\}/\{1+2\gamma(1-q)\} \qquad (16).$$

This is likely if f is large and/or q is small. Further, the cost of obtaining perfect information should be bounded above and below. From (9) and (15),

$$4(1-q) > c > 2(1-q) \qquad (17).$$

To summarize, no insider trading law is better than an unenforced insider trading law if corporate insiders have very imperfect information, if the cost of acquiring perfect information is not too high nor too low, and if there are many who will not follow the insider trading law if the insider trading law is not enforced. The intuition for these results is as follows. Whenever there is no insider trading law, all corporate insiders will trade. However, as their information is very imperfect, the adverse selection problem will be low. Moreover, as all insiders trade and compete away their rents, their insider trading revenues are low, and this does not cover the cost of acquiring perfect information if the cost is bounded below. So they will not acquire perfect information. When there is an insider trading law but not enforced, some corporate insiders will not trade. The revenues of the ones who do trade will rise, and this will cover the cost of acquiring perfect information if the cost is bounded above. So they will acquire perfect information. This, plus the fact that many of them are trading with inside information, increases the adverse selection problem.

III. Empirical Research Design

A. Insider Trading Measures

Bhattacharya and Daouk (2002) found that there were 103 countries that had stock markets at the end of 1998, of which 22 were classified as developed markets, and 81 were classified as emerging markets. They found out from each of the 103 stock markets whether these markets had insider trading laws and, if yes, from when, and whether and when anyone had been prosecuted under these laws, successfully or otherwise.

We use the above two dates from Bhattacharya and Daouk (2002). These two dates, the year an insider trading law was first enacted and the year there was the first prosecution under these laws, are given in columns two and three in Table 1. Our measure of insider trading law takes on a value 0 till the year the law comes into existence, and takes on the value 1 in the years after that. Our measure of insider trading enforcement takes on a value 1 in t years after the law is enacted, and in the years after the first enforcement; it takes on the value 0 in the other years. We allow t to be 1 or 2, with t=1 being our primary measure. The reason for this definition is our view that the market believes that there will be enforcement after a law is enacted, but this belief is eroded if there is no enforcement after t years after a law is enacted, and this belief is revived only when they observe an actual enforcement.

B. Cost of Equity Measures

The cost of equity in a country is defined as the return shareholders require for holding shares in that country. Classical finance theory tells us that the major determinant of the cost of equity is the risk of equity. So the first thing we do is to remove the effect of risk.

We employ the approach used by Bhattacharya and Daouk (2002) to remove the effect of risk. They adopt a simplified version of an international asset pricing model first used by Bekaert and Harvey (1995). This empirical model allows for partial integration of a country to the world equity markets. The model is very appealing because it permits a country to evolve from a developing segmented market (where risk is measured by the country's variance) to a developed country which is integrated to world equity markets (where risk is measured by the sensitivity of a country's equity returns to movements in the world market portfolio). The special case of complete integration, where the world factor is the only factor, is nested. This international asset pricing model is expressed as follows:

$$\left(r_{i,t} - r_{f,t}\right) = \alpha_0 + \phi_{i,t}\lambda_{\text{cov}}h_{i,w,t} + \left(1 - \phi_{i,t}\right)\lambda_{\text{var}}h_{i,t} + e_{i,t} \quad (18),$$

where

$r_{i,t}$ is the dollar monthly return of the stock market index of country i at time t,

$r_{f,t}$ is the monthly return of the one month U.S. T-Bill at time t,

α_0 is a constant that would be estimated,

$\phi_{i,t}$ is a measure of the level of integration of country i at time t, $0 \leq \phi_{i,t} \leq 1$, and this is defined later,

λ_{cov} is the price of the covariance risk that would be estimated,

$h_{i,w,t}$ is the conditional covariance of the monthly return of the stock market index of country i with the monthly return of the world index at time t, and this is defined later,

λ_{var} is the price of own country variance risk that would be estimated (which we are restricting to be the same across all countries),

$h_{i,t}$ is the conditional variance of the monthly return of the stock market index of country i at time t, and this is defined later, and

$e_{i,t}$ is the residual error term, which is the cost of equity after the effect of risk has been removed.

The independent variables in model (18) – conditional covariance $h_{i,w,t}$ and conditional variance $h_{i,t}$ – are separately estimated pair-wise for each country i and world pair from the multivariate ARCH model specified below.

$$
\begin{aligned}
r_{i,t} &= c_1 + \varepsilon_{i,t}, \\
r_{w,t} &= c_2 + \varepsilon_{w,t}, \\
h_{i,t} &= b_1 + a_1\left(\tfrac{1}{2}\varepsilon^2_{i,t-1} + \tfrac{1}{3}\varepsilon^2_{i,t-2} + \tfrac{1}{6}\varepsilon^2_{i,t-3}\right), \\
h_{w,t} &= b_2 + a_2\left(\tfrac{1}{2}\varepsilon^2_{w,t-1} + \tfrac{1}{3}\varepsilon^2_{w,t-2} + \tfrac{1}{6}\varepsilon^2_{w,t-3}\right), \\
h_{i,w,t} &= b_3 + a_3\left(\tfrac{1}{2}\varepsilon_{i,t-1}\varepsilon_{w,t-1} + \tfrac{1}{3}\varepsilon_{i,t-2}\varepsilon_{w,t-2} + \tfrac{1}{6}\varepsilon_{i,t-3}\varepsilon_{w,t-3}\right), \\
\varepsilon_{i,t}, \varepsilon_{w,t} &\sim N\left(\begin{bmatrix}0\\0\end{bmatrix}, \begin{bmatrix}h_{i,t} & h_{i,w,t}\\ h_{i,w,t} & h_{w,t}\end{bmatrix}\right).
\end{aligned} \qquad (19),
$$

where

$r_{w,t}$ is the dollar monthly return of the stock market index of the world at time t,

$\epsilon_{i,t-j}$ is the innovation in monthly return of the stock market index of country i at time t-j, j $\in$ {0,1,2,3},

$\epsilon_{w,t-j}$ is the innovation in monthly return of the stock market index of the world at time t-j, j $\in$ {0,1,2,3},and

$h_{w,t}$ is the conditional variance of the monthly return of the stock market index of the world at time t.

