Serving More than One Master: A Social Network Analysis of Section 8 of the Clayton Act

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I. INTRODUCTION

An interlocking directorate "occurs when a person affiliated with one organization sits on the board of directors of another organization."[1] Section 8 of the Clayton Act prohibits "persons" from serving as a "director or officer in any two corporations that engaged in commerce if the corporations are competitors."[2] Under current Supreme Court section 8 jurisprudence, competition is judged on qualitative factors[3] as opposed to a market analysis.[4] This Note uses Social Network Analysis (SNA) to examine whether the standard for determining the legality of interlocking directorates under section 8 of the Clayton Act should be changed.

This Note is organized as follows: Section II.A describes interlocking directorates and section 8 of the Clayton Act. Section II.A then gives a brief historical context for the passage of section 8. It then catalogues section 8 jurisprudence over time and notes important and proposed changes to section 8. Section II.B explains the Horizontal Merger Standard used under section 7 of the Clayton Act. Finally, Section II.C gives a background on SNA.

Section III.A begins with a discussion of the scholarship on interlocking directorates. Section III.B then introduces the Maximum Likelihood Estimator (MLE) regression methodology used in the analysis. Next, Section III.C introduces the data used in the SNA and gives a table of the descriptive statistics[5] of the data. Section III.D then explains the creation of the Social Network and presents a graphical depiction.[6] Section III.D gives the relevant descriptive statistics of the Network.[7] It then explains the MLE model used to measure the effect of interlocking directorates on corporate performance. Next, Section III.E gives the regression results[8] of the MLE models. Section III.E.2 also explains the impact of the regression results on the understanding of interlocking directorates and section 8 of the Clayton Act. Finally, Section III.F discusses the popular criticism of section 8 of the Clayton Act.

Part IV recommends that section 8 of the Clayton Act be changed to implement a hypothetical horizontal merger analysis, which would allow two firms' boards to interlock where a hypothetical merger between the corporations would be allowed under section 7 of the Clayton Act. Part IV first recommends the Supreme Court adopt the Seventh Circuit's rule from *Robert F. Booth Trust v. Crowley* and apply a hypothetical horizontal merger standard to interlocks. Finally, Part IV recommends that Congress alter section 8 to change the standard of interlocking directorates from a per se rule to an abbreviated hypothetical merger standard ensuring that the benefits of interlocking directorates could be enjoyed while minimizing the costs of anticompetitive interlocks.

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1. Mark S. Mizruchi, *What Do Interlocks Do? An Analysis, Critique, and Assessment of Research on Interlocking Directorates*, 22 ANN. REV. SOC. 271, 271 (1996) (discussing the relevant literature on interlocking directorates).

2. 15 U.S.C. § 19(a)(1) (2014).

3. *See* TRW, Inc. v. FTC, 647 F.2d 942, 947 (9th Cir. 1981) (noting the qualitative factors for determining competition under section 8).

4. *See* United States v. Sears, Roebuck & Co., 111 F. Supp. 614, 617 (S.D.N.Y. 1953) (rejecting the market analysis in section 8 cases).

5. *Infra* Table 1.

6. *Infra* Figure 2.

7. *Infra* Table 2.

8. *Infra* Tables 3, 4, & 5.

I. Background

This Part will first give background on interlocking directorates and section 8 of the Clayton Act. It focuses specifically on the evolution of section 8 caselaw. This Part then outlines section 7 of the Clayton Act and the *Horizontal Merger Guidelines.* It concludes by introducing SNA and explaining its application in legal analysis.

A. Interlocking Directorates and Section 8 of the Clayton Act

An interlocking directorate "occurs when a person affiliated with one organization sits on the board of directors of another organization."[9] Section 8 of the Clayton Act prohibits any "person[]" from serving as a "director or officer in any two corporations that engaged in commerce if the corporations are competitors" so that the elimination of competition by agreement between them would violate any of the antitrust laws.[10] This prohibition does not apply to corporations: (1) with profits less than ten million dollars,[11] (2) with competitive sales of less than one million dollars,[12] (3) where "competitive sales of either corporation are less than 2[%] of that corporation's total sales; [or (4) where] the competitive sales of each corporation are less than 4[%] of that corporation's total sales."[13]

Section 8 of the Clayton Act was originally passed in 1914 amidst significant concern about the size and power of corporations in the market.[14] At the time of the Clayton Act's passage, the members of the board of J.P. Morgan held "over 341 directorships in 112 corporations."[15] Before the passage of the Clayton Act, both President Woodrow Wilson and his antitrust policy advisor, Louis Brandeis, opposed interlocks and sought an outright ban.[16] Brandeis wrote about interlocks at length, calling them "the root of many evils" and that they "offend laws human and divine."[17] The passage of the Clayton Act was also significantly influenced by congressional investigations of interlocks.[18] The House Committee on the Judiciary found that interlocks facilitated collusion, created conflicts of interests, and discouraged the development of new corporate and civic leadership.[19] At the passage of the Clayton Act, many scholars considered corporate interlocks "antagonistic

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9. *See* Mizruchi, *supra* note 1, at 271 (discussing the relevant literature on interlocking directorates).

10. 15 U.S.C. § 19(a)(1) (2014).

11. *Id.* § 19(a)(1)(B).

12. *Id.* § 19(a)(2)(A).

13. *Id.* § 19(a)(2).

14. *See* ABA Section of Antitrust Law, Interlocking Directorates: Handbook on Section 8 of the Clayton Act 1 (2011) (noting different sources of support for legislation on interlocking directorates).

15. *See* Arthur H. Taveras, Jr., *Interlocks in Corporate Management and the Antitrust Laws*, 46 Tex. L. Rev. 819, 829 (1968) (explaining the context under which the Clayton Act was passed).

16. *See* J. Randolph Wilson, *Unlocking Interlocks: The On-Again-Off-Again Saga of Section 8 of the Clayton Act*, 45 Antitrust L.J. 317, 319 (1976) (presenting a history of the circumstances leading up to the passage of section 8).

17. *See* Louis D. Brandeis, Other People's Money 51–52 (1914) (arguing for the outlawing of interlocking directorates).

18. House Comm. on Banking and Currency, Investigation of Concentration of Control of Money and Credit, H.R. Rep. No. 1593-62 (1913) (referred to as "Report of the Pujo Committee"); House Comm. on Banking and Currency, Investigation of the United States Steel Corporation, H.R. Rep No. 1127-62d (1912) (referred to as "Report of the Stanly Committee").

19. *See* House Admin., H.R. Rep. No. 101-483 (1990) (noting the Judiciary Committee's original reasoning for the need for section 8).

to the public interest."[20]

Section 8 is a preventative antitrust measure.[21] The prohibition on interlocking directorates was intended to prevent antitrust violations by "removing the opportunity or temptation" to collude.[22] The court considered the definition of competition under section 8 in *United States v. Sears, Roebuck & Co.* and rejected an interpretation that would allow interlocks if the two firms would be allowed to merge under section 7 of the Clayton Act.[23] However, in *American Bakeries Co. v. Gourmet Bakers, Inc.*, the district court used a relevant market test for determining competition.[24] Subsequent courts have departed from *American Bakeries* and instead followed the qualitative test set out in *TRW, Inc. v. FTC*, which focused on three factors: (1) "the extent to which the industry and its customers recognize the products as . . . competing," (2) "the extent to which production techniques for the products are similar," and (3) "the extent to which the products can be said to have distinctive customers."[25] The Federal Trade Commission (FTC) later affirmed the *TRW* court's analysis.[26] The line of caselaw suggesting a qualitative and preventative methodology for determining the meaning of competition continued until 2012, when the Seventh Circuit decided *Robert F. Booth Trust v. Crowley*.[27] The court noted in *Crowley*, without citing any precedent, that the appropriate standard to resolve a section 8 case was to "define a market and decide whether a merger . . . would be unlawful."[28] In its decision, the court acknowledged potential benefits of interlocking directorates, noting that "serving on multiple boards demonstrates breadth of experience, which promotes competent and profitable management."[29]

During the 1990 Amendment process to section 8, a market share test similar to the *Horizontal Merger Guidelines* was part of original versions of the bill, but was not included in the final bill because of the high burdens of implementation.[30] The final amendment to section 8 removed the per se condemnation of interlocking directorates when firms do not compete.[31] In 2005, the Antitrust Modernization Committee considered a total repeal of section 8, but eventually decided against it because of the uncertainty of the effects of repeal.[32]

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20. *See* Bankamerica Corp. v. United States, 462 U.S. 122, 127 (1983) (explaining the history leading up to the passage of section 8).

21. United States v. Sears, Roebuck & Co., 111 F. Supp. 614, 617 (S.D.N.Y. 1953).

22. TRW, Inc. v. FTC, 647 F.2d 942, 947 (9th Cir. 1981).

23. *See Sears*, 111 F. Supp. at 617 (noting that an inquiry into the intent of the parties would all but neuter the effect of the statute); *see also* Protectoseal Co. v. Barancik, 484 F.2d 585, 588 (7th Cir. 1973) (rejecting the application of a section 7 standard because the inquiry into competition would no longer be simple and objective).

24. Am. Bakeries Co. v. Gourmet Bakers, Inc., 515 F. Supp. 977, 980 (D. Md. 1981) ("'[R]elevant market test may be applied to determine whether corporations (1) sell products which are physically or functionally identical (i.e., reasonably interchangeable) (2) within the same geographic area.").

25. *TRW*, 647 F.2d at 947.

26. *See generally In re* Borg-Warner Corp., 101 F.T.C. 863 (1983) (affirming *TRW*).

27. Robert F. Booth Tr. v. Crowley, 687 F.3d 314 (7th Cir. 2012).

28. *See id.* at 317 (holding that a failure to make a demand on the board of directors precluded derivate suit under section 8).

29. *Id.* at 320.

30. *See* HOUSE ADMIN., H.R. REP. NO. 101-483 (1990) (noting that the FTC supported a section 7 standard, but as written in the 1990 amendment, the standard would be too difficult to implement).

31. *See* ABA SECTION OF ANTITRUST LAW, *supra* note 14, at 2–4 (adding a requirement of competition between the corporations as well as expanding the interlocking prohibition to directors).

32. *See* ANTITRUST MODERNIZATION COMMITTEE, TRANSCRIPT OF PUBLIC MEETING 129 (Jan. 13, 2005),

Since its passage, enforcement of section 8 has been lax and sporadic.[33] One court explicitly noted that the government rarely enforces section 8.[34] Many other advanced economies have not adopted laws prohibiting interlocking directorates like section 8.[35]

B. The Horizontal Merger Standard and Section 7 of the Clayton Act

Section 7 of the Clayton Act condemns the merger of any two corporations such that the result would be to "substantially . . . lessen competition, or tend to create a monopoly."[36] To determine whether a merger will substantially lessen competition, the Federal Agencies tasked with considering mergers will look for evidence of adverse competitive effects.[37] The *Horizontal Merger Guidelines* promulgated by the U.S. Department of Justice (DOJ) and the FTC outline the analysis by which the agencies evaluate a merger.[38] In analyzing a horizontal merger, agencies first look to the adverse competitive effects of a merger.[39] In analyzing the adverse competitive effects of a merger, the agencies look to a number of factors: actual observed effects, comparisons based on evidence, market shares, and concentration.[40] When evaluating the anticompetitive effects of a merger based upon the observed effects, the agencies examine whether any anticompetitive effects from the merger have already occurred.[41] To evaluate a merger using direct comparisons, the agencies "look for historical events or natural experiments" as well as evidence based upon similar markets.[42] When evaluating the market share and market concentration of a merger the agencies focus on both the raw market share and concentration, as well as the change in market share and market concentration that occur as a result of the merger.[43]

The agencies will then define the relevant product market[44] and relevant geographic market.[45] The agencies then determine the market participants by finding all firms that currently earn revenues in the relevant market.[46] The agencies then calculate the market share for each firm in the market.[47] Finally, the agencies calculate the market concentration

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http://govinfo.library.unt.edu/amc/pdf/meetings/050113_Meeting_Transcript_reform.pdf (noting the flaws of current section 8).

33.   ABA SECTION OF ANTITRUST LAW, *supra* note 14, at 4.

34.   *Crowley*, 687 F.3d at 319.

35.   ABA SECTION OF ANTITRUST LAW, *supra* note 14, at 94.

36.   15 U.S.C. § 18 (2014).

37.   ABA SECTION OF ANTITRUST LAW, ANTITRUST LAW DEVELOPMENTS 354 (7th ed. 2012); U.S. DEP'T JUSTICE & FTC, HORIZONTAL MERGER GUIDELINES § 1 (2010) [hereinafter HORIZONTAL MERGER GUIDELINES].

38.   HORIZONTAL MERGER GUIDELINES, *supra* note 37, § 2.

39.   *Id.* § 2.1 (noting that at that time the agencies also consider evidence that the merger will enhance competition).

40.   *Id.* § 2.1.

41.   *Id.* § 2.1.1.

42.   *Id.* § 2.1.2.

43.   HORIZONTAL MERGER GUIDELINES, *supra* note 37, § 2.

44.   *Id.* § 4.2 (focusing on "demand substitution factors" and using the "Hypothetical Monopolist Test").

45.   *Id.* § 4.2 (factoring in both the locations of suppliers and the locations of the customers).

46.   *Id.* § 5.1.

47.   *Id.* § 5.2 (basing the market shares calculations on historical evidence); *see* PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW ¶ 931c (3d ed. 2009) (noting that percentage, as opposed to a fraction, is used for market share).

using the Herfindahl–Hirschman Index (HHI).[48] HHI "is calculated by summing the squares of the individual firms' market shares, and gives proportionally greater weight to the larger market shares.[49] Agencies classify markets into three categories: (1) "Unconcentrated Markets" with an HHI below 1500,[50] (2) "Moderately Concentrated Markets" with an HHI between 1500 and 2500,[51] and (3) a "Highly Concentrated Market" with an HHI above 2500.[52] Moderately Concentrated Markets and Highly Concentrated Markets are susceptible to anticompetitive effects and require greater scrutiny.[53]

The agencies also employ standards for analyzing the markets they have defined.[54] First, a "[s]mall change in [c]oncentration" with an increase of HHI of less than 100 ordinarily requires no further analysis.[55] Second, unconcentrated markets are unlikely to have adverse competitive effects and ordinarily require no further analysis.[56] Moderately Concentrated Mergers involve an increase in the HHI of between 100 points and 200 points and often warrant scrutiny.[57] Highly Concentrated Mergers involve an increase of HHI of more than 200 points.[58] Mergers resulting in an increase of more than 200 points will be presumed to enhance market power.[59] The *Horizontal Merger Guidelines* note that these categories are fluid and used primarily to separate innocent mergers from harmful mergers.[60] Courts have applied HHI in merger cases in accordance with the *Horizontal Merger Guidelines*.[61] Obtaining a precise HHI can be difficult because it requires full knowledge of all firms in the market; however, an upper and lower bound can be calculated rather easily.[62]

C. Social Network Analysis

The composition of a social network impacts the performance of the members of the network.[63] Social Network Analysis (SNA) is a unique methodology for understanding the effects of network relationships.[64] Part of the power of a SNA is that it provides a

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48. HORIZONTAL MERGER GUIDELINES, *supra* note 37, § 5.3.

49. *Id.* § 5.3 (stating that, "for example, a market consisting of four firms with market shares of thirty percent, thirty percent, twenty percent and twenty percent has an HHI of 2600 ($30^2+30^2+20^2+20^2=2600$)").

50. *Id.* § 3.

51. *Id.*

52. *Id.*

53. Horizontal Merger Guidelines, *supra* note 37, § 3.

54. *Id.*

55. *Id.* § 4.

56. *Id.* § 3.

57. *Id.* (describing how these mergers "potentially raise significant competitive concerns").

58. HORIZONTAL MERGER GUIDELINES, *supra* note 37, § 3.

59. *Id.* (noting that the presumption can be rebutted by a "showing that the merger is unlikely to enhance market power").

60. *Id.* (focusing on "demand substitution factors").

61. Chicago Bridge & Iron Co. N.V. v. FTC, 534 F.3d 410, 431 (5th Cir. 2008) (noting that a post-merger HHI of 4995 with an increase of 2635 are evidence of an anticompetitive merger); FTC v. Univ. Health, Inc., 938 F.2d 1206, 1211 (11th Cir. