The Effects of Anti-Bribery Enforcement

Firms that bribe governments face various punishments if caught. The most obvious and direct being a fine charged to the company. Additionally, markets may penalize the firm by reducing its valuation. However, it’s unclear whether the markets are responding to the bribery action per se or the improprieties implicit in bribery discourage investors.

In PERC Working Paper #1202, Jonathan Karpoff, PERC Research Fellow D. Scott Lee, and Gerald Martin investigate the effects of bribery allegations on firms. They explore both direct costs and indirect costs and find that the primary harm comes not from the direct costs (fines levied against the firm or the costs to fight the allegation in court) but from the charge of financial impropriety that generally accompanies bribery charges.

Firms will bribe governments when the benefits of doing so outweigh the costs. Because bribery is illegal, if a firm bribes officials, it must do so discreetly; the openness of their balance sheets makes hiding bribes exceedingly difficult and forces the firm to deliberately misreport its finances. Therefore, it is very common for bribery charges and financial reporting charges to occur simultaneously. Karpoff, et al, suggest that investors care much more about the latter than the former.

Bribery to foreign officials was explicitly outlawed in the Foreign Corrupt Practices Act in 1977. Before passage, prosecuting bribery required substantial amounts of evidence and proof of intent. The FCPA also strengthened reporting requirements to ensure the firm’s finances were transparent.

The authors analyze all bribery enforcement actions from 1978–2011 and all related charges and lawsuits. Of the 175 actions in the time period, they focus on the 115 allegations against publicly traded firms. Heavy manufacturing, oil and gas, and the pharmaceutical and healthcare industries faced more bribery enforcement than any other, although the arms, defense, and military industry has a higher proportion of its firms investigated for bribery. Additionally, alleged bribes tended to take place in reputedly corrupt developing countries.

The purposes of the bribes varied. In 80% of cases, firms desired to elicit sales; in 20% firms sought political/regulatory favors; and in 4%, firms requested tax reductions. The authors were also able to determine the benefits the firms received from their bribes. They found that firms on average paid $58 million in bribes and benefited by $1 billion. In other words, firms received a 2000% return on bribes.

When the bribery charge was first announced, firms experienced a 3% drop in their stock price. However when firms are charged with bribery only (not financial fraud), the drop was only 1.6%. For the thirteen observations with accompanying fraud charges, the stock price fell 15%, suggesting that investors are more concerned with the financial reporting aspect that coincides with bribery than the bribery itself.

It’s possible that the share devaluations are caused by investors expecting costs to rise—paying the fines and penalties, investigating the allegations, and defending themselves in court. Fines and penalties combined for about 1% of the firm’s market capitalization, and therefore is unlikely to have a significant effect on the stock price. The investigation costs and legal expenses amounted to only a little more at 1.5% of market value.

The authors argue that the primary reason for the market devaluation comes from indirect costs. Because investigations found that firms hid bribery payments but did not inflate assets or deflate liabilities, the authors believe that investors increase their expectations of the firms’ willingness to hide information. An alternate possibility is that investors believe the allegations will hurt the firms’ reputation among consumers and effect a decrease in sales. The authors again find that the reputational loss from bribery
only is much smaller than that from the financial fraud.

The authors also find that the indirect costs of the allegation increase with firm size. Additionally, they find that both the indirect costs and the reputational costs increase when the firm faces a class-action lawsuit. Interestingly, the costs depend much more on enforcement mechanisms such as these than the nature of the bribery.

Firms that bribe government officials stand much to gain and much to lose if caught. However, this paper suggests that the direct losses from enforcement are much smaller than those imposed by investors; these investors (as well as consumers) care less about the bribery charge than the firms’ willingness to misrepresent their finances.

Risk Aversion Orders and Intensity Measures of a Higher Degree

In PERC Working Paper #1203, PERC Research Scientist Liqun Liu and Jack Meyer of Michigan State University investigate how to quantify aversion to risk of a higher degree. As a generalization of the concept of the risk premium (which is a special type of 1st-degree risk increase), they formally define the rate of substitution between an nth-degree risk increase and an mth-degree risk increase, where n and m are positive integers and n is greater than m. The rate of substitution is more general than the risk premium in that it allows the “payment” for avoiding an nth-degree risk increase to take the form of an increase in risk of any lower degree, including the 1st degree. This definition is then used to examine the partial order of nth-degree Ross more risk averse and the local intensity measure of nth-degree risk aversion. The analysis both organizes the existing results as well as generates many new ones.

Economic analysis of decision-making under uncertainty commonly uses measures of risk aversion and increases in risk. Arrow and Pratt (AP) define risk aversion as concavity of the utility function, while Rothschild and Stiglitz (RS) define how to compare the riskiness of random variables. R-S show that a change to a riskier probability distribution is one that decreases expected utility for all risk averse decision-makers; the two definitions, though expressed differently, correspond to one another.

In addition to defining risk aversion, AP also propose the absolute risk aversion measure, \( A_u(x) = -u''(x) / u'(x) \). \( A(x) \) is used in two ways, referred to in the literature as “in the large” and “in the small,” respectively. First, it is used to order agents in terms of their level of risk aversion. Specifically, AP define \( u(x) \) to be AP more risk averse than \( v(x) \) if \( A_u(x) \) is greater than or equal to \( A_v(x) \) for all x, and show that \( u(x) \) is AP more risk averse than \( v(x) \) if and only if \( u(x) \) is always willing to incur a larger fixed reduction in initial nonrandom wealth in order to avoid the introduction of a risk (the “in the large” result). This reduction in wealth, referred to as a risk premium, is denoted \( \pi \), and has become a standard way to quantify an agent’s propensity to avoid a risk. Second, \( A(x) \) is used as a measure of the strength or intensity of risk aversion at point x. AP show that, for a small risk \( \varepsilon \) with mean zero and variance \( \sigma^2 \), the risk premium an agent is willing to pay to avoid the introduction of a small risk is approximately \( \pi(x, \varepsilon) = (1/2) \cdot A(x) \cdot \sigma^2 \), which is proportional to \( A(x) \) and the size of the risk indicated by \( \sigma^2 \) (the “in the small” result).

Pointing out the need to consider initial wealth levels that are random rather than certain, Ross defines a partial order over agents that is stronger than AP’s and justifies it by showing that \( u(x) \) is Ross more risk averse than \( v(x) \) if and only if \( u \) is willing to pay a higher risk premium than \( v \) for avoiding a given risk increase.

Ekern generalizes the definitions of risk aversion and an increase in risk, defining both nth-degree risk aversion and an nth-degree risk increase. Concavity of the utility function
is referred to as 2\textsuperscript{nd}-degree risk aversion and an R-S increase in risk as a 2\textsuperscript{nd}-degree risk increase. Menezes, Geiss and Tressler (MGT) present work that is similar in nature to that of Ekern, but with a focus on the interpretation of the extension to the 3\textsuperscript{rd} degree only. The definitions of MGT and Ekern are constructed so that downside and n\textsuperscript{th}-degree risk increases are avoided by those agents who are downside risk averse and n\textsuperscript{th}-degree risk aversive, respectively.

The n\textsuperscript{th}-degree extensions by Ekern appear to have largely settled the issue of how to define n\textsuperscript{th}-degree risk aversion and n\textsuperscript{th}-degree risk increases, but not measurement of risk aversion issues. Liu and Meyer’s work builds on Ekern’s definitions and provides a unifying generalization of both Ross comparative risk aversion and the AP intensity measure of risk aversion to the n\textsuperscript{th} degree, and adds significantly to the known n\textsuperscript{th}-degree results.

A critical construct that facilitates these generalizations is the rate of substitution – denoted as T – of a change in the cumulative distribution for another. In this paper, T measures the expected utility preserving tradeoff between a specific n\textsuperscript{th}-degree risk increase and a specific m\textsuperscript{th}-degree risk increase, where n > m. T is used to quantify an agent’s propensity to avoid an (n\textsuperscript{th}-degree) risk increase, instead of the more traditional π. The size of π reflects the agent’s rate of substitution between a risk increase and a leftward shift by one unit in the probability distribution of initial wealth. This leftward shift is just a special case of a 1\textsuperscript{st}-degree risk increase. The use of T generalizes the AP and Ross risk premium π by considering any first degree stochastic dominant (FSD) offsetting change rather than just the specific leftward shift embodied in π, and also by considering offsetting risk increases of degrees greater than one when the risk increase to be offset is of a degree higher than two. For instance, when n = 3, the rate of substitution can be in terms of a 1\textsuperscript{st}-degree risk increase or a 2\textsuperscript{nd}-degree risk increase substituting for a 3\textsuperscript{rd}-degree risk increase.

Naturally, different rates of substitution involving an n\textsuperscript{th}-degree risk increase represent different methods of quantifying aversion to n\textsuperscript{th}-degree risk increases. Once this point is understood, the existing literature and the debate over how to order agents in terms of higher-degree risk aversion and how to measure the intensity of higher-degree risk aversion can be organized by noting which rate of substitution is being implicitly or explicitly used.

After reviewing the Ekern definitions of n\textsuperscript{th}-degree risk aversion and n\textsuperscript{th}-degree risk increases and formally defining the rate of substitution T between an n\textsuperscript{th}-degree risk increase and an m\textsuperscript{th}-degree risk increase for any agent, where n > m, Liu and Meyer first present the “in the large” results. Specifically, for two utility functions \(u(x)\) and \(v(x)\) defined on interval \([a, b]\) that are each both n\textsuperscript{th}-degree risk averse and m\textsuperscript{th}-degree risk averse, \(u\) is defined to be n/m-degree Ross more risk averse than \(v\) if

\[
\frac{(-1)^{n-1}u^{(n)}(x)}{(-1)^{m-1}u^{(m)}(y)} \geq \frac{(-1)^{n-1}v^{(n)}(x)}{(-1)^{m-1}v^{(m)}(y)}
\]

for all \(x, y \in [a, b]\). They then show that an n/m-degree Ross more risk averse agent has a higher rate of substitution \(T\), and thus is willing to accept a larger increase in the m\textsuperscript{th}-degree risk to avoid any given increase in the n\textsuperscript{th}-degree risk than is the less risk avverse agent. Alternatively, an n/m-degree Ross more risk averse agent is characterized as the one who chooses a lower level of n\textsuperscript{th}-degree risk when this means accepting a higher level of m\textsuperscript{th}-degree risk.

The “in the small” results differ from the “in the large” results. Liu and Meyer define and justify \((-1)^{n-1}u^{(n)}/(-1)^{m-1}u^{(m)}\), where \(n > m\), as the (absolute) n/m intensity measure of (n\textsuperscript{th}-degree) risk aversion. The two measures \((-1)^{n-1}u^{(n)}/u^{(1)}\) and \(-u^{(n)}/u^{(n-1)}\) proposed by Denuit and Eeckhoudt in very different contexts are special cases of \(m = 1\) and \(m = n - 1\). The authors show that for small risk changes, the rate of substitution \(T\) between an n\textsuperscript{th}-degree risk increase and an n\textsuperscript{th}-degree risk increase is proportional to this n/m-intensity measure and the relative sizes of the risk increases.