

# THE IMPACT OF INSIDER TRADING REGULATIONS ON STOCK MARKET EFFICIENCY: A CRITIQUE OF THE LAW AND ECONOMICS DEBATE AND A CROSS-COUNTRY COMPARISON

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## ABSTRACT

The goal of this Comment is to highlight the disconnect between the theoretical law and economics debate over the merits of insider trading regulations and the empirical body of work regarding the effect of these regulations on stock market efficiency. This Comment first summarizes the theories of insider trading which have heretofore consumed and defined this law and economics debate. It then compares the varied regulatory schemes which have arisen in different countries as a result of the public perception of insider trading and policy makers generally favoring theoretical arguments against insider trading. This Comment then presents three measures of stock market efficiency and reviews the body of empirical work on insider trading as it relates to these efficiency measures. Additionally, a new statistical model is introduced to explore the empirical effects of insider trading regulations on market efficiency, the findings of which are analyzed, critiqued, and ultimately presented as inconclusive. This Comment concludes by proposing that more empirical research is necessary to quell the law and economics debate about the effects and necessity of insider trading regulations in stock markets around the world.

## I. INTRODUCTION

Does individual greed and insider trading hinder or fuel the stock markets that societies depend on for economic growth and opportunity? The answer is not clear. The implications of insider trading on market efficiency remain ambiguous, and the debate over whether and how to regulate it should continue with a greater emphasis placed on empirical evidence rather than academic theory.<sup>1</sup> Insider trading is most often defined as the buying or selling of stocks based on material non-public information; where “material” means relevant to an investor’s decision

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1. *E.g.*, Laura Nyantung Beny, *Insider Trading Laws and Stock Markets Around the World: An Empirical Contribution to the Theoretical Law and Economics Debate*, 32 J. CORP. L. 237, 239 (2007).

whether to buy or sell a stock.<sup>2</sup> The body of theoretical academic work regarding the benefits of regulations prohibiting insider trading is decades old and largely unsettled.<sup>3</sup> In contrast, empirical research about the effects of insider trading regulations has only recently begun to grow in volume and significance.<sup>4</sup> Although empirical findings generally support regulation, this body of work is neither large nor conclusive enough to affirmatively quell the debate.<sup>5</sup>

Different beliefs regarding the impact of insider trading give rise to policy arguments for and against regulations that prohibit it.<sup>6</sup> Proponents of insider trading regulation argue that insider trading reduces market efficiency by increasing volatility<sup>7</sup> and the cost of equity,<sup>8</sup> while also decreasing liquidity and stock price accuracy.<sup>9</sup> As a result, proponents claim that regulations, which prohibit insider trading in publicly traded stock markets, result in greater stock market efficiency.<sup>10</sup> Conversely, opponents of regulation believe that insider trading allows relevant information to be reflected more quickly in the stock price,<sup>11</sup> and that insider trading has no negative effect on stock market liquidity.<sup>12</sup> Opponents of regulation therefore think insider trading should not be illegal and regulations should be reduced because insider trading may actually result in increased stock market efficiency.<sup>13</sup>

Part II of this Comment provides a general summary of the long-standing theoretical law and economics debate over insider trading, followed by an overview of the more recently established empirical body of research surrounding the effects of insider trading. Part III examines the development of insider trading

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2. H.R. REP. NO. 98-355, at 2 (1984).

3. Beny, *supra* note 1, at 239 (“The law and economics debate about the desirability of prohibiting insider trading . . . is both long-standing and unresolved.”).

4. *Id.*; *see infra* Part I.

5. *See infra* Part I.

6. Beny, *supra* note 1, at 239 (“the law and economics approach has advanced the legal policy debate about insider trading [.]”); *see generally* Alexandra Padilla, *How Do We Think About Insider Trading? An Economist’s Perspective on the Insider Trading Debate and Its Impact*, 4 WASH. & LEE J.L. ECON. & POL. 239 (2008) (discussing the impact of the insider trading debate on lawmaking and policy).

7. Julian Du & Shang-Jin Wei, *Does Insider Trading Raise Market Volatility?*, 114 ECON. J. 916, 940 (2004) (finding that insider trading is an important contributor to a “rise in market volatility.”).

8. Uptal Bhattacharya & Hazem Daouk, *The World Price of Insider Trading*, 57 J. FIN. 75, 79 (2002) (“We are interested in finding out whether the existence and enforcement of insider trading laws affect the cost of equity in a country.”).

9. *See, e.g.*, Beny, *supra* note 1, at 248, 251 (summarizing the arguments of advocates of insider trading regulation in regard to stock price informativeness and stock market liquidity).

10. *See id.*

11. HENRY MANNE, *INSIDER TRADING AND THE STOCK MARKET* 80-91(1966) (proposing that insider trading will result in efficient incorporation of information into stock prices). *Accord* Dennis W. Carlton and Daniel R. Fischel, *The Regulation of Insider Trading*, 35 STAN. L. REV. 857, 79; Beny, *supra* note 1, at 246-53.

12. *See, e.g.*, Beny, *supra* note 1, at 250-52 (summarizing the arguments of opponents of insider trading regulation in regard to stock market liquidity).

13. *See id.*

regulations in the United States and around the world. Part IV then discusses three measures of stock market efficiency. The first is the extent to which a stock's price reflects the information about that stock. If the stock's price reflects *all* the information concerning the stock, there are no informational asymmetries.<sup>14</sup> The second measure is the extent to which the market is liquid. If there are no informational asymmetries, then the stock's price reflects all the information about the stock and the market is completely liquid.<sup>15</sup> The third measure is the extent to which stock prices are volatile over the long run. If the market is completely liquid, the stock prices are not volatile over the long run.<sup>16</sup>

In Part V, an original statistical model is introduced to test hypotheses regarding the effects of insider trading regulations on stock market efficiency. In setting up my regression analysis, I attempt a new measurement of the actual strength of regulation enforcement because, to date, this regulation component has not been successfully quantified.<sup>17</sup> The statistical results of the regression analysis (provided in Annex A) are inconclusive due to multicollinearity in the data. Although I cannot empirically reject the hypothesis that insider trading regulations *do not* affect efficiency, the theoretical arguments favoring regulations are too strong to allow my acceptance of this hypothesis. The inconclusive nature of my empirical analysis indicates that whether regulations prohibiting insider trading are good or bad is an extraordinarily complicated question, and one which has been left unanswered by modern scholarship. Part VI concludes that these findings coupled with the lack of a substantial body of conclusive empirical research show that the debate over the merits of insider trading regulations is far from over. Moreover, the continuation and eventual resolution of this debate is increasingly relevant given the current tumultuous economic times, where questions regarding the effectiveness of securities regulation have arisen due to failures in the financial system - failures linked in part to the greed of insiders.<sup>18</sup>

## II. THE LAW AND ECONOMICS DEBATE ON INSIDER TRADING REGULATIONS

The law and economics debate over whether insider trading is beneficial for stock markets and in turn whether it should be regulated, has academics,

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14. See Randall Morck, Bernard Yeung & Wayne Yu, *The Information Content of Stock Markets: Why Do Emerging Markets Have Synchronous Stock Price Movements?*, 58 J. FIN. ECON. 215, 216 (2000) ("Stock returns reflect new market-level and firm-level information.")

15. E.g., Beny, *supra* note 1, at 249-52.

16. Du & Wei, *supra* note 7, at 916.

17. See generally e.g., Simeon Djankov et. al, *The Law and Economics of Self Dealing*, 88 J. FIN. ECON. 430, 451 (2008).

18. See e.g., *How to Fix Finance: An influential group makes some provocative proposals for re-regulating global finance*, THE ECONOMIST, Jan. 15, 2009, [http://www.economist.com/finance/displaystory.cfm?story\\_id=12958209](http://www.economist.com/finance/displaystory.cfm?story_id=12958209) ("With the fires still raging, scorching industry after industry, it might seem premature to ask what should rise from the ashes. But policymakers are understandably keen to start work on redesigning their financial systems. If 2008 was the year when the flaws in the old model became painfully clear, 2009 is likely to be the one when governments embrace re-regulation in an effort to fix it.")

politicians, and the public on either side of the fence.<sup>19</sup> The debate has focused on two main theories of insider trading—agency theory and market theory.<sup>20</sup> Agency theory focus on the micro-economic, firm-level perspective and address the effects of insider trading on the corporate agency problem—the conflict of interests among managers, directors, and shareholders.<sup>21</sup> Market theory moves from the firm level to a macro-economic, broader perspective and address the effects of insider trading on market efficiency.<sup>22</sup> To limit the scope of this analysis, only market level theories are addressed.

The theoretical debate looks at market failures as they affect a hypothetical securities market and how government regulation can fix these failures.<sup>23</sup> In contrast to this largely abstract debate, empirical research uses real world data to scientifically analyze the effects of insider trading regulations.<sup>24</sup> Policy decisions about securities market regulations largely stem from the former discipline.<sup>25</sup> To fully understand the effects of insider trading and whether it should be regulated, this Comment presents the strengths and short comings of conclusions drawn from both the theoretical law and economics studies and real world empirical research.

#### ***A. The Theoretical Law and Economics Debate on Insider Trading Regulations***

Law and economics scholars have debated the merits of insider trading and its impact on the market since Henry Manne's seminal book, *Insider Trading and the Stock Market*, was published in 1966.<sup>26</sup> Prior to 1966, it was generally agreed that insider trading should be regulated.<sup>27</sup> Microeconomic theory asserts that when left alone, buyers and sellers will reach an efficient market equilibrium where demand exactly matches supply and everyone is satisfied.<sup>28</sup> This theory is predicated on the

19. See generally Padilla, *supra* note 6, at 239 (discussing the influence of the insider trading on lawmakers, policymakers, and the general public).

20. Beny, *supra* note 1, at 241 (“Law and economics theories about insider trading fall into two main categories: agency theories and market theories[.]”).

21. *Id.* (“Agency theories of insider trading analyze effect on the classic corporate agency problem, the manager-shareholder conflict of interest.”).

22. *Id.* (“market theories of insider trading address its broader ramification for market efficiency.”).

23. *Cf.* Beny, *supra* note 1, at 239-40 (discussing the theoretical nature of existing scholarship and the narrow effects of insider trading on efficiency at the firm level).

24. See *id.* at 240 (explaining the importance of empirical and comparative research with respect to the insider trading debate).

25. See *id.* at 239-40 (noting the importance of the insider trading debate on policy and the dichotomy between firm level and market level theories).

26. See e.g., Padilla, *supra* note 6, at 239-40.

27. *Id.* at 240 (noting that Manne's work “challenged the conventional wisdom that insider trading had to be regulated[.]”).

28. See e.g., TRUMAN F. BEWLEY, GENERAL EQUILIBRIUM, OVERLAPPING GENERATIONS MODELS, AND OPTIMAL GROWTH THEORY, Chapter 1: Why Study Equilibrium? (Harvard Univ. Press 2007), available at <http://cowles.econ.yale.edu/books/bewley/ge.htm> (“The economy is said to be in *equilibrium* when all markets *clear*, that is, when the total demand for each commodity equals the total supply. Since demands and supplies depend on prices, these are part of the

assumption that buyers and sellers have access to the same information.<sup>29</sup> Additionally, the government should only step in when one of four market failures is present:<sup>30</sup> a monopoly, an externality,<sup>31</sup> a public good,<sup>32</sup> or asymmetric information.<sup>33</sup> As for the stock market, it is the existence of asymmetric information between insiders and outsiders that has historically justified government intervention in the form of prohibiting insider trading.<sup>34</sup>

Manne refused to accept this maxim and injected into academia and public policy the radical idea that, “when one takes the time to *rigorously* and *scientifically* analyze insider trading, it is no longer an apodictic truth that . . . we should come down [so harshly] on insiders.”<sup>35</sup> Manne argued that by trading on nonpublic material information, insiders contributed to improving the informational efficiency of stock prices by allowing firm information to be quickly and cheaply reflected in prices.<sup>36</sup> The traditionalists’ response to the implications of Manne’s argument was “immediate and vitriolic.”<sup>37</sup> Over the past four decades legal and economic scholars have responded to Manne’s suggestion in a variety of ways.<sup>38</sup> Two such scholars describe the disparity of these responses:

[I]nsider trading remains, at least among economists and legal scholars, one of the most controversial economic transactions. A substantial body of academic and legal scholarship questions whether insider trading is even harmful, much less worthy of legal action. The views on insider trading range from moral revulsion to positive evaluations of its economic benefits. In turn, many scholars support the current restrictions

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description of equilibrium . . . . The main conclusions of general equilibrium theory are that competitive equilibria exist and are efficient in the sense that there is no other attainable economic state that would make some consumer better off and none worse off.”)

29. See John Sloman, *Asymmetric Information and Market Failure*, TEACHING, BUS. & ECON., Autumn 2006, available at: [http://findarticles.com/p/articles/mi\\_qa3889/is\\_200610/ai\\_n17192783/](http://findarticles.com/p/articles/mi_qa3889/is_200610/ai_n17192783/) (last visited Oct. 27, 2009) (explaining the importance of information in reaching a market equilibrium).

30. See generally HAL R. VARIAN, MICROECONOMIC ANALYSIS, Chapters 23-25 (3rd ed., W.W. Norton & Company 1992) (1978) (chapters addressing market failures in a private market).

31. *Id.* at 432 (defining “externality” as “[w]hen the actions of one agent directly affect the environment of another agent.”).

32. *Id.* at 414 (defining “public goods” as “[g]oods that are not excludable and are nonrival”; like “police and fire protection” or “highways”).

33. *Id.* at 440 (defining “asymmetric information” as information that “one economic agent knows . . . that another economic agent doesn’t.”).

34. *E.g.*, Beny, *supra* note 1, at 250 (“Insider trading is profitable because of the asymmetry between insiders and outsiders.”).

35. Padilla, *supra* note 6, at 241 (referring to John Shad’s “hobnail boots” expression as related to insider trading used in a speech when he took office in 1981).

36. See generally, MANNE, *supra* note 11, at 80-91. Manne sets forth the idea that insider trading can be an efficient compensation method within firms, but seeing as this relates to firm theory of insider trading, it will not be addressed in this paper.

37. Padilla, *supra* note 6, at 243.

38. *E.g.*, *Id.* (“[a] very prolific literature emerged that went beyond just trying to prove Manne was right or wrong.”).

placed on insider trading while others advocate a laissez-faire government policy.<sup>39</sup>

These varied responses originated from the differences in the criteria used to evaluate insider trading and the differences in assumptions about the importance of the distinct effects of insider trading activity on overall economic well-being.<sup>40</sup> Law and economics literature on insider trading is not grounded in empirical evidence and instead is “largely speculative and theoretical,”<sup>41</sup> yet resolution of the debate is ultimately an empirical question.<sup>42</sup> As the excerpt suggests, the implication of this debate is of particular importance,<sup>43</sup> namely in regard to whether insider trading should be deregulated rather than subjected to increasing regulation.<sup>44</sup>

### ***B. Empirical Evidence on the Effects of Insider Trading Regulations***

Empirical research on the topic of insider trading has significantly lagged behind the theoretical debate.<sup>45</sup> In the thirty years after Manne’s seminal book was published, the academic debate over insider trading flourished, public awareness of insider trading grew, and regulations against insider trading increased.<sup>46</sup> However, little empirical research was conducted during this time to determine who was right: Manne or the traditionalists.<sup>47</sup> Moreover, the existing empirical research was American-centered and the lack of cross country comparative studies allowed little to be gleaned regarding the effect of regulations.<sup>48</sup>

Finally, in 1997, Professors La Porta, Lopez-de-Silanes, and Shleifer published *The Legal Determinants of External Finance*, which incorporated survey data from forty-nine countries.<sup>49</sup> Over the past decade the body of empirical

39. Jie Hu and Thomas Noe, *The Insider Trading Debate*, FEDERAL RESERVE BANK OF ATLANTA ECONOMIC REVIEW 34, 34 (1997), available at: <http://www.frbatlanta.org/invoke.cfm?objectId=227E966B-9568-11D5-898300609459DBE6&method=display> (last visited Oct. 15, 2009).

40. See *infra* Part III (further examining these arguments).

41. Beny, *supra* note 1, at 240.

42. See Carlton & Fischel, *supra* note 11, at 866 (noting that “the desirability of regulating insider trading is ultimately an empirical question.”).

43. See Hu & Noe, *supra* note 39, at 34.

44. See *e.g.*, *id.*

45. Beny, *supra* note 1, at 240 (noting that much of the law and economics literature is “insufficiently grounded in empirical evidence”); Du & Wei, *supra* note 7, at 917 (noting that “[r]elative to the active theoretic modelling [sic], empirical work on the subject is lagging behind.”).

46. See *e.g.*, Padilla, *supra* note 6, at 240.

47. See Beny, *supra* note 1, at 240 (noting the dearth of empirical evidence about the effectiveness of insider trading regulations).

48. See *e.g.*, *id.* (“until recently the existing empirical literature on insider trading has been largely American-centered. Few scholars have sought to examine the impact of insider trading regulations in a comparative context. This is important because, without variation in insider trading rules, one cannot test causal hypotheses.”); see also Bhattacharya & Daouk, *supra* note 8, at 77 (“nearly all empirical research has been concentrated in the United States.”).

49. Rafael La Porta, et al., *Legal Determinants of External Finance*, 52 J. FIN. 1131 (Jul.

research using comparative data has grown but is still small in comparison to the theoretical scholarship.<sup>50</sup> Other notable scholars have attempted to determine whether insider trading regulations hurt or help market efficiency; their findings generally suggest a positive association between insider trading laws and more efficient stock markets.<sup>51</sup>

Three major short-comings plague the body of existing empirical research: 1) the lack of a single measure of market efficiency,<sup>52</sup> 2) data recycling,<sup>53</sup> and 3) the need for more comprehensive international data sets.<sup>54</sup>

First, scholars have not agreed on what is the single, most relevant measure of market efficiency.<sup>55</sup> Instead, studies have addressed the effects of insider trading on a wide variety of efficiency measures, including: stock market development,<sup>56</sup>

1997).

50. See Beny, *supra* note 1, at 240 (discussing the lack of empirical research about the effectiveness of insider trading regulations); compare Padilla, *supra* note 6, at 243-45 (discussing the scope and magnitude of scholarship in response to Manne's book); and MANNE, *supra* note 11; with La Porta et. al., *Legal Determinants*, *supra* note 49 (one of the first empirical studies published in 1997).

51. See Beny, *supra* note 1, at 237 (finding that "more stringent insider trading laws are generally associated with more dispersed equity ownership, greater stock price accuracy and greater stock market liquidity."); Bhattacharya & Daouk, *supra* note 8, at 75 (finding that the cost of equity in a country decreases after the first insider trading prosecution); Du & Wei, *supra* note 7, at 916 (finding that countries with more prevalent insider trading have more volatile stock markets); Rafael La Porta, Florencio Lopez-de-Salines, and Andrei Shleifer, *What Works in Securities Laws?*, 61 J. OF FIN. 1, 1 (2006) (finding "little evidence that public enforcement benefits stock markets, but strong evidence that laws mandating disclosure and facilitating private enforcement through liability rules benefit stock markets."); La Porta, et al., *Legal Determinants of External Finance*, *supra* note 49, at 1131 (finding that "countries with poorer investor protections, measured by both the character of legal rules and the quality of law enforcement, have smaller and narrower capital markets."); David A. Lesmond, *Liquidity of Emerging Markets*, 77 J. OF FIN. ECON. 411, 411 (2005) (finding that countries with weak political and legal systems have higher liquidity costs); Morck et al., *supra* note 14, at 216 (finding that firm specific return variation found in developed countries is associated with stronger public investor rights); *contra* Djankov et al., *supra* note 17, at 451 (finding that "there is no relation between public enforcement and stock market capitalization.").

52. Beny, *supra* note 1, at 239; see also sources cited *supra* note 51.

53. See Margaret Law, *Reduce, Reuse, Recycle: Issues in the Secondary Use of Research Data*, IASSIST Q., Spring 2005, at 6-7, available at <http://www.iassistdata.org/publications/iq/iq29/iqvol291law.pdf> ("Some writers have also proposed a negative effect on 'good science', brought about as a result of too much data-sharing. 'It is a lot easier, faster, and less costly to obtain someone else's data than it is to design a study, recruit participants, collect and analyze data'." (internal citations omitted)); see generally Michael Chau, Reynold Cheng & Ben Kao, *Uncertain Data Mining: A New Research Direction* § 1 (Dec. 7-8, 2005) (proceedings of the Workshop on the Science of the Artificial, Hualien, Taiwan), available at [http://www.fbe.hku.hk/~mchau/papers/UncertainDataMining\\_WSA.pdf](http://www.fbe.hku.hk/~mchau/papers/UncertainDataMining_WSA.pdf) (noting the use of outdated data as a cause for uncertainty).

54. E.g., Du & Wei, *supra* note 7, at 917 (discussing the difficulty of empirical study concerning insider trading due to the lack of an international data set of insider trading cases).

55. Beny, *supra* note 1, at 239; see also *supra* note 51.

56. Djankov et. al., *supra* note 17, at 452 (finding that private enforcement and not public

stock market volatility,<sup>57</sup> the cost of equity,<sup>58</sup> stock market liquidity,<sup>59</sup> ownership concentration,<sup>60</sup> stock price synchronicity,<sup>61</sup> and the bid-ask spread.<sup>62</sup> Consequently, this lack of a consensus results in the body of empirical work appearing disjointed.<sup>63</sup> Although these researchers generally agree that regulations increase efficiency, questions remain about which specific components of the regulation have the greatest effects on market efficiency.<sup>64</sup> Agreeing on a single locus of efficiency (or at least a narrower range of measures) will grant the cohesion necessary to bring public attention to the regulation debate and give the debate the political and academic support necessary for its eventual resolution.

The lack of consensus also facilitates data recycling, resulting in the scholarship becoming repetitive.<sup>65</sup> Data recycling occurs when data is first collected and used as an independent variable by one researcher as a determinant of what she believes to be the most relevant measure of market efficiency.<sup>66</sup> Later, the same data set is recycled and used in studies concerned with different measures of market efficiency.<sup>67</sup> This data eventually becomes stale and outdated.<sup>68</sup> The outdated nature of much of the existing data compromises the applicability and relevance of conclusions drawn in these studies.<sup>69</sup> Data recycling coupled with

enforcement, predicts more developed stock markets).

57. See Du & Wei, *supra* note 7, at 916 (finding that prevalent insider trading is associated with higher market volatility).

58. See Bhattacharya & Daouk, *supra* note 8, at 75 (finding that the cost of equity in a country decreases after the first insider trading prosecution).

59. See Lesmond, *supra* note 51, at 446 (finding that countries with weak political and legal systems have higher liquidity costs); Beny, *supra* note 1, at 237 (finding that more stringent insider trading laws are generally associated with greater stock market liquidity).

60. See Beny, *supra* note 1, at 237 (finding “more stringent insider trading laws are generally associated with more dispersed equity ownership.”).

61. See *id.* (finding a relationship between stringent insider trading laws and a more efficient stock market as measured by equity ownership, stock market accuracy and market liquidity); Morck et al., *supra* note 14, at 258 (showing that providing public shareholders with stronger legal protection against corporate insiders is linked with greater firm specific return variation).

62. Lesmond, *supra* note 51, at 445.

63. See generally, Beny, *supra* note 1, at 240 (“Researchers who focus their studies at different levels and report different results could be talking past each other.”).

64. See *supra* note 51; see also Beny, *supra* note 1, at 251.

65. See generally *supra* note 51 (the cited authorities rely on much of the same data).

66. See generally, e.g., Bhattacharya & Daouk, *supra* note 8, at 79 (using secondary data and adjusting for different variables).

67. See generally Ted Goertzel, *Myths of Murder and Multiple Regression*, 26 SKEPTICAL INQUIRER 19, 21 (Jan./Feb. 2002), available at <http://crab.rutgers.edu/~goertzel/mythsofmurder.htm> (“It is quite common, even typical, for rival studies to be published using econometric methods to reach opposite conclusions about the same issue. Often there is nothing demonstrably wrong with either of the analyses. They simply use slightly different data sets or different techniques to achieve different results. It seems as if regression modelers can achieve any result they want without violating the rules of regression analysis in any way.”).

68. *Id.* at 23.

69. *Id.*

disagreement as to a single locus of efficiency has eroded the strength of the body of empirical research on insider trading regulations.

Scholars are in agreement concerning the third shortcoming of current research—the dearth of two important data sets. The first data set is one which would measure the frequency of illegal insider trading in any given country,<sup>70</sup> but such data is unavailable due to the practical obstacle that most trading reports are filed by managers who are unlikely to report their own violations or violations of friends and colleagues.<sup>71</sup> Additionally, no data set exists measuring how frequently and with what strength laws against insider trading are enforced in any country.<sup>72</sup> One scholar recognized that her analysis would greatly benefit from the knowledge of “how regularly a country’s insider trading laws have been enforced[,] and not merely whether they have been enforced [just] once.”<sup>73</sup>

The lack of a comprehensive international data set raises the question of what is the most important component of regulation in influencing efficiency: the mere presence of the law, the scope of activity prohibited, the severity of possible sanctions, or the strength of enforcement?<sup>74</sup> To sufficiently address this question, the ideal data set would include the results of all insider trading prosecutions from a large sample of countries.<sup>75</sup> This data set would contain the success rate of prosecutions in those cases, as well as the criminal sanction(s) actually imposed (e.g. years in jail), and/or monetary sanctions. More complete data can guide policy makers in developing and enforcing laws which result in greater market efficiency.

### III. AN OVERVIEW OF INSIDER TRADING REGULATIONS IN THE UNITED STATES AND ABROAD

Insider trading regulations are complicated and vary across the globe.<sup>76</sup> The insider trading debate would not be present if there was global consensus regarding the necessity of regulations and how to best design and enforce them. To understand the complexity and diversity of these regulations, the next section provides an overview of the evolution of U.S. securities law, followed by a summary of insider trading regulation elsewhere.

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70. *E.g.*, Bhattacharya & Daouk, *supra* note 8, at 77 (discussing the difficulty of empirical study concerning insider trading due to the lack of an international data set of insider trading cases).

71. *Id.*

72. *See generally* Du & Wei, *supra* note 7, at 921 (asserting that lack of information on the severity and rigor of enforcement provides an imperfect description of enforcement).

73. Beny, *supra* note 1, at 281.

74. *E.g.* Du & Wei, *supra* note 7, at 921.

75. *Id.* (explaining that currently collected data paints an incomplete picture).

76. *E.g.*, Du & Wei, *supra* note 7, at 921.

### A. *Insider Trading Regulations in the United States*

The United States is widely perceived as having the most comprehensive and strongly enforced laws against insider trading.<sup>77</sup> The U.S. Securities and Exchange Commission (SEC) is the government agency responsible for regulating U.S. securities markets; its stated mission is “to protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation.”<sup>78</sup>

From the fictional Gordon Gekko’s speech in the 1987 film, *Wall Street*,<sup>79</sup> to Bernie Madoff’s real-life Ponzi Scheme in 2008,<sup>80</sup> the American investing public’s perception of insider trading as a villainous crime has been cemented.<sup>81</sup> Linda Chatman Thomsen, former Director of the SEC’s Division of Enforcement explores the fascination with insider trading, noting:

Of all financial crimes, insider trading has a unique hold on the American popular imagination. Other types of schemes are either too complex for people to understand or too mundane to excite them. But insider trading, in its most basic form, possesses all of the elements of great drama. It starts with a secret, a piece of precious knowledge that can make its owner rich. Then comes the betrayal, an individual turning away from duty toward self-enrichment. Throw some complicated personal and family ties into the mix, which, for whatever reason, are almost inevitably present in these cases. And finally, spice up the whole story with some old-fashioned detective work, since it is usually a note, a record of a telephone call, or the painstaking analysis of a mountain of trading records, that breaks the case open. These stories have beginnings, and middles, and ends, and their progress has all the rising and falling action of a good thriller.<sup>82</sup>

The Stock Market Crash of 1929 and resulting Great Depression spurred development of federal securities laws and the creation of the SEC.<sup>83</sup> Prior to the Crash, companies issued stock indiscriminately to brokers who then sold this stock

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77. *Id.* at 919-20.

78. How the SEC Protects Investors, Maintains Market Integrity, and Facilitates Capital Formation, <http://www.sec.gov/about/whatwedo.shtml> (last visited Oct. 10, 2009) [*hereinafter* The Investor’s Advocate].

79. *Wall Street*, Twentieth Century Fox Films Corp. (1987) (“The point is, ladies and gentleman, that greed, for lack of a better word, is good. Greed is right; greed works. Greed clarifies, cuts through, and captures the essence of the evolutionary spirit. Greed, in all of its forms; greed for life, for money, for love, knowledge has marked the upward surge of mankind. And greed, you mark my words, will not only save Teldar Paper, but that other malfunctioning corporation called the U.S.A. Thank you very much.”).

80. See Julie Creswell and Landon Thomas Jr., *The Talented Mr. Madoff*, N.Y. TIMES, Jan. 25, 2009, at BU1 (describing Madoff’s scheme which involved attracting investment by posting reliable returns and projecting an aura of trustworthiness, but ultimately lying to investors).

81. E.g., Linda Chatman Thomsen, *Remarks Before the Australian Securities and Investments Commission 2008 Summer School: U.S. Experience of Insider Trading Enforcement* (Feb. 19, 1998) <http://www.404.gov/news/speech/2008/spch021908lct.htm>; See U.S. v. Stewart, 433 F.3d 273, 279 (2006) (upholding conviction against known celebrity homemaker, Martha Stewart, for perjury relating to an allegation of insider trading).

82. Thomsen, *supra* note 81.

83. *Id.*

to investors based on promises of huge returns, but with little disclosure of important company information.<sup>84</sup> These promises rarely had a substantive basis and were often fraudulent.<sup>85</sup> After the Crash, Congress passed the Securities Act of 1933,<sup>86</sup> followed by the Securities Exchange Act of 1934,<sup>87</sup> in an effort to restore investor confidence in U.S. securities markets. The two underpinning notions of the legislation were:

[1] Companies publicly offering securities for investment dollars must tell the public the truth about their businesses, the securities they are selling, and the risks involved in investing. [2] People who sell and trade securities – brokers, dealers, and exchanges – must treat investors fairly and honestly, putting investors’ interests first.<sup>88</sup>

Insider trading is specifically prohibited by two federal statutes, the Securities Exchange Act of 1934<sup>89</sup> and the Insider Trading Sanctions Act of 1984;<sup>90</sup> and one Congressional Act, the Insider Trading and Securities Fraud Enforcement Act of 1988.<sup>91</sup> An insider is any “person who is directly or indirectly the beneficial owner of more than 20 percent of any class of any [registered] security. . . or who is a director or an officer of the issuer”<sup>92</sup> In other words; an insider can be a director, officer, or principal shareholder of the traded entity. The Supreme Court has further held that in addition to permanent insiders of a corporation (i.e. officers and directors), insider trading regulations also apply to temporary insiders who have a fiduciary duty to the company during the time period they work for or represent that company.<sup>93</sup> These temporary insiders include attorneys, accountants, and consultants.<sup>94</sup>

Until 1997, cases regarding insider trading were primarily concerned with the scope of individuals covered by regulations, and turned on whether the defendant had a fiduciary duty to the company - be it permanent or temporary.<sup>95</sup> Moving away from the pure question of fiduciary duty, in *United States v. O’Hagan*, the Supreme Court held that SEC Rule 14e-3 made it illegal for anyone to trade on

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84. Deepa Sarkar, Cornell Law School Securities Law Clinic, *Securities Law History*, [http://topics.law.cornell.edu/wex/securities\\_law\\_history](http://topics.law.cornell.edu/wex/securities_law_history) (last visited Oct. 10, 2009).

85. *Id.*

86. The Investor's Advocate, *supra* note 78.

87. 15 U.S.C. §§ 78a (1934) *et seq.*

88. The Investor's Advocate, *supra* note 78.

89. 15 U.S.C. §§ 78a-78nn (1934).

90. Pub. L. No. 98-376, 98 Stat. 1264 (1984) (codified as amended at 15 U.S.C. §§78a-78nn (1984)).

91. Pub. L. No.100-704, 102 Stat. 4677 (1988).

92. 15 U.S.C. § 78p(a)(1) (2002).

93. *See Dirks v. SEC*, 463 U.S. 646, 655, n.14 (1983).

94. *Id.*

95. *See United States v. O’Hagan*, 521 U.S. 642, 652 (1997) (defendant who purchased stock based on inside information that he acquired as member of law firm representing offeror company was found guilty of securities fraud in violation of Rule 10b-5 under misappropriation theory).

material non-public information regarding any tender offer.<sup>96</sup> This became known as the “misappropriation theory” wherein “a person commits fraud in connection with a securities transaction, and thus violates § 10(b) and Rule 10b-5, when he misappropriates confidential information for securities trading purposes, in breach of a duty owed to the source of the information.”<sup>97</sup>

Under the misappropriation theory anyone who misappropriates information from their employer and trades *any* stock, not just the stock of his employer, has committed the crime of insider trading.<sup>98</sup> Rather than predicating guilt on an agent’s or fiduciary’s breach of the duty owed to the company, the misappropriation theory bases liability on the agent’s or fiduciary’s deception of those principals who entrusted the confidential information to him.<sup>99</sup> The scope of trading activity covered by insider trading regulations under the misappropriation theory is far wider than the scope of activity forbidden by the agency theory.<sup>100</sup>

Concern for protecting the public is echoed throughout opinions interpreting provisions and definitions in the Securities Exchange Act.<sup>101</sup> Specifically, the courts recognize the importance of access to information about a company in facilitating fair securities dealings.<sup>102</sup> Congress largely leaves interpretation of securities laws to the SEC and the courts.<sup>103</sup> Arguments against regulating insider trading have been given little authority in the U.S. political arena or the courts.<sup>104</sup> Evidence of this disregard is the increasing number of regulations against insider trading passed by Congress and the increasing scope these regulations are given by the courts.<sup>105</sup> The evolution of regulations and the enforcement of these regulations by the courts echo the negative public perception of insider trading and indicate that insider trading will continue to be prohibited.

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96. *Id.* at 672.

97. *Id.*; see also Du & Wei, *supra* note 7, at 919.

98. *O’Hagan*, 521 U.S. at 652.

99. *Id.* at 643 (“Misappropriation, as just defined, is the proper subject of a § 10(b) charge because it meets the statutory requirement that there be ‘deceptive’ conduct ‘in connection with’ a securities transaction. First, misappropriators deal in deception: A fiduciary that pretends loyalty to the principal while secretly converting the principal’s information for personal gain dupes or defrauds the principal. A company’s confidential information qualifies as property to which the company has a right of exclusive use; the undisclosed misappropriation of such information constitutes fraud akin to embezzlement.”).

100. *See id.*

101. *E.g.*, *Tcherepnin v. Knight* 389 U.S. 332, 336 (1967).

102. *See id.*

103. *E.g.*, *Beny*, *supra* note 1, at 239; *Padilla*, *supra* note 6, at 241.

104. *E.g.* *United States v. O’Hagan*, 521 U.S. at 652 (cases which have extended the scope of laws prohibiting insider trading); see *supra* notes 89-92 and accompanying text (All regulations involving insider trading in the United States have further prohibited the practice).

105. *See generally* Thomas Newkirk, SEC Staff, *Insider Trading – A U.S. Perspective at the 16th International Symposium on Economic Crime* (Sept. 19, 1998), <http://www.sec.gov/news/speech/speecharchive/1998/spch221.htm> (explaining the legislative and judicial history of insider trading laws in the United States).

### ***B. Insider Trading Regulations Around the World***

The negative public perception of insider trading and those who commit it is not as strong in countries outside of the United States,<sup>106</sup> particularly in those countries with historically hierarchical societies.<sup>107</sup> In a hierarchical society, the idea that a few top individuals are allowed access to better information than the general public is an accepted concept.<sup>108</sup> In contrast, this very proposition offends the foundations of equality upon which the American Dream was built.<sup>109</sup>

In countries other than the United States, the definition of insider trading and enforcement of insider trading regulations vary greatly.<sup>110</sup> First, regarding definition, the actions that constitute insider trading differ across countries.<sup>111</sup> For example, some countries do not prohibit trading by tpees or misappropriators (e.g. corporate outsiders: attorneys, accountants, and consultants).<sup>112</sup> Second, the extent of regulation and how strictly it is enforced varies greatly among countries.<sup>113</sup> European countries treat insider trading as a criminal offense in accordance with the European Community Directive Coordinating Regulations on Insider Trading,<sup>114</sup> yet enforcement is much stronger in some European nations than in others.<sup>115</sup> South Africa prohibits insider trading with severe penalties, but rarely enforces these regulations.<sup>116</sup> In contrast, Hong Kong treats insider trading as a lesser civil offense, yet enforcement is vigorous and fines are severe.<sup>117</sup> China prohibits insider trading, nevertheless it occurs frequently and remains largely unchecked.<sup>118</sup> The magnitude with which regulations prohibiting insider trading differ across countries reveals the lack of a popular consensus outside of the United States about the immorality, illegality, and harmfulness of insider

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106. Du & Wei, *supra* note 7, at 919.

107. *See generally* Newkirk, *supra* note 105 (“Germany and Italy, in particular, have had trouble surmounting cultures which traditionally viewed insider trading as an acceptable practice . . . [In Italy] ‘[i]n spite of the passage of laws on takeovers and insider trading since 1992, the bourse has not shaken its reputation as a fiefdom of an inward-looking financial community that treats small shareholders shabbily.’” (quoting Robert Graham, *New Broom for Bourse: The Head of Italy's Stock Market Watchdog Outlines His Plans*, FIN. TIMES (London), Mar. 24, 1997, at 22)).

108. *Id.*

109. *See id.*

110. *E.g.*, Du & Wei, *supra* note 7, at 920.

111. *Id.*

112. *E.g., id.*; *see also* Beny, *supra* note 1, at 287 (“Tipee equals one if tpees, like corporate insiders, are prohibited from trading on material non-public information, that they have received from corporate insiders.”).

113. *E.g.*, Du & Wei, *supra* note 7, at 920-21.

114. Council Directive 89/592, Coordinating Regulations on Insider Trading, 1989 O.J. (L 334).

115. Du & Wei, *supra* note 7, at 920.

116. *Id.*

117. *Id.* at 920-21.

118. *Id.* at 921.

trading.<sup>119</sup> Moreover, variation across regulatory schemes is indicative of the lack of concrete evidence about the effects and necessity of insider trading regulations.<sup>120</sup>

#### IV. MEASURES OF STOCK MARKET EFFICIENCY

The economic concept of market efficiency is ambiguous in practice and application, particularly in relation to the stock market.<sup>121</sup> The efficient stock market hypothesis holds that a perfectly efficient stock market is informationally efficient, meaning that the price of any tradable asset (stock, bonds, options, etc.) is accurate in reflecting all known information about that asset.<sup>122</sup> But, *fair* stock prices necessitate that all market participants, insiders and mom and pop investors, have access to the *same* information.<sup>123</sup> Informational asymmetry may contribute to a decrease in liquidity below what is socially optimal and efficient,<sup>124</sup> and an increase in long term volatility above what is socially optimal and efficient.<sup>125</sup> Existence of any of these three market failures: informational asymmetry, under provision of liquidity (a public good), and overprovision of volatility (a public good), support government intervention to help the market reach an efficient equilibrium, to the benefit of all investors.<sup>126</sup> However, if these market failures do exist but the public sector is able to effectively regulate the market, their effects will essentially disappear and will no longer be empirically measurable.<sup>127</sup>

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119. *See generally id.* at 920-21 (describing the wide variety of laws which exist outside of the United States).

120. *Id.*

121. *See* Beny, *supra* note 1, at 240 (discussing how scholars have yet to agree on any one measure of stock market efficiency).

122. *E.g.*, Jean-Jacques Laffont & Eric S. Maskin, *The Efficient Market Hypothesis and Insider Trading on the Stock Market*, 98 J. POL. ECON. 70, 70 (1990); *see* SMART ET AL., CORPORATE FINANCE 381 (Thomson South-Western 2d ed. 2007) (“Informational efficiency refers to the tendency for prices in a market to fully incorporate new, relevant information.”).

123. Beny, *supra* note 1, at 259-60.

124. *See id.* at 261 (“Some microstructure studies in the finance literature show that a high degree of asymmetric information among traders can lead to greater transaction costs in trading, thus compromising market liquidity.”)

125. Volatility depends on how accurately stock prices serve as signals for resource allocation and the accuracy of stock prices depends on the extent to which prices reflect all information about that stock. *See generally* Du & Wei, *supra* note 7, at 916-17 (explaining that market volatility is a function of how much people want to save and invest and that stock prices are supposed to serve as signals resource allocation).

126. *E.g.*, VARIAN, *supra* note 30, at 414, 440 (stating that public goods will always be underprovided by the private sector and explaining the problems associated with asymmetric information); Sloman, *supra* note 29.

127. *See generally* VARIAN, *supra* note 30, at 414-39 (if the market failure is fixed, it will no longer cause problems).

### A. *Insider Trading and Stock Price Informativeness*

An insider who trades on material non-public information will buy stock when it is priced less than its true value<sup>128</sup> and will sell stock when the price surpasses its true value,<sup>129</sup> able to benefit from the non-public information they are privy to.<sup>130</sup> This price includes public information regarding the current state of the corporation, information known about the corporation's future, and information about how outside market forces will affect this corporation.<sup>131</sup> In other words, stock returns reflect both firm-specific and market-level information.<sup>132</sup> "The extent to which stocks move together depends on the relative amounts of firm-level and market-level information capitalized into stock prices."<sup>133</sup> The market information incorporated in stock's price is ideally the same for every stock.<sup>134</sup>

Therefore, the more stock prices in a market move together, the less firm-specific information is being incorporated into those prices in proportion to market information.<sup>135</sup> This is referred to as stock price synchronicity.<sup>136</sup> Randall Morck's study calculated an international cross-section data set of stock price synchronicity and used this measure as an independent variable in his regression analysis.<sup>137</sup> The study found "significantly more firm specific variation in stocks in developed countries that provide better protection of public shareholders against corporate insiders."<sup>138</sup> Laura Nyantung Beny then recycled Morck's data set and used it as a dependent variable in her regression analysis to conclude that countries who subject inside traders to greater criminal and monetary sanctions have more informative stock prices.<sup>139</sup>

When combined, Beny's and Morck's findings suggest that investors are better protected by having insider trading laws that carry severe consequences; but, this proposition is by no means definitive. Morck and his partners openly invite critique of their analysis, recognizing that their interpretations of the regression

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128. *See infra* note 145 (defining true value).

129. *E.g.*, SMART ET AL., *supra* note 122 (According to the Capital Asset Pricing Model (CAPM), a stock with a higher expected return would be under-priced and investors will snap up the stock, driving up its price. Conversely, if an asset is overpriced, investors will divest their holdings of that stock, driving its price down and expected return up.).

130. *Id.*

131. *E.g. id.* at 381 (describing the importance of the efficient market hypothesis which asserts that financial asset prices fully reflect all available information).

132. Morck et al., *supra* note 14, at 216; *see also* SMART ET AL. *supra* note 122, at 381-84.

133. Morck et al., *supra* note 14, at 216, internal citations omitted.

134. *Id.*

135. *Id.*

136. *Id.*

137. *Id.* at 222 (explaining the method of distinguishing firm-specific price movements from market-wide price movements); *id.* at 223 (Table 2, Per capital gross domestic product and stock return synchronicity).

138. Morck et al., *supra* note 14, at 258.

139. Beny, *supra* note 1, at 276.

results, though supported by their findings, remain conjectures.<sup>140</sup> Beny further warns: “[i]t is premature . . . to claim that [enacting or strengthening insider trading laws] will surely succeed or that the debate between proponents and opponents of insider trading laws has now been empirically resolved.”<sup>141</sup>

Stock price informativeness is vital to market efficiency.<sup>142</sup> A stock’s *true* price is that which reflects *all* information about the company and the market.<sup>143</sup> More realistically, a stock’s *fair* price reflects all *publicly available* information about the future of the company.<sup>144</sup> When a stock’s fair price fully reflects all publicly available information, free market theory dictates that investors must have had access to the same information.<sup>145</sup> Therefore, the market failure of asymmetric information has been effectively eliminated by government regulation.<sup>146</sup> If this is true, then a country with effective regulations will have more fully informed stock prices.<sup>147</sup> This leads to the first testable hypothesis:<sup>148</sup>

**Hypothesis 1 (H1).** *The null hypothesis (H<sub>0</sub>): Countries with more comprehensive and stringent insider trading laws do not have more informative stock prices than countries with less comprehensive and stringent regulations. The alternative hypothesis (H<sub>a</sub>): Countries with more comprehensive and stringent insider trading laws do have more informative prices.*

### **B. Insider Trading and Stock Market Liquidity**

Less liquid markets may be less efficient than those which are firmly founded and have operated over longer periods of time.<sup>149</sup> Liquidity is commonly defined as

140. Morck et al., *supra* note 14, at 259.

141. Beny, *supra* note 1, at 281.

142. E.g., SMART ET AL., *supra* note 122, at 381 (discussing the importance of informational efficiency in regard to stock markets); Laffont & Maskin, *supra* note 122, at 70.

143. Laffont & Maskin, *supra* note 122, at 126 (“the value of any asset equals the present value of all future benefits accruing to the asset’s owner.”).

144. See generally Beny, *supra* note 1, at 259 (discussing how insiders’ trading can affect stock price accuracy). Fair is the better word to use as regulation is concerned with keeping markets fair. See *supra* Part II.A.

145. See generally Sloman, *supra* note 29.

146. See generally *id.*

147. E.g. Beny, *supra* note 1, at 261 (“If it is true that analyst (informed) trading yields more efficient price discovery than insider trading, stock prices will be less informative when insider trading is legal, since there will be less informed trading when insiders may freely trade on the basis of private information.”).

148. Hypothesis testing is the use of statistics to determine the probability that a given idea is true. This process, called significance testing, shows whether the real world data contradicts the proposed idea (the null hypothesis). In hypothesis testing the null hypothesis can be either rejected or not rejected, but never accepted. By rejecting the null hypothesis, inferential conclusions can be drawn which favor the alternate hypothesis. In this comment’s analysis, the null hypotheses stand for the idea that insider trading laws do not effect stock market efficiency. In direct contrast, the alternate hypotheses stand for the idea that insider trading laws do have a positive effect on market efficiency. If the null hypotheses can be rejected, this supports the proposition that insider trading laws are good for the stock market. E.g. HILDEBRAND ET AL., BASIC STATISTICAL IDEAS FOR MANAGERS 308-10 (Thomson South-Western 2nd ed. 2007).

149. Du & Wei, *supra* note 7, at 928.

the ratio of the market turnover to market capitalization and is relatively straightforward to measure.<sup>150</sup> Liquidity refers to the direct and indirect transaction costs of trading.<sup>151</sup> In a liquid stock market, stocks are bought and sold freely and easily, and buyers and sellers of a stock are able to immediately find one another.<sup>152</sup> In such a liquid market, investors attempting to sell stock can do so instantaneously, provided that they are willing to accept the going price.<sup>153</sup> Conversely, in an illiquid market, buyers and sellers are not able to find each other easily.<sup>154</sup> In an illiquid market, a seller is unable to dispose of stock because no one will buy it, the price is so absurdly and unfairly low that it would be irrational to sell it, or because the seller is unable to effectively communicate to the market that he wishes to sell the stock.<sup>155</sup>

In finance, a stock's price reflects the present value of all future cash flows expected to be generated from the stock.<sup>156</sup> The stock's true value is the price which incorporates all public and non-public information about the company, whereas the fair value is the price which reflects all publicly available information. An insider who trades on information that the rest of the market is not aware of, and which has not been incorporated in a stock's price, has the ability to trade at a premium over the stock's fair value.<sup>157</sup> Supporters of insider trading regulation believe that a market where insider trading is prevalent will be plagued by informational asymmetries and will result in individual investors without inside knowledge choosing not to invest because they believe they will never be able to get ahead.<sup>158</sup> A market devoid of all investors is the most extreme form of an illiquid market.<sup>159</sup>

Not everyone believes that insider trading adversely affects market liquidity.<sup>160</sup> Opponents of insider trading regulation cite the fact that uninformed investors trade every day without taking the time or energy to research a stock

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150. *Id.*; see also Beny, *supra* note 1, at 249.

151. *Id.*

152. *E.g.*, SMART ET AL., *supra* note 122, at 74.

153. Jim Mueller, *Diving Into Financial Liquidity*, <http://www.investopedia.com/articles/basics/07/liquidity.asp>, (last visited Mar. 1, 2009) ("The market for a stock is said to be liquid if the shares can be rapidly sold and the act of selling has little impact on the stock's price."); see also Beny, *supra* note 1, at 249.

154. *But cf.* Mueller, *supra* note 155 (the opposite of a market where shares can be rapidly sold is a market where shares cannot be rapidly sold).

155. *Id.*; Beny, *supra* note 1, at 250.

156. *E.g.*, SMART ET AL., *supra* note 122, at 126-27 (the value of an asset, such as a stock, is equal to the present value of all future benefits (i.e. cash flows) accruing to the stock's owner).

157. Beny, *supra* note 1, at 250.

158. *Id.*

159. *Id.* (discussing the trading cost to uninformed investors); *but cf.*, Mueller, *supra* note 155 (the extreme opposite of a market where stocks can be freely traded is one where stocks cannot be traded at all).

160. Beny, *supra* note 1, at 250-51 (discussing the views of Carlton & Fischel, *supra* note 11).

sufficiently in order to determine whether the stock's price is "worth it."<sup>161</sup> Some opponents of regulation go so far as to argue that uninformed traders buy and sell stock because they rely on insider trading to actually *increase* the accuracy of stock prices.<sup>162</sup> However, these individuals appear to have little empirical evidence to support this claim.

Critics of regulation also reason that if insider trading was damaging to the market, this would in turn harm firms, who would then have an incentive to voluntarily prohibit the practice.<sup>163</sup> Supporters of regulation denounce this point by arguing that liquidity is a public good that will be underprovided by the private sector, meaning that it becomes the responsibility of the government to secure a socially optimal level of market liquidity.<sup>164</sup> A liquid market is a public good because an individual cannot be excluded from enjoying the economic benefits afforded by a properly functioning, liquid market (i.e. it is non-excludable),<sup>165</sup> nor does one investor trading in a liquid market impede another investor from trading (i.e. it is non-rival).<sup>166</sup> Public goods, by definition, are underprovided in the market and must be provided by the public sector.<sup>167</sup> Beny summarizes the views of regulation supporters on liquidity:

[E]ven if firms know the true correlation of price and transaction costs, they may still reduce transaction costs less than is socially desirable if there is a benefit to society from low transaction costs and market liquidity which firms do not enjoy (in essence, transaction costs are [a positive] externality). Because firms have insufficient incentives to provide liquidity by banning insider trading themselves, markets must rely on government regulation, proponents of regulation argue.<sup>168</sup>

A market which is perfectly liquid is perfectly efficient, so the more liquid a market is, the more efficient it will be. This leads to the second testable hypothesis:

**Hypothesis 2 (H2).** *The null hypothesis (H<sub>0</sub>): Countries with more comprehensive and stringent insider trading laws do not have more liquid stock markets than countries with less comprehensive and stringent regulations. The alternative hypothesis (H<sub>a</sub>): Countries with more comprehensive and stringent insider trading laws do have more liquid stock markets.*

161. *Id.*

162. *Id.* (discussing Kraakman, Cox, Benabou & Laroque who present a model illustrating the incentives to invest created by inside trading/ insider traders).

163. *E.g.*, Beny, *supra* note 1, at 251.

164. *Id.* at 252.

165. *E.g.*, VARIAN, *supra* note 30, at 414 ("a good is excludable if people can be excluded from consuming it.").

166. *Id.* (a good is non-rival if one person's consumption of it does not reduce the amount available to other consumers).

167. *Id.* at 415 (explaining that private markets do not efficiently allocate public goods and that generally, other social institutions must be used to allocate these goods).

168. Beny, *supra* note 1, at 252, (quoting Nicholas L. Georgakopoulos, *Insider Trading as a Transactional Cost: A Market Microstructure Justification and Optimization of Insider Trading Regulations*, 26 CONN. L. REV. 1, 17, 34 n.69 (1993)).

### C. *Insider Trading and Stock Market Volatility*

A stock market that is less volatile over the long run may be more efficient.<sup>169</sup> Volatility is best thought of as the variation in market prices: the extent to which the market goes up and down over some period of time.<sup>170</sup> Without short term stock market volatility, prices would stagnate and the opportunity to make a profit would disappear.<sup>171</sup> However, too much volatility can eventually result in similarly extreme consequences with disinvestment due to increased long-term risk.<sup>172</sup> Rational investors accept the risks associated with short term volatility because they can make short swing profits. In the long run, both experienced and mom-and-pop investors know that, historically, the market has gone up, and they are guaranteed some return on their investment.<sup>173</sup> Du and Wei characterize the importance of market volatility:

A certain degree of market volatility is unavoidable, even desirable, as one would like the stock price fluctuation to indicate changing values across economic activities so that resources can be better allocated. However, precisely because stock prices are supposed to serve as signals for resource allocation, excessive volatility that is not related to economic fundamentals would diminish the signaling function and impede resource allocation.<sup>174</sup>

Du and Wei examined the relationship between insider trading regulations and market volatility; where market volatility was measured by the standard deviations of monthly returns from December 1984 to December 1998 in markets around the globe.<sup>175</sup> They found that countries with more prevalent insider trading have more volatile stock markets, suggesting that regulations do increase efficiency.<sup>176</sup>

A low level of long-term volatility is a public good because investors cannot be excluded from enjoying the economic benefits afforded by a properly functioning, non-volatile long run market (i.e. it is non-excludable),<sup>177</sup> nor does any single investor trading in this market impede another investor from trading (i.e. it is non-rival).<sup>178</sup> The daily functioning of a stock market inherently requires

169. *E.g.*, Du & Wei, *supra* note 7, at 916.

170. *What's Stock Market Volatility*, [http://www.commonwealth.com/RepSiteContent/stock\\_volatility.htm](http://www.commonwealth.com/RepSiteContent/stock_volatility.htm) (last visited Mar. 1, 2009) (“When the stock market goes up one day, and then goes down for the next five, then up again, and then down again, that’s what you call stock market volatility.”).

171. *E.g.*, Du & Wei, *supra* note 7, at 916.

172. *Id.*

173. *Id.*

174. *Id.*

175. *Id.* at 916 n.1.

176. *See* Du & Wei, *supra* note 7, at 940 (finding that countries with more prevalent insider trading have more volatile stock markets).

177. *See, e.g.*, VARIAN, *supra* note 30, at 414 (“a good is excludable if people can be excluded from consuming it.”).

178. *Id.* (a good is non-rival if one person’s consumption of it does not reduce the amount

some stock market volatility,<sup>179</sup> yet long-term volatility will lead to decreased investor confidence and in turn a less efficient market.<sup>180</sup> Therefore the third testable hypothesis is:

**Hypothesis 3 (H3).** *The null hypothesis (H<sub>03</sub>): Countries with more comprehensive and stringent insider trading laws have no less volatile stock markets than countries with less comprehensive and stringent regulations. The alternative hypothesis (H<sub>a3</sub>): Countries with more comprehensive and stringent insider trading laws do have less volatile stock markets.*

## V. A NEW MODEL TO MEASURE THE EFFECTIVENESS OF INSIDER TRADING REGULATIONS

Each of the aforementioned hypotheses contains a statement regarding a particular indicator of market efficiency: H1) stock price informativeness,<sup>181</sup> H2) stock market liquidity,<sup>182</sup> and H3) stock market volatility.<sup>183</sup> An economic measure has been identified to quantify each of these indicators. These economic measures are the dependent variables in three separate regressions. Each of these dependent variables is then regressed against four independent variables and one control variable. The independent variables are the four main components of insider trading regulations: 1) scope—the range of activities prohibited by regulation,<sup>184</sup> 2) sanctions—the criminal and monetary penalties of violating a law,<sup>185</sup> 3) perceived strength—whether insiders (possible defendants) believe there is a likelihood of prosecution,<sup>186</sup> and 4) actual strength—the true likelihood of prosecution (the true

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available to other consumers).

179. Du & Wei, *supra* note 7, at 916.

180. *Id.*

181. Hypothesis 1 (H1). The null hypothesis (H<sub>01</sub>): Countries with more comprehensive and stringent insider trading laws do not have more informative stock prices markets than countries with less comprehensive and stringent regulations. The alternative hypothesis (H<sub>a1</sub>): Countries with more comprehensive and stringent insider trading laws do have more informative stock prices.

182. Hypothesis 2 (H2). The null hypothesis (H<sub>02</sub>): Countries with more comprehensive and stringent insider trading laws do not have more liquid stock markets markets than countries with less comprehensive and stringent regulations.. The alternative hypothesis (H<sub>a2</sub>): Countries with more comprehensive and stringent insider trading laws do have more liquid stock markets.

183. Hypothesis 3 (H3). The null hypothesis (H<sub>03</sub>): Countries with more comprehensive and stringent insider trading laws have no less volatile stock markets than countries with less comprehensive and stringent regulations. The alternative hypothesis (H<sub>a3</sub>): Countries with more comprehensive and stringent insider trading laws do have less volatile stock markets.

184. Du & Wei, *supra* note 7, at 921 (noting that the prevalence of insider trading depends on the scope of the prohibited behavior and the penalty for a given offense); Beny, *supra* note 1, at 266 (“A country’s insider trading prohibition can be characterized along two broad (although not exhaustive) dimensions: the *scope* of the activities that it prohibits and the *sanctions* for violating it.”).

185. See Du & Wei, *supra* note 7, at 921; Beny, *supra* note 1, at 266.

186. See Du & Wei, *supra* note 7, at 921 (noting that the prevalence of insider trading depends on the enforcement of existing laws and regulations).

probability of an insider actually being caught and forced to suffer consequences).<sup>187</sup>

Using ordinary least squares regression, a common statistical and econometric technique,<sup>188</sup> I test whether the null hypotheses corresponding to each regression can be rejected with statistical certainty.<sup>189</sup> Rejection of the null hypotheses will lend support to policy arguments supporting insider trading regulations.<sup>190</sup> Additionally, the regression results can identify which component of regulation has the strongest effect on decreasing the prevalence of insider trading. The results of the regressions are anticipated to show that countries with more comprehensive regulations (greater in scope, sanction, actual strength, and perceived strength) have more efficient stock markets. Additionally, the actual strength of enforcement is expected to have the greatest influence on whether countries with insider trading regulations have more efficient stock markets. Annex A contains summary statistics of the data, a pair-wise correlation and significance table, and the full regression results. A description of the dependent variables, independent variables, control variable, and the problem of multicollinearity is presented below.

#### **A. The Variables**

##### **1. The Dependent Variables**

Each hypothesis contains a statement regarding a particular indicator of market efficiency. An economic measure has been identified to quantify each of these indicators. These economic measures are the dependent variables in three separate regressions.

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187. *Id.* (examining the effect of scope, sanction, and strength generally); *see also* Beny, *supra* note 1, at 266 (addressing only the first two measures, scope and sanction).

188. WILLIAM H. GREENE, *ECONOMETRIC ANALYSIS* 21, 83 (Pearson Prentice Hall 2008) (1990) (the most frequently used method of hypothesis testing is ordinary least squares regression).

189. The scientific method provides a program to “accept” a scientific idea based on rejection of a null hypothesis. “Acceptance” of an idea should not be interpreted to mean that idea is definitively true, but only that the status quo is not true with some level of confidence. The null hypothesis formally describes some aspect of a set of data and this description is treated as the status quo (in other words, it is assumed that the null is true) unless the data contradicts this assumption. Hypothesis testing is used to determine whether the data contradict the null hypothesis. A researcher can never prove the null hypothesis is true, nor does rejection of the null hypothesis prove that the alternate hypothesis is definitively true. The null hypothesis can only be rejected with some level of certainty (i.e. with 95% confidence). Failing to reject the null means that the data used does not indicate that there is a good enough reason to change our assumption about the status quo. *Id.* at Appendix C, 1019-38 (provides a review of statistical estimation and inference).

190. Rejection of the null hypothesis (that countries with less stringent insider trading regulations do not have less efficient stock markets) although not allowing complete acceptance in the scientific sense of the alternative hypothesis (that countries with less stringent insider trading do have less efficient stock markets) does allow acceptance of the alternative in the more colloquial sense.

### a. *Stock Price Informativeness*<sup>191</sup>

Stock price informativeness is measured by stock price synchronicity, defined as the extent to which stock price returns in a country are dependent on the market.<sup>192</sup> A low level of synchronicity with the market means that the stock price is more reflective of firm specific information.<sup>193</sup> Where synchronicity is low, stock price returns are more dependent upon the actual value of the firm than the effect of the market on stock prices.

### b. *Stock Market Liquidity*

Liquidity is measured by the stock market turnover ratio.<sup>194</sup> This is the ratio of the value of total shares traded to the average real market capitalization.<sup>195</sup> Unlike Beny who uses the average from 1991-1995, the measure of stock price informativeness in this article computes an updated average from the years 2000-2005. This variation provides a measure that is more reflective of recent changes and developments in laws, which are incorporated in the independent variables. A larger turnover ratio indicates more liquidity and greater stock market efficiency.

### c. *Stock Market Volatility*

Volatility is measured by the standard deviation of monthly stock market returns from December 1984 to December 1998.<sup>196</sup> Greater stock market volatility is indicative of a less efficient stock market.<sup>197</sup>

191. Morck et al., *supra* note 14, at 223 Table 2 Panel B (enumerating the data set used in this regression analysis).

192. *Id.* at 216.

193. Synchronicity is the  $R^2$  of regressions of the form:  $r_{it} = \alpha_i + \beta_{1,i} r_{m,jt} + \beta_{2,i}(r_{US,t} + e_{jt}) + \varepsilon_{it}$ , where  $r_i$  is the return of a given stock, which is dependent on the market index,  $r_{mt}$ ,  $i$  is a firm index,  $j$  a country market index,  $t$  a two-week period time index,  $r_{m,jt}$  a domestic market index,  $r_{US,t}$  is the U.S. market return, and  $e_{jt}$  is the rate of change in the exchange rate per U.S. dollar. *Id.* at 222. The stock price synchronicity measure  $R^2$  is unsuitable as a dependent variable in a regression because it is bounded within the [0,1] interval. Therefore the standard econometric remedy of applying a logistic transformation is adopted with respect to this variable. The left-hand side (dependent) variable is thus:  $r_i^2 = |\ln(R_i^2/(1-R_i^2))|$  ( $r_i^2$  = Absolute value of the logistic transformation of  $R^2$  for country  $i$ ). This equation,  $r_i^2$ , maps  $R_i^2$  from the unit interval [0,1] to the set of real numbers. I use the absolute value of this measure so that a higher  $r_i^2$  corresponds to less stock price synchronicity, and in turn, greater stock price informativeness. Morck et al., *supra* note 14, at 225.

194. *Id.*

195. *Id.* at 224. The denominator is deflated using the following method:  $T/P_a/t / \{(0.5) * [Mt/P_e t + Mt - 1/P_e t - 1]$  where  $T$  is total value traded,  $M$  is stock market capitalization,  $P_e$  is end-of period Consumer Price Index (CPI),  $P_a$  is the average annual Consumer Price Index. Standard and Poor's Emerging Market Database; Standard and Poor's Emerging Stock Markets Factbook. End-of period CPI (IFS line 64M..ZF or, if not available, 64Q..ZF) and annual CPI (IFS line 64..ZF) are from the IMF's International Financial Statistics, October 2005. Thorsten Beck, et al., *A New Database on the Structure and Development of the Financial Sector*, 14 WORLD BANK ECON. REV. 597 (2000), available at <http://www.jstor.org/pss/3990086>.

196. Du & Wei, *supra* note 7, at Appendix A, available at [http://www.res.org.uk/economic/ta/pdfs/eco\\_j\\_249\\_app.pdf](http://www.res.org.uk/economic/ta/pdfs/eco_j_249_app.pdf).

197. *See id.* at 916 ("The more volatile an asset market . . . the less an agent will save.").

## 2. The Independent Variables

Each independent variable measures one of the four components identified as influencing the effectiveness of insider trading regulation: scope, sanction, actual strength, and perceived strength.

### a. *Scope*

Scope measures the breadth of the insider trading prohibition. It is the sum of Tipping and Tippee.<sup>198</sup> Scope ranges from zero to two, with zero representing the most permissive insider trading prohibition and two representing the most restrictive insider trading prohibition.<sup>199</sup> Tipping equals one if corporate insiders are prohibited from tipping outsiders (tippees) about material non-public information and/or encouraging them to trade on such information for personal gain; and it equals zero otherwise.<sup>200</sup> Tippee equals one if tippees, like corporate insiders, are prohibited from trading on material non-public information that they have received from corporate insiders; and it equals zero otherwise.<sup>201</sup>

### b. *Sanction*

Sanction is a proxy for the expected criminal and monetary sanctions for violating a country's insider trading laws.<sup>202</sup> In other words, sanction is the sum of Civil Damages and Criminal Penalties.<sup>203</sup> Sanction ranges from zero to two, with zero representing the lowest expected sanctions and two representing the highest expected sanctions.<sup>204</sup> Money Damages equals one if potential monetary penalties for violating insider trading laws are proportional to insiders' trading profits; and it equals zero otherwise.<sup>205</sup> Criminal Penalty equals one if violation of insider trading laws is a potential criminal offense; and it equals zero otherwise.<sup>206</sup>

### c. *Actual Strength*

Actual Strength is the sum of Enforcement by 2008 and Prosecution Success by 2008. Actual Strength measures the extent to which insider trading regulations are *actually* enforced in a country, as opposed to merely measuring the presence of such regulations. Enforcement by 2008 equals one if the country's insider trading law has been enforced for the first time by the end of 2008; and it equals zero

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198. Beny, *supra* note 1, at 287-91 Illustration 4. "A tippee is a third person (a corporate outsider) who has been tipped about material, non-public information by an insider (a director, manager, employee, etc.)." *Id.* at 265.

199. *Id.*

200. *Id.*

201. *Id.*

202. *Id.*

203. *Id.*

204. Beny, *supra* note 1, at 287-91 Illustration 4.

205. *Id.*

206. *Id.*

otherwise. Bhattacharya & Daouk identified those countries which had enforced an insider trading law by 1994. This article updates the data to 2008.<sup>207</sup> Prosecution Success equals one if an easily identifiable, public record of a successful insider trading criminal prosecution in the country exists; and it equals zero otherwise. A public record is a newspaper article, journal article, or some other periodical. It is easily identifiable if it could be found within thirty minutes of searching online using Google.<sup>208</sup> In order to be successful, there must be explicit mention of penal sanction (such as jail time) or a monetary sanction (such as a large fine).

#### *d. Perceived Strength*

Perceived Strength is a proxy for corporate insiders' subjective belief regarding the strength of regulation against insider trading. This measure was derived from the *Global Competitiveness Reports* from 1997 and 1998 which surveyed corporate officers in over 3,000 firms around the world wherein respondents were asked the following:<sup>209</sup> "Do you agree that insider trading is not common in the domestic stock market?" (1 = strongly disagree, 8 = strongly agree).

Du and Wei used the responses to this question to define the variable, Insider Trading Index (ITI), and a larger ITI value meant a greater belief by corporate insiders that insider trading was actually happening around them.<sup>210</sup> Du and Wei argue that this number reflects the consequences of three dimensions of insider trading: scope, sanction, and strength.<sup>211</sup> I assert that responses to the question, "Do you agree that insider trading is not common in the domestic stock market?" do not adequately reflect these three components of regulation. However, merely acknowledging that insider trading exists fails to reveal whether those director respondents had any true appreciation of the consequences.

Du and Wei admittedly captured information that was not present in the earlier models of Bhattacharya and Daouk or La Porta et al.<sup>212</sup> Still, their ITI is less a measure of regulation strength and more a measure of perceived strength of regulations. Alternatively, ITI could measure the frequency of insider trading. Du and Wei ventured too far to say that a director's answer to the aforementioned question was reflective of that person's beliefs about the scope, sanction, and the

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207. Bhattacharya & Daouk, *supra* note 8, at 84 (Table I column 8 the authors mistakenly labeled "IT Laws Existence" rather than "IT Laws Enforcement").

208. Search was conducted between November 28, 2008 and December 1, 2008 through [www.google.com](http://www.google.com).

209. Du & Wei, *supra* note 7, at 921-22 (quoting WORLD ECONOMIC FORUM & HARVARD UNIVERSITY, GLOBAL COMPETITIVENESS REPORT (1997)).

210. Du & Wei, *supra* note 7, at 921 (defining ITI as: Insider Trading Index = 8 – Country Mean Answer).

211. *Id.* at 921-22. ("Since the respondents were asked to assess the prevalence of insider trading in reality rather than in law, presumably the answer reflects the consequences of all three dimensions (whether a given act is illegal, how likely the offender will be caught, and how severe the penalty will be)").

212. *Id.* (explaining that the correlation between the Insider Trading Index and the measure of Bhattacharya & Daouk was low).

likelihood of punishment in that particular country. Therefore, this study employs the results of the Global Competitiveness Survey as a measure of perceived, not actual strength.<sup>213</sup>

### 3. The Control Variable: Log of GDP Per Capita

The control variable of GDP per capita (GDP/Cap) is employed because it is a measure of a country's wealth and may be indicative of a mature, well-functioning stock market.<sup>214</sup> Economic development is associated with increased financial market development, better government and law enforcement ability, and general economic prosperity.<sup>215</sup> Therefore it is helpful to control for the logarithm of gross domestic product per capita.<sup>216</sup> The log of GDP per capita is measured in 1995 constant U.S. dollars, averaged over 1985-1998.<sup>217</sup>

#### B. The Problem of Multicollinearity

Due to multicollinearity in the data, the model unfortunately cannot adequately predict stock price informativeness, stock market liquidity, or stock market volatility. Multicollinearity arises when some or all of the independent variables are highly correlated with one another.<sup>218</sup> It is a statistical disease that is a likely weakness of the specified model, greatly reducing the certainty of any conclusions drawn from the regression. A multiple regression model with correlated predictors can indicate how well the entire bundle of predictors will indicate the outcome variable, but it may not give valid results about any individual predictor, or about which predictors are redundant with others.<sup>219</sup> In other words, even if the model as a whole can successfully predict whether a country's stock market is efficient, it may be impossible to draw any conclusions regarding the effect of each individual dependent variable (scope, sanction, actual enforcement, or perceived enforcement).<sup>220</sup>

A high correlation coefficient between any two variables means that when one variable increases or decreases, the other variable is likely to increase or decrease as well.<sup>221</sup> This phenomenon makes it difficult to draw conclusions

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213. The variable Perceived Strength is thus defined as: Perceived Strength = (Country Mean Answer - 1)/3.5. Subtracting 1 shifts the range of possible responses from [1,8] to [0,7]. In addition, dividing by 3.5 rescales the responses from [0.7] to [0,2]. Scaling the responses to [0,2] provides this variable with the same range as the other three variables (which are each the sum of two dummy variables and lie in the [0,2] range). The variables were scaled because of an a priori belief that each of the four components, scope, scale, actual strength, and perceived strength are equal in influence.

214. Beny, *supra* note 1, at 268; Morck et al., *supra* note 14, at 227.

215. *Id.*

216. *Id.*

217. Du & Wei, *supra* note 7, at Appendix A.

218. GREENE, *supra* note 188, at 59.

219. *Id.*

220. *Id.*

221. *Id.*

regarding which of the variables is affecting the dependent variable.<sup>222</sup> Therefore, making any statements about the relationship between the independent and dependent variables is highly suspect.<sup>223</sup>

Much of the data used in this analysis is highly correlated as indicated in Table 2 (those variables which have suspiciously high correlations are marked with an asterisks). This correlation is not surprising because dummy variables can only take on two values (one or zero) and the sample size (twenty-nine countries) is low. The high correlation could disappear with a larger sample of countries. Moreover, although it may be unfeasible to draw conclusions about the effect any single component of regulation has on market efficiency, it may be possible to draw conclusions about these components' combined effect. The credibility of these latter conclusions is determined less by the scientific method and more by subjective beliefs about the strength of the model. To this extent, the regression findings are presented in Annex A in an unbiased manner and explain why it is inconclusive whether or not insider trading regulations result in greater market efficiency.

## VI. CONCLUSION AND RECOMMENDATIONS

The empirical analysis conducted here adds to the body of research that is confounded by the ambiguity of the effect insider trading regulations have on stock market efficiency. Nevertheless, the regression results highlight the complexity of insider trading and difficulty inherent in determining the value and efficacy of its regulation. This complexity will hopefully continue to drive researchers to contribute to the body of empirical work surrounding insider trading, and eventually reach the level of the theoretical scholarship which empirical research has historically lagged behind.

More than forty years after Henry Manne first suggested the radical idea that insider trading may not have a negative effect on stock market efficiency, the question of whether and how to regulate insider trading remains. The relevance of this issue increases in the face of the current worldwide economic crisis. Financial institutions and global securities markets are connected not only to each other, but to the lives of people around the world. The failure of many of these institutions has been linked to the behavior of insiders, who are often categorized as greedy and short-sighted. These are the same words used to describe those guilty of insider trading. In moving forward to develop regulations which strive to preserve the integrity of securities markets across the globe, policy makers should look to the small but growing body of empirical evidence on the subject. Empirical research can determine whether insider trading regulations increase market efficiency and can pinpoint what, if any, components of laws *actually* deter people from insider trading; thus allowing regulations to be better formed to deter insider trading and increase market efficiency for the benefit of all investors.

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222. *Id.*

223. *Id.*

As it stands, the effect of insider trading on market efficiency is ambiguous, and the legal and economic debate over the merits of regulation can only be quelled with empirical evidence, not through academic theory. Currently, the body of empirical research is neither extensive nor conclusive enough to settle the debate. Shortcomings plaguing the existing research include: the lack of a single measure of market efficiency, data recycling, and the need for more comprehensive international data sets.

Should insider trading be regulated or is this regulation ineffective and wasteful? Although the majority of academics and policy-makers have concluded in favor of the former, the empirical evidence supporting this determination is so limited and weak that any conclusions drawn from it should be regarded with restraint.

#### **APPENDIX A - THE REGRESSION RESULTS**

Ordinary least squares regression analysis was used to analyze the data in accordance with the specified model. Summary statistics of the regression variables are provided in Table 1 followed by the pair-wise correlations of the variables in Table 2.

**Table 1. Summary Statistics.**

<i>Summary Statistics of Variables</i>								
<b>Country (Total = 27)</b>	<b>Liquidity</b>	<b>Inform</b>	<b>Volatility</b>	<b>Scope</b>	<b>Sanct.</b>	<b>Actual Strength</b>	<b>Perceived Strength</b>	<b>GDP/ Capita</b>
Australia	0.7106	2.6827	0.0771	2	1	2	1.2657	0.9797
Austria	0.2972	2.2775	0.0784	2	0	0	1.0900	1.0197
Brazil	0.3518	1.6508	0.1823	2	0	1	0.7886	0.8361
Canada	0.6477	2.7166	0.0497	2	2	1	1.2257	0.9814
Denmark	0.7478	2.5123	0.0544	2	2	0	1.3986	1.0370
Finland	1.0166	1.7988	0.0773	2	1	1	1.2557	1.0067
France	0.8169	2.5123	0.0633	2	2	2	1.1229	1.0129
Germany	1.2231	2.0505	0.0636	2	1	2	1.2914	1.0283
Greece	0.4299	1.4371	0.1103	2	0	0	0.7143	0.9264
Hong Kong	0.4981	1.7346	0.0934	2	1	1	0.8943	0.9881
Indonesia	0.4165	1.8153	0.1441	1	1	0	0.6986	0.6691
Ireland	0.4271	2.7876	0.0700	2	1	0	1.2529	0.9455
Italy	1.1129	1.4962	0.0764	2	1	0	0.8943	0.9779
Japan	0.8577	1.1859	0.0749	1	1	2	1.1871	1.0558
Malaysia	0.2968	0.2859	0.1030	1	1	0	0.7243	0.8095
Mexico	0.2715	0.8954	0.1403	1	0	0	0.7186	0.8045
Netherlands	1.1946	*	0.0458	2	1	2	1.1171	1.0087
Norway	0.9303	2.0019	0.0775	1	0	2	0.9871	1.0308
Philippines	0.1648	1.6288	0.1100	1	1	0	0.6857	0.6948
Portugal	0.5499	2.6178	0.1051	2	1	0	0.9843	0.9149
Singapore	0.5551	1.4435	0.0909	2	1	2	1.3029	1.0029
South Africa	0.4173	1.4052	0.0900	1	1	0	0.8014	0.8142
Sweden	1.1220	1.7988	0.0675	2	1	2	1.2943	1.0121
Switzerland	0.8603	*	0.0559	2	1	2	1.1386	1.0729
Thailand	0.9338	0.9896	0.1176	2	1	1	0.6486	0.7651
UK	1.0335	2.7166	0.0562	2	1	2	1.3557	0.9785
USA	1.6258	3.8420	0.0433	2	2	2	1.2529	1.0150
<i>Mean</i>	0.7226	1.9313	0.0859	1.7407	0.9630	1.0000	1.0404	0.9403
<i>Stand Dev.</i>	0.3620	0.7609	0.0329	0.4466	0.5871	0.9199	0.2455	0.1123

\* Missing value due to unavailable data.

**Table 2. Pair-wise Correlation Coefficients and Significance Levels**

<i>Pair-wise Correlation</i>							
	Informativeness	Liquidity	Volatility	Scope	Sanction	Actual Strength	Perceived Strength
Liquidity	0.434						
	<i>0.030</i>						
Volatility	-0.563	-0.637					
	<i>0.003</i>	<i>0.000</i>					
Scope	0.514	0.405	-0.363				
	<i>0.009</i>	<i>0.036</i>	<i>*0.063</i>				
Sanction	0.471	0.413	-0.581	0.255			
	<i>0.018</i>	<i>0.032</i>	<i>0.001</i>	<i>*0.199</i>			
Actual Strength	0.297	0.670	-0.465	0.281	0.214		
	<i>*0.149</i>	<i>0.000</i>	<i>0.015</i>	<i>*0.156</i>	<i>*0.285</i>		
Perceived	0.631	0.544	-0.760	0.519	0.465	0.571	
	<i>0.001</i>	<i>0.003</i>	<i>0.000</i>	<i>0.006</i>	<i>0.015</i>	<i>0.002</i>	
GDP/Capita	0.454	0.574	-0.750	0.540	0.215	0.591	0.802
	<i>0.023</i>	<i>0.002</i>	<i>0.000</i>	<i>0.004</i>	<i>*0.281</i>	<i>0.001</i>	<i>0.000</i>

P Values are given in italics under correlation coefficients. Those correlations which are significantly different from zero are marked with an asterisk (\*).

#### A. *Stock Price Informativeness*

The regression result for stock price informativeness is:  $\text{Inform} = 0.23 + 0.456 \text{ Scope} + 0.232 \text{ Sanction} - 0.032 \text{ Actual} + 1.65 \text{ Perceived} - 1.05 \text{ GDP/Cap}$ . This regression does not adequately predict the dependent variable. The adjusted  $R^2$  is 36.2, which indicates that the model can only explain 36.2 percent of the variation in stock price informativeness.<sup>224</sup> Furthermore, while the regression (the model) is significant with 95 percent confidence,<sup>225</sup> none of the independent variables are significant at this level. This is a result of the multicollinearity between the independent variables. This multicollinearity is not surprising, given the nature of the variables as both dummies and equally weighted components of insider trading regulation.

It was expected that the sign on actual strength of enforcement would be positive, with greater enforcement associated with less insider trading and thus greater stock market efficiency, but this is not the case. I will not draw any conclusions from these regression results. Although the model as a whole may be statistically significant as determined by the F statistic, the model is clearly plagued with multicollinearity and does not adequately explain the variance in

224. The  $R^2$  is the coefficient of determination and reveals the degree of fit of the regression line; or, how much of the variance in the dependent variable is explained by the model. A higher  $R^2$  indicates a better fit.

225. The F test is a statistical test where the test statistic has an F-distribution if the null hypothesis is true.

stock price informativeness. Consequently, although the F statistic supports rejecting the null hypothesis, doing so would be a type one error,<sup>226</sup> and drawing any conclusions from this would be inappropriate.<sup>227</sup> Correspondingly, I refuse to reject the null hypothesis.

### B. *Liquidity*

The regression equation for liquidity measured by stock market turnover is:

$Liq = -0.423 + 0.101 \text{ Scope} + 0.180 \text{ Sanction} + 0.198 \text{ Actual} - 0.251 \text{ Perceived} + 0.914 \text{ GDP/Cap}$ . This explains 47.7 percent of the variation in liquidity using this model. Only actual strength is significant at this level. The coefficient on perceived strength is negative, rather than having an expected positive effect on liquidity.

When scope, sanction, and perceived strength are dropped from the regression, leaving only the significant variable—actual strength, and the control variable—GDP/Cap, this regression is:  $Liquidity = -0.307 + 0.200 \text{ Actual Strength} + 0.882 \text{ GDP/Capita}$ , with actual strength again significant with 95% confidence; and with the model explaining 45.6% (adjusted  $R^2 = 45.6$ ) of variance in liquidity. This is consistent with the argument that the actual strength of enforcement is the most effective deterrent for insider trading. Regardless, the adjusted  $R^2$  is too low to draw any meaningful conclusions. I thus refuse to reject the null hypothesis.

### C. *Stock Market Volatility*

The regression equation for stock market volatility is:  $Vol = 0.288 + 0.0120 \text{ Scope} - 0.0237 \text{ Sanct} + 0.00196 \text{ Actual} - 0.0205 \text{ Percieved} - 0.193 \text{ GDP/Cap}$ . Similar to stock price informativeness, none of the regression coefficients are significant at the 95% level. The adjusted  $R^2$  is 71.5 which is markedly greater than the adjusted  $R^2$  of either informativeness (36.2) or liquidity (47.7). Additionally, the F statistic is 14.06, which again is significant at the 95% level.

The fact that Scope, Sanction, and Actual Strength are so highly correlated, while none of them are statistically significant, makes it difficult to reject the null

226. A type one error is the rejection of a null hypothesis when it is true. A type two error is failing to reject a null hypothesis when it is false. GREENE, *supra* note 188, at 1034.

227. “In the justice system and statistics there is no possibility of absolute proof and so a standard has to be set for rejecting the null hypothesis. In the justice system the standard is “a reasonable doubt”. The null hypothesis has to be rejected beyond a reasonable doubt. A jury sometimes makes an error and an innocent person goes to jail. Statisticians ... call this a type I error. Civilians call it a travesty. In the justice system, failure to reject the presumption of innocence gives the defendant a not guilty verdict. This means only that the standard for rejecting innocence was not met. It does not mean the person really is innocent. It would take an endless amount of evidence to actually prove the null hypothesis of innocence. Sometimes, guilty people are set free. Statisticians have given this error the highly imaginative name, type II error. Americans find type II errors disturbing but not as horrifying as type I errors. A type I error means that not only has an innocent person been sent to jail but the truly guilty person has also gone free. In a sense, a type I error is twice as bad as a type II error.” Type I and Type II Errors - Making Mistakes in the Justice System, <http://www.intuitor.com/statistics/T1T2Errors.html> (last visited Oct. 10, 2009) (explaining the difference between errors and why a type I error is particularly egregious).

hypothesis for fear of a type one error. Once again, this is likely due to multicollinearity between these variables. Nevertheless, the coefficients on scope and actual strength of enforcement are positive, which is unexpected because in theory, greater scope and actual strength of enforcement contribute to less long run volatility. Therefore, the null hypothesis is not rejected.