Model (19) was first introduced by Bollerslev, Engle, and Wooldrige (1988). As in Engle, Lilien, and Robins (1987), the weights of the lagged residual vectors are taken to be 1/2, 1/3, and 1/6, respectively. The constants a_2 , b_2 , and c_2 are constrained to be identical for all country-world pairs. Maximum likelihood is used to estimate model (19).

The other independent variable in model (18) – $\phi_{i,t}$ – measures the level of integration of country i at time t. It is defined as follows:

$$
\phi_{i,t} = \frac{\exp\left(\alpha_1\left(\frac{exports_{i,t} + imports_{i,t}}{gdp_{i,t}}\right)\right)}{1 + \exp\left(\alpha_1\left(\frac{exports_{i,t} + imports_{i,t}}{gdp_{i,t}}\right)\right)} \qquad (20).
$$

The above definition of $\phi_{i,t}$ in (20) implies that it is a function of the ratio of the sum of exports and imports to gross domestic product. It is designed to take on values between zero and one. When its value is zero, the country is not integrated with world equity markets, and its equity is exposed only to local risk (own variance). When its value is one, the country is fully integrated with world equity markets, and its equity is exposed only to global risk (covariance with world factor). Bekaert and Harvey (1997) find that increases in this ratio are empirically associated with increased importance of the world factor relative to local risk factors.

Data on monthly equity indices of 22 developed countries were obtained from Morgan Stanley Capital International (MSCI). Data on monthly equity indices of 33 emerging markets were obtained from International Financial Corporation (IFC). The first column in Table 1 gives the names of these countries as well as the sample period that was available for these 55 monthly stock market indices in the 1969-1998 period. These indices are value-weighted, and are calculated with dividend reinvestment. As noted by Harvey (1991), the returns computed on the basis of these indices are highly correlated with popular country indices. The MSCI value-weighted World Index was used as a proxy for the world market portfolio. Finally, monthly data on exports and imports for the 55 countries were obtained from the International Financial Statistics provided by the International Monetary Fund. Data on GDP for the 55 countries were also obtained from the International Financial Statistics provided by the International Monetary Fund. For some countries the frequency of GDP was quarterly, and for some it was yearly. To obtain monthly GDP, we divided by 3 in the former case, and by 12 in the latter case.

We computed monthly returns of each country's stock market from their indices, the monthly return of the global portfolio from the MSCI value-weighted world index, and ϕ, the integration measure of each country per month from its exports, imports and GDP, using the formula given in (20). The seventh and eighth columns in Table 1 gives the mean monthly return and the standard deviation of monthly returns per country in the 1969-1998 sample period (some countries do not have data for the full period.)

We then used the monthly returns of each country, the monthly return of the global portfolio, and the monthly integration measure of each country in (18) and (19) to obtain $e_{i,t}$, which is the cost of equity after the effect of risk has been removed.[6]

C. Link between Insider Trading and the Cost of Equity

Insider trading and cost of equity are both endogenous variables. It is possible that changes in institutional factors within a country intended to facilitate capital formation simultaneously impact the likelihood of enacting and enforcing an insider trading law as well as the cost of equity. As an example, a substantial commitment of government resources to improve law and order could result in the enactment and enforcement of insider trading laws as well as lower cost of equity due to better enforcement of property rights. In such circumstances, a simple regression would reveal a spurious association between insider trading and the cost of equity, as all are impacted by a third variable. This limits our ability to draw clear causal inferences from simple regressions.

The above is a valid criticism. To mitigate this criticism, the tests in this paper are panel Vector Auto Regressions (panel VARs). These panel VARs are corrected for country fixed-effects, country-specific heteroskedasticity and country-specific autocorrelation. These panel data tests with fixed country effects minimize the endogeneity problem. As a matter of fact, if the unobserved source of the endogeneity is constant over time, panel data with fixed effects effectively eliminates the potential bias caused by endogeneity. However, it is possible that the missing country-specific variables or the institutional features creating simultaneity between insider trading laws and cost of equity may change over the period of our analyses. We address this issue directly by explicitly modeling insider trading laws and the cost of equity as endogenously determined dependent variables at each point in time. That is the reason we use a panel VAR test instead of simple panel tests in this paper. This contrasts with Bhattacharya and Daouk (2002), who do not have this correction for endogeneity, and, therefore, use simple panel data tests.

The endogenous variables are modeled as linear functions of lagged endogenous variables and all

[6] Bhattacharya and Daouk (2002) used a two-step procedure (first remove the effect of risk, and then test the effect of other independent variables on the residuals) instead of using a one-step procedure (include all independent variables in model (1) directly) because of technical convergence problems in the one-step non-linear estimation procedure.

exogenous variables in the system. The system of equations in the VAR is estimated *jointly*. This means that the effect of the independent variables on each endogenous variable takes into account the endogenous nature of some of the independent variables. The system of equations to estimate the effect of insider trading on the cost of equity is formally modeled as

$e_{i,t} = \beta_{10} + \beta_{11}\,Foreign\ Exchange\ Risk_{i,t} + \beta_{12}\,Liquidity_{i,t} + \beta_{13}\,Liberalization_{i,t} + \beta_{14}\,Insider\ Trading\ Law_{i,t-1} + \beta_{15}\,Insider\ Trading\ Enforcement_{i,t-1} + u_{1i,t}$

and

$Insider\ Trading\ Law_{i,t} = \beta_{20} + \beta_{21}\,e_{i,t-1} + \beta_{22}\,Corruption_{i,t} + \beta_{23}\,Law\ and\ Order_{i,t} + \beta_{24}\,Bureaucracy\ Quality_{i,t} + u_{2i,t}$

and

$Insider\ Trading\ Enforcement_{i,t} = \beta_{30} + \beta_{31}\,e_{i,t-1} + \beta_{32}\,Corruption_{i,t} + \beta_{33}\,Law\ and\ Order_{i,t} + \beta_{34}\,Bureaucracy\ Quality_{i,t} + u_{3i,t}$ (21),

where

$e_{i,t}$ is the monthly residual error term from equation (18), which is the risk-adjusted cost of equity;

$Foreign\ Exchange\ Risk_{i,t}$ is the conditional covariance of the return of the stock market index with the depreciation of the i[th] foreign currency with respect to the dollar at time t, is denoted as $h_{i,ifx,t}$, and is estimated every month from the multivariate ARCH model given below

$$
\begin{aligned}
r_{i,t} &= f_1 + \varepsilon_{i,t}, \\
r_{ifx,t} &= f_2 + \varepsilon_{ifx,t}, \\
h_{i,t} &= e_1 + d_1\left(\tfrac{1}{2}\varepsilon^2_{i,t-1} + \tfrac{1}{3}\varepsilon^2_{i,t-2} + \tfrac{1}{6}\varepsilon^2_{i,t-3}\right), \\
h_{ifx,t} &= e_2 + d_2\left(\tfrac{1}{2}\varepsilon^2_{ifx,t-1} + \tfrac{1}{3}\varepsilon^2_{ifx,t-2} + \tfrac{1}{6}\varepsilon^2_{ifx,t-3}\right), \qquad (22),\\
h_{i,ifx,t} &= e_3 + d_3\left(\tfrac{1}{2}\varepsilon_{i,t-1}\varepsilon_{ifx,t-1} + \tfrac{1}{3}\varepsilon_{i,t-2}\varepsilon_{ifx,t-2} + \tfrac{1}{6}\varepsilon_{i,t-3}\varepsilon_{ifx,t-3}\right), \\
\varepsilon_{i,t}, \varepsilon_{ifx,t} &\sim \mathrm{N}\left(\begin{bmatrix}0\\0\end{bmatrix}, \begin{bmatrix} h_{i,t} & h_{i,ifx,t} \\ h_{i,ifx,t} & h_{ifx,t}\end{bmatrix}\right).
\end{aligned}
$$

where

$\epsilon_{i,\, t\text{-}j}$ is the innovation in monthly return of the stock market index of country i at time t-j, $j \in \{0,1,2,3\}$, and

$\epsilon_{ifx,\, t\text{-}j}$ is the innovation in monthly depreciation of the i^{th} foreign currency with respect to the dollar at time t-j, $j \in \{0,1,2,3\}$;

$Liquidity_{i,t}$ is the natural logarithm of the ratio of volume of dollar trade per month to dollar market capitalization at the end of the month;

$Liberalization_{i,t}$ in country i is 1 for t=P+1,P+2,...and is 0 for the other months, where P is the official liberalization month;

$Insider\ Trading\ Law_{i,t}$ in country i is 1 for t=L+1,L+2,...and is 0 for the other years, where L is the year the insider trading law is enacted;

$Insider\ Trading\ Enforcement_{i,t}$ in country i is 1 for t=L+1, E+1, E+2, ... and is 0 for the other years, where L is the year the insider trading law is enacted and E is the year there is a first prosecution;

$Corruption_{i,t}$ is a monthly measure of corruption within the political system;

$Law\ and\ Order_{i,t}$ is the sum of two monthly sub-components; the Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment of popular observance of the law;

$Bureaucracy\ Quality_{i,t}$ is a monthly measure of the institutional strength and quality of the bureaucracy.

The first equation in the system of equations (21) is the most important equation. It checks whether the risk-adjusted cost of equity in a country is affected by certain variables of interest. The two variables of interest in this paper are the existence of an insider trading law and the existence of enforcement of the insider trading law. The coefficient on the insider trading law variable is the effect of an insider trading law that is not enforced. The sum of the coefficients on the insider trading law variable and the insider trading enforcement variable is the effect of an insider trading law that is enforced. As there is no enforcement without having a law, the coefficient on the insider trading enforcement variable has no interpretation.

Control variables used in the first equation are foreign exchange risk, liquidity, and liberalization.

If purchasing power parity holds, foreign exchange risk should not affect the cost of equity. However, as purchasing power parity is not observed in the data, standard international asset pricing models like Ferson and Harvey (1993) and Dumas and Solnik (1995) have a foreign exchange factor. We include this control in our international asset pricing factor model as well. Monthly data on foreign exchange rates are obtained from the International Financial Statistics. From this we compute the monthly depreciation or appreciation of the i^{th} foreign currency with respect to the US dollar, and then use equation (22) to estimate the monthly foreign exchange risk of country i. This is the conditional covariance of the return of the stock market index of country i with the depreciation of the i^{th} foreign currency with respect to the dollar at time t; it is denoted as $h_{i,ifx,t}$ in equation (22).

Liquidity, as demonstrated by Amihud and Mendelson (1986), and Brennan and Subrahmanyam (1996), may also affect the cost of equity. We include this control in our international asset pricing factor model as well. The measure of liquidity that we adopted was the natural log of turnover, where turnover is defined as the volume of trade in the stock market divided by the market capitalization of the stock market. We could obtain monthly data on the volume of trade and market capitalization for 35 of the 55 countries from the vendor Datastream. The ninth column in Table 1 gives the mean monthly liquidity of these 35 countries, and the time periods for which this was estimated.

When a country opens up its capital markets to foreigners, the cost of equity is reduced through two routes (Stulz (1999)). It reduces required return because risk-sharing improves, and it reduces required return because corporate governance improves. Bekaert and Harvey (2000) and Henry (2000) empirically confirm that such liberalization reduces the cost of equity. We include this control in our international asset pricing factor model as well. Our liberalization variable is 0 till the month a county liberalizes, and it becomes 1 after that. We obtain official liberalization dates from Table I in Bekaert and Harvey (2000). These dates are given in column ten in Table 1.

The second equation in the system of equations (21) explicitly recognizes that the enactment of an insider trading law may be an endogenous variable. A country may enact an insider trading law when the cost of equity in its stock market has risen. This is to make its stock market more attractive. This implies that a positive correlation between insider trading law and the cost of equity is actually because an increase in the cost of equity is causing an enactment of an insider trading law, and not because the enactment of the insider trading law (which has not been enforced) is causing an increase in the cost of equity. This confusion between cause and effect has to be sorted out, and that is what the second equation in the system of equations (4) does. The second equation also recognizes that insider trading laws may be enacted in a country when the general quality of its legal and bureaucratic institutions change. We use three measures of the quality of institutions in a country: corruption, law and order, and bureaucracy quality. These three metrics are obtained from the International Country Risk Guide (ICRG) of the PRS group. Corruption is a monthly measure of corruption within the political system; it can range from 0 (most corrupt) to 6 (least corrupt). Law and Order is the sum of two monthly sub-components; the Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment of popular observance of the law; each sub-component can range from 0 (lowest) to 3 (highest). Bureaucracy Quality is a monthly measure of the institutional strength and quality of the bureaucracy. It can range from 0 (worst) to 4 (best). We obtain these three monthly time series from January 1984 through December 1998. The mean value of these three time series of corruption, law and order and bureaucracy quality, is given in columns four through six in Table 1 respectively.

The third equation in the system of equations (21) explicitly recognizes that, like the enactment of an insider trading law, the enforcement of an insider trading law also may be an endogenous variable. A country may enforce an insider trading law when its cost of equity changes and/or the general quality of its legal and bureaucratic institutions change. We use the same four control variables we used for the insider trading law case – past risk-adjusted cost of equity and the three measures of the quality of institutions in a country (corruption, law and order, and bureaucracy quality).

The system of equations (21) is estimated jointly using Seemingly Unrelated Regressions (SUR). SUR computes estimates using the technique of joint GLS (Generalized Least Squares). The three error terms

$u_{1i,t}$, $u_{2i,t}$ and $u_{3i,t}$ are allowed to be correlated (see Enders (1996) for further details). The estimation allows for country fixed-effects, for country-specific heteroskedasticity, and for country-specific autocorrelation.

IV. Empirical Evidence

The results of the estimation of equation (18) are given in Panel A of Table 2, whereas the results of the joint estimation of the system of equations (21) are given in Panels B, C and D of Table 2.

Panel A of Table 2 tells us whether risk is priced in global equity markets. Panel A reveals that country covariance risk seems to have a positive price (λ_{cov} is positive) and is statistically significant at the five percent level. This suggests that a country beta is priced. Panel A in Table 2 also tells us that even country variance risk has a positive price(λ_{var} is positive), though the estimate is significant only at the six percent level. This suggests that many equity markets in the world are quite segmented, and their returns are driven by their own variances. The above results are the same as in Bhattacharya and Daouk (2002). This should not be surprising, as we use the same data set and the same estimation procedure.

Panel B of Table 2 checks whether the risk-adjusted equity return of a country – the residuals from the estimation of equation (18) – are influenced by the existence and enforcement of insider trading laws in the country after we control for foreign exchange risk, liberalization, and liquidity. Panel B of Table 2, therefore, gives the main empirical results of the paper. We notice that the coefficient on the lagged insider trading law variable is positive and significant, suggesting that when an insider trading law is instituted in a country but not enforced, the cost of equity in that country *actually rises*. According to our theoretical model, one explanation of this seemingly counter-intuitive phenomenon is that when an insider trading law is instituted but not enforced, only some corporate insiders follow the law; the ones who do not follow the law trade with greater intensity, thereby increasing adverse selection, which in turn increases the return investors demand for holding the corporation's equity. Notice also that the sum of the coefficients on the lagged insider trading law variable and the lagged insider trading enforcement variable is negative, suggesting that when an insider trading law is enforced in a country, the cost of equity in that country falls. This is the same result that Bhattacharya and Daouk (2002) obtained.

The effect of the control variables on the cost of equity is worth noting. We find, like many researchers before us (e.g., Dumas and Solnik (1995)), that foreign exchange risk increases the cost of equity. We also find, like Bekaert and Harvey (2000) and Henry (2000), that if a country liberalizes, its cost of equity falls. Our finding about the effect of liquidity on the cost of equity seems surprising at first. Market microstructure theory suggests that investors would want less equity return for more liquid stocks, but we are apparently finding the opposite. Our view is that liquidity is endogenous, and interpretations of the correlation coefficient between two endogenous variables should be done with caution.

The enactment of insider trading laws and the enforcement of insider trading laws could also be endogenous, and therefore the interpretation of the correlation coefficients between these two variables and the cost of equity (which is another endogenous variable) should also be done with caution. We take extreme caution by explicitly modeling the enactment of insider trading laws and the enforcement of insider trading laws as endogenous. Panel C in Table 2 tests whether the enactment of insider trading laws in a country are influenced by the past risk-adjusted cost of equity in a country, after we control for corruption, law and order, and the quality of bureaucracy. Panel D in Table 2 tests whether the enforcement of insider trading laws in a country are influenced by the past risk-adjusted cost of equity in a country, after we control for corruption, law and order, and the quality of bureaucracy. The results of Panels C and D in Table 2 are broadly similar, and quite intuitive. They tell us, as suspected, that the enactment of insider trading laws and the enforcement of insider trading laws are endogenous variables. Insider trading laws are likely to be enacted and are likely to be enforced if the law and order situation improves and/or the quality of the bureaucracy improves. Interestingly, insider trading laws are likely to be enacted and are likely to be enforced if corruption increases, which means that these could be responses to increased corruption. Past risk-adjusted cost of equity seems to have no effect on the enactment of insider trading laws, though it seems to have a negative effect on the enforcement of insider trading laws.

Finally, though the enactment and enforcement of insider trading laws are endogenous, since we estimate Panels B, C and D in Table 2 jointly, the effect of the independent variables on each endogenous variable takes into account the endogenous nature of some of the independent variables. Our interpretations of the coefficients in Panel A of Table 1 are, therefore, legitimate.

V. Conclusion

We do three things in this paper.

We first formalize the conditions under which no law is better than a good law that is not enforced. Our answer is that we need two sufficient conditions. The first condition is that the motivation to enact the law should be to solve a prisoner's dilemma problem. This means that if there is no law, everyone is stuck in the bad equilibrium; if there is a law and it is enforced, the good equilibrium results. The second condition is that there are some agents who will follow the law even if it is not enforced. If these assumptions hold, if a law is enacted but not enforced, only some will follow the law; the ones who do not follow the law will deviate with greater intensity in equilibrium, thereby causing law abiders more harm than they were incurring when there was no law.

We next ask whether insider trading laws satisfy the above conditions. Our answer is sometimes they do. This happens when corporate insiders have very imperfect information, if the cost of acquiring perfect information is not too high nor too low, and if there are many who will not follow the insider trading law if the insider trading law is not enforced.

We finally take our theories to the data. We ask whether the cost of equity rises when a country enacts an insider trading law but does not enforce it. We find the answer to be yes, on an average.

References

Amihud, Y., and H. Mendelson, 1986, Asset pricing and the bid-ask spread, *Journal of Financial Economics* 15, 223-249.

Bainbridge, S., 2000, Insider trading, in *Encyclopedia of Law and Economics* III (Edward Elgar Publishing, Cheltenham, U.K.).

Bekaert, G., and C. Harvey, 1995., Time varying world market integration, *Journal of Finance* 50, 403-444.

Bekaert, G., and C. Harvey, 1997, Emerging equity market volatility, *Journal of Financial Economics* 43, 29-77.

Bekaert, G., and C. Harvey, 2000, Foreign speculators and emerging equity markets, *Journal of Finance* 55, 565-613.

Bhattacharya, U., and H. Daouk, 2002, The world price of insider trading, *Journal of Finance* 57, 75-108.

Bollerslev, T., R. Engle, and J. Wooldrige, 1988, A capital asset pricing model with time-varying covariances, *Journal of Political Economy* 96, 116-131.

Brennan, M., and A. Subrahmanyam, 1996, Market microstructure and asset pricing: On the compensation for illiquidity in stock returns, *Journal of Financial Economics* 41, 441-464.

Dumas, B., and B. Solnik, 1995, The world price of foreign exchange risk, *Journal of Finance* 50, 445-479.

Durnev, A., and A. Nain, 2004, The unanticipated effects of insider trading regulation, Working Paper, University of Michigan

Engle, R., D. Lilien, and R. Robins, 1987, Estimating time varying risk premia in the term structure: The ARCH-M model, *Econometrica* 55, 391-407.

Enders, W., 1996, *RATS Handbook for Econometric Time Series* (John Wiley and Sons, New York).

Ferson, W., and C. Harvey, 1993, The risk and predictability of international equity returns, *Review of Financial Studies* 6, 527-566.

Financial Times, April 8, 2002.

Fudenberg, D., and J. Tirole, 1991, *Game Theory* (MIT Press, 1991).

Glosten, L., and P. Milgrom, 1985, Bid, ask and transactions prices in a specialist model with heterogeneously informed traders, *Journal of Financial Economics* 14, 71-100.

Grossman, S., and J. Stiglitz,1980, On the impossibility of informationally efficient markets, *American Economic Review*, 70, 393-408.

Harvey, C, 1991, The world price of covariance risk, *Journal of Finance* 46, 111-157.

Henry, P., 2000, Stock market liberalization, economic reform, and emerging market equity prices, *Journal of Finance* 55, 529-564.

Krishnan, M., 1992, On the equivalence between Kyle (1985) and Glosten-Milgrom (1985), *Economics Letters* 40, 333-338.

Kyle, A.S., 1985, Continuous auctions and insider trading, *Econometrica* 53, 1315-1336.

Langevoort, D., 1999, Rereading Cady, Roberts: the ideology and practice of insider trading regulation," *Columbia Law Review* 99, 1319-1343.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. Vishny, 1998, Law and finance, *Journal of Political Economy* 106, 1113-1155.

McGee, R., 2004, Insider trading regulation in transition economies," working paper, Barry University.

Stulz, Rene′, 1999, Globalization, corporate finance, and the cost of capital, *Journal of Applied Corporate Finance*, Fall 1999, 8-25.

TABLE 1
Summary Statistics

	INSIDER TRADING VARIABLES		INSTITUTIONAL QUALITY VARIABLES			STOCK MARKET VARIABLES			
(1) Country (Period)	(2) Insider Trading Law	(3) Insider Trading Enforcement	(4) Mean corruption (1/84 to 12/98)	(5) Mean law and order (1/84 to 12/98)	(6) Mean bureaucracy quality (1/84 to 12/98)	(7) Mean monthly return	(8) Standard deviation of monthly returns	(9) Mean liquidity (Period)	(10) Liberalization date
Argentina (1975-1998)	1991	1995	3.4611	3.7222	2.0944	0.0167	0.2305	0.0127 (1993-1998)	11/89
Australia (1969-1998)	1991	1996	5	6	4	0.0068	0.0760	0.0329 (1984-1998)	Before 12/69
Austria (1969-1998)	1993	No	4.9	6	3.85	0.0084	0.0601	0.0364 (1986-1998)	Before 12/69
Belgium (1969-1998)	1990	1994	4.8833	5.8556	4	0.0131	0.0534	0.0114 (1986-1998)	Before 12/69
Brazil (1975-1998)	1976	1978	3.6167	3.5333	2.9056	0.0064	0.1604	NA	05/91
Canada (1969-1998)	1966	1976	6	6	4	0.0076	0.0552	0.0189 (1973-1998)	Before 12/69
Chile (1975-1998)	1981	1996	3.2111	4.3167	2.2	0.0189	0.1020	0.0079 (1989-1998)	01/92
China (1992-1998)	1993	No	3.5429	3.8971	2.1029	0.0010	0.1456	0.1012 (1991-1998)	NA
Colombia (1984-1998)	1990	No	2.7667	1.3667	2.8667	0.0188	0.0835	NA	2/91
Czech Republic (1993-1998)	1992	1993	4.1111	5.6111	3	-0.0110	0.0938	NA	NA
Denmark (1969-1998)	1991	1996	6	6	4	0.0114	0.0536	0.0165 (1988-1998)	Before 12/69
Egypt (1994-1998)	1992	No	2.4444	3	1.9333	0.0087	0.0749	NA	NA
Finland (1987-1998)	1989	1993	6	6	3.9639	0.0127	0.0809	NA	Before 12/69
France (1969-1998)	1967	1975	5.1397	5.324	3.9609	0.0104	0.0668	0.0313 (1988-1998)	Before 12/69
Germany (1969-1998)	1994	1995	5.5152	5.8081	4	0.0102	0.0588	0.1445 (1988-1998)	Before 12/69
Greece (1975-1998)	1988	1996	4.6333	4.1222	2.5444	0.0059	0.0948	0.0215 (1988-1998)	12/87
Hong Kong (1969-1998)	1991	1994	4.8222	4.9556	2.8806	0.0141	0.1131	0.03620 (1988-1998)	Before 12/69
Hungary (1992-1998)	1994	1995	4.6	5.2687	3.1829	0.0112	0.1191	NA	NA
India (1975-1998)	1992	1998	2.7778	2.7833	2.9611	0.0092	0.0783	0.0325 (1995-1998)	11/92
Indonesia (1989-1998)	1991	1996	1.5333	2.9056	0.8833	-0.0126	0.1441	0.0144 (1990-1998)	09/89
Ireland (1987-1998)	1990	No	4.7833	4.9278	3.7583	0.0127	0.0575	NA	Before 12/69
Israel (1996-1998)	1981	1989	4.8	3.4722	3.3444	0.0026	0.0685	NA	NA
Italy (1969-1998)	1991	1996	3.7611	5.2278	3.2111	0.0066	0.0760	0.0267 (1986-1998)	Before 12/69
Japan (1969-1998)	1988	1990	4.7722	5.4333	3.975	0.0103	0.06547	0.0258 (1990-1998)	12/80
Jordan (1978-1998)	No	No	3.4667	3.1611	2.2056	0.0073	0.0476	NA	12/95
Korea (South)(1975-1998)	1976	1988	3.3722	3.4389	3.2028	0.0080	0.1038	0.0611 (1987-1998)	1/92
Luxembourg (1987-1998)	1991	No	5.8698	6	3.9941	0.0088	0.0506	NA	Before 12/69
Malaysia (1984-1998)	1973	1996	4.1389	4.2944	2.4556	0.0017	0.1030	0.0152 (1986-1998)	12/88
Mexico (1975-1998)	1975	No	2.9278	3.033	1.9333	0.1070	0.1358	0.0409 (1988-1998)	5/89
Morocco (1995-1998)	1993	No	2.7333	3.5667	2.1778	0.0264	0.0455	NA	NA
Netherlands (1969-1998)	1989	1994	6	6	4	0.0131	0.0513	0.0586 (1986-1998)	Before 12/69
New Zealand (1987-1998)	1988	No	5.8333	5.9778	4	0.0027	0.0679	0.0206 (1990-1998)	7/84
Nigeria (1984-1998)	1979	No	1.9444	1.9944	1.4222	0.0029	0.1567	NA	8/95
Norway (1969-1998)	1985	1990	5.8333	6	3.6861	0.0089	0.0789	0.0261 (1980-1998)	Before 12/69
Pakistan (1984-1998)	1995	No	2.0611	2.25	1.95	0.0041	0.0886	NA	2/91
Peru (1992-1998)	1991	1994	2.9778	1.7889	1.0944	0.0077	0.0983	NA	NA
Philippines (1984-1998)	1982	No	2.1722	2.2222	0.9333	0.0181	0.1100	0.0142 (1990-1998)	6/91
Poland (1992-1998)	1991	1993	4.5714	4.7086	2.2457	0.0244	0.1765	0.0409 (1994-1998)	NA
Portugal (1986-1998)	1986	No	4.6556	5.1611	2.5389	0.0056	0.0676	0.0174 (1990-1998)	7/86
Russia (1995-1998)	1996	No	2.7738	3.4524	1.7976	-0.0061	0.2853	NA	NA
Saudi Arabia (1997-1998)	1990	No	2.2889	4.3444	2.5167	-0.0222	0.0434	NA	NA
Singapore (1969-1998)	1973	1978	4.6	5.2944	3.5472	0.0095	0.0875	0.0167 (1983-1998)	01/92
Slovakia (1995-1998)	1992	No	3.7361	5.5140	2.5167	-0.0185	0.0820	NA	NA
South Africa (1992-1998)	1989	No	5.1333	2.4944	3.7167	0.0055	0.0900	0.0160 (1990-1998)	Before 12/69
Spain (1969-1998)	1994	1998	4.2778	4.7444	3.0583	0.0090	0.0661	0.0406 (1990-1998)	Before 12/69
Sweden (1969-1998)	1971	1990	6	6	4	0.0126	0.0638	0.0285 (1982-1998)	Before 12/69
Switzerland (1969-1998)	1988	1995	5.8333	6	4	0.0116	0.0552	0.0412 (1989-1998)	Before 12/69
Sri Lanka (1992-1998)	1987	1996	3.1722	1.6778	2	-0.0025	0.0897	NA	NA
Taiwan (1984-1998)	1988	1989	3.8667	4.8667	3.225	0.0126	0.1323	0.1238 (1991-1998)	01/91
Thailand (1975-1998)	1984	1993	2.9278	4.1444	3.1556	0.00737	0.0989	0.0409 (1987-1998)	09/87
Turkey (1986-1998)	1981	1996	2.8778	3.3944	2.3722	0.0128	0.1829	0.0489 (1988-1998)	08/89
United Kingdom (1969-1998)	1980	1981	5.2611	5.25	4	0.0109	0.0675	0.0452 (1986-1998)	Before 12/69
United States (1969-1998)	1934	1961	4.8889	6	4	0.0103	0.0444	0.0452 (1973-1998)	Before 12/69
Venezuela (1984-1998)	1998	No	2.9611	3.9722	1.9056	0.0080	0.1467	NA	1/90
Zimbabwe (1975-1998)	No	No	3.1778	2.7778	2.6111	0.0019	0.1075	NA	6/93

Notes and Sources:

(1) Data on monthly stock market indices for the 22 developed markets were obtained from Morgan Stanley Capital Market International (MSCI). Data on monthly stock market indices for the 33 emerging markets were obtained from the International Financial Corporation (IFC). These countries are listed in Column 1. The periods for which this data were obtained are also listed in Column 1.
(2) The dates in Column 2 come from column 7 in Table I of Bhattacharya and Daouk (2002).
(3) The dates in Column 3 come from column 8 in Table I of Bhattacharya and Daouk (2002).
(4) Corruption is a monthly measure of corruption within the political system; it can range from 0 (most corrupt) to 6 (least corrupt). The average of this variable for the period January 1984 through December 1998 is given in Column 4. Source: International Country Risk Guide of the PRS Group.
(5) Law and Order is the sum of two monthly sub-components; the Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment of popular observance of the law; each sub-component can range from 0 (lowest) to 3 (highest). The average of the sum of these two variables for the period January 1984 through December 1998 is given in Column 5. Source: International Country Risk Guide of the PRS Group.
(6) Bureaucracy Quality is a monthly measure of the institutional strength and quality of the bureaucracy. It can range from 0 (worst) to 4 (best). The average of this variable for the period January 1984 through December 1998 is given in Column 6. Source: International Country Risk Guide of the PRS Group.
umn 2.
(7) The mean monthly return of the 22 developed countries and the 33 emerging markets is given in Column 7. The sample periods used to calculate these statistics are given in Column 1.
(8) The standard deviations of monthly returns of the 22 developed countries and the 33 emerging markets is given in Column 8. The sample periods used to calculate these statistics are given in Column 1.
(9) Liquidity is defined as the natural logarithm of the ratio of volume of dollar trade per month to dollar market capitalization at the end of the month. Monthly data on these two variables were obtained from Datastream. The mean liquidity as well as the sample period used to estimate this mean is given in Column 9.
(10) The official liberalization date, which was obtained from column 1 in Table I of Bekaert and Harvey (2000), is given in Column 10.

TABLE 2
Effect of Insider Trading on the Cost of Equity

MODEL 1:

The international asset pricing factor model used for risk-adjusting is

$$\left(r_{i,t} - r_{f,t}\right) = \alpha_0 + \phi_{i,t}\lambda_{\text{cov}}h_{i,w,t} + \left(1-\phi_{i,t}\right)\lambda_{\text{var}}h_{i,t} + e_{i,t}$$

where the measure of integration of country i at time t, $\Phi_{i,t}$, is defined as

$$\phi_{i,t} \equiv \frac{\exp\left(\alpha_1\left(\frac{\exp orts_{i,t} + imports_{i,t}}{gdp_{i,t}}\right)\right)}{1+\exp\left(\alpha_1\left(\frac{\exp orts_{i,t} + imports_{i,t}}{gdp_{i,t}}\right)\right)}$$

and λ_{cov} is the price of the covariance risk with the world, and λ_{var} is the price of own country variance risk. The independent variables are the conditional covariances and variances, $h_{i,w,t}$ and $h_{i,t}$, respectively, and these are obtained from the multivariate ARCH model below:

$$\begin{aligned} r_{i,t} &= c_1 + \varepsilon_{i,t}, \\ r_{w,t} &= c_2 + \varepsilon_{w,t}, \\ h_{i,t} &= b_1 + a_1\left(\tfrac{1}{2}\varepsilon^2_{i,t-1} + \tfrac{1}{3}\varepsilon^2_{i,t-2} + \tfrac{1}{6}\varepsilon^2_{i,t-3}\right), \\ h_{w,t} &= b_2 + a_2\left(\tfrac{1}{2}\varepsilon^2_{w,t-1} + \tfrac{1}{3}\varepsilon^2_{w,t-2} + \tfrac{1}{6}\varepsilon^2_{w,t-3}\right), \\ h_{i,w,t} &= b_3 + a_3\left(\tfrac{1}{2}\varepsilon_{i,t-1}\varepsilon_{w,t-1} + \tfrac{1}{3}\varepsilon_{i,t-2}\varepsilon_{w,t-2} + \tfrac{1}{6}\varepsilon_{i,t-3}\varepsilon_{w,t-3}\right), \\ \varepsilon_{i,t}, \varepsilon_{w,t} &\sim \mathrm{N}\left(\begin{bmatrix}0\\0\end{bmatrix}, \begin{bmatrix}h_{i,t} & h_{i,w,t}\\ h_{i,w,t} & h_{w,t}\end{bmatrix}\right). \end{aligned}$$

where
$\epsilon_{i,\,t-j}$ is the innovation in monthly return of the stock market index of country i at time t-j, j ϵ {0,1,2,3}, and
$\epsilon_{w,\,t-j}$ is the innovation in monthly return of the stock market index of the world at time t-j, j ϵ {0,1,2,3}.

Panel A: Some coefficients of the risk-adjustment model, MODEL 1 [a]

Dependent variable [b]	Excess return of country
Some independent variables [c]	
Covariance of the country's equity return with the world equity return multiplied by the measure of the country's integration with the world	λ_{cov} = 2.2157 (0.0471)
Variance of the country's equity return multiplied by one minus the measure of the country's integration with the world	λ_{var} = 2.3784 (0.0615)

[a] The numbers below are coefficient estimates from the panel regressions described above. p-values are in parentheses.
[b] The dependent variable is the monthly equity return for each country minus the one mounth U.S. T-Bill return. The equity return for each country is computed from its stock market index. Data on monthly stock market indices for the 22 developed markets were obtained from Morgan Stanley Capital Market International (MSCI). Data on monthly stock market indices for the 33 emerging markets were obtained from the International Financial Corporation (IFC). The sample periods are given in the Appendix. The data for the one-month U.S. Treasury bill return was obtained from Datastream.
[c] The measure of a country's integration with the world, as defined above, is computed from its exports, imports, and GDP. It is equation (20) in the text. Data on quarterly/annual GDP, monthly exports and monthly imports were from the International Financial Statistics of the International Monetary Fund.

The conditional covariance of the return of the stock market index with the depreciation of the i[th] foreign currency with respect to the dollar at time t, defined as the foreign exchange risk and denoted as $h_{i,ifx,\,t}$, is estimated from the multivariate ARCH model below.

$$
\begin{aligned}
r_{i,t} &= f_1 + \varepsilon_{i,t}\,, \\
r_{ifx,t} &= f_2 + \varepsilon_{ifx,t}\,, \\
h_{i,t} &= e_1 + d_1\left(\tfrac{1}{2}\varepsilon_{i,t-1}^2 + \tfrac{1}{3}\varepsilon_{i,t-2}^2 + \tfrac{1}{6}\varepsilon_{i,t-3}^2\right), \\
h_{ifx,t} &= e_2 + d_2\left(\tfrac{1}{2}\varepsilon_{ifx,t-1}^2 + \tfrac{1}{3}\varepsilon_{ifx,t-2}^2 + \tfrac{1}{6}\varepsilon_{ifx,t-3}^2\right), \\
h_{i,ifx,t} &= e_3 + d_3\left(\tfrac{1}{2}\varepsilon_{i,t-1}\varepsilon_{ifx,t-1} + \tfrac{1}{3}\varepsilon_{i,t-2}\varepsilon_{ifx,t-2} + \tfrac{1}{6}\varepsilon_{i,t-3}\varepsilon_{ifx,t-3}\right), \\
\varepsilon_{i,t}\,, \varepsilon_{ifx,t} &\sim \mathrm{N}\left(\begin{bmatrix}0\\0\end{bmatrix}, \begin{bmatrix} h_{i,t} & h_{i,ifx,t} \\ h_{i,ifx,t} & h_{ifx,t}\end{bmatrix}\right).
\end{aligned}
$$

where

$\epsilon_{i,\,t-j}$ is the innovation in monthly return of the stock market index of country i at time t-j, j $\in$ {0,1,2,3}, and
$\epsilon_{ifx,\,t-j}$ is the innovation in monthly depreciation of the i[th] foreign currency with respect to the dollar at time t-j, j $\in$ {0,1,2,3}.

MODEL 2 (A Panel VAR Model):

$$Residual\ from\ Model\ 1,\ e_{i,t} = \beta_{10} + \beta_{11}\ Insider\ Trading\ Law_{i,t-1} + \beta_{12}\ Insider\ Trading\ Enforcement_{i,t-1} + \beta_{13}\ Liberalization_{i,t} + \beta_{14}\ Foreign\ Exchange\ Risk_{i,t} + \beta_{15}\ Liquidity_{i,t} + u_{1i,t}$$

and

$$Insider\ Trading\ Law_{i,t} = \beta_{20} + \beta_{21}\ e_{i,t-1} + \beta_{22}\ Corruption_{i,t} + \beta_{23}\ Law\ and\ Order_{i,t} + \beta_{24}\ Bureaucracy\ Quality_{i,t} + u_{2i,t}$$

and

$$Insider\ Trading\ Enforcement_{i,t} = \beta_{30} + \beta_{31}\ e_{i,t-1} + \beta_{32}\ Corruption_{i,t} + \beta_{33}\ Law\ and\ Order_{i,t} + \beta_{34}\ Bureaucracy\ Quality_{i,t} + u_{3i,t}$$

Panel B: Coefficients of the first equation in Model 2 [a]

Dependent variable	Residual from Risk Adjustment Model (1) [b]		
Independent variables	Coefficient	Standard Error	p-value
Foreign exchange risk, $h_{i,ifx,\ t}$ [c]	6.3867	1.4256	0.0000
Liquidity [d]	0.0065	0.0015	0.0000
Liberalization [e]	-0.0083	0.0035	0.0166
Lagged insider trading law [f]	0.0101	0.0037	0.0064
Lagged insider trading enforcement [g]	-0.0190	0.0037	0.0000

Panel C: Coefficients of the second equation in Model 2 [a]

Dependent variable	Insider Trading Law [f]		
Independent variables	Coefficient	Standard Error	p-value
Lagged residual from risk adjustment model [b]	0.0575	0.0805	0.4748
Corruption [h]	-0.0408	0.0043	0.0000
Law and order [i]	0.0743	0.0114	0.0000
Bureaucracy quality [j]	0.2016	0.0220	0.0000

Panel D: Coefficients of the third equation in Model 2 [a]

Dependent variable	Insider Trading Enforcement [g]		
Independent variables	Coefficient	Standard Error	p-value
Lagged residual from risk adjustment model [b]	-0.1845	0.0807	0.0222
Corruption [h]	-0.0148	0.0043	0.0007
Law and order [i]	0.0764	0.0114	0.0000
Bureaucracy quality [j]	0.0643	0.0220	0.0036

[a] The numbers below are results from panel regressions, and are corrected for country fixed-effects, country-specific heteroskedasticity and country-specific autocorrelation.
[b] This variable is the residual from Model 1.
[c] The control variable "foreign exchange risk" is estimated from the multivariate ARCH model given above.
[d] The control variable "liquidity" is defined as the natural logarithm of the ratio of volume of dollar trade per month to dollar market capitalization at the end of the month. This data were obtained from Datastream for the main stock market of each country. The sample periods for which this data were available are given in column 9 in Table I.
[e] The control variable "Liberalization" is an indicator variable. It changes from 0 to 1 in the month after the official liberalization date. This date was obtained from Bekaert and Harvey (2000). These liberalization dates are given in column 10 of Table 1.
[f] Insider Trading $Law_{i,t}$ in country i is 1 for t=L+1,L+2,...and is 0 for the other years, where L is the year the insider trading law is enacted. These dates were obtained from Bhattacharya and Daouk (2002). These dates are given in column 2 of Table 1.
[g] Insider Trading $Enforcement_{it}$ in country i is 1 for t=L+1, E+1, E+2, ... and is 0 for the other years, where L is the year the insider trading law is enacted and E is the year there is a first prosecution. These dates were obtained from Bhattacharya and Daouk (2002). These dates are given in column 3 of Table 1.
[h] Corruption is a monthly measure of corruption within the political system; it can range from 0 (most corrupt) to 6 (least corrupt). Source: International Country Risk Guide of the PRS Group.
[i] Law and Order is the sum of two monthly sub-components; the Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment of popular observance of the law; each sub-component can range from 0 (lowest) to 3 (highest). Source: International Country Risk Guide of the PRS Group.
[j] Bureaucracy Quality is a monthly measure of the institutional strength and quality of the bureaucracy. It can range from 0 (worst) to 4 (best). Source: International Country Risk Guide of the PRS Group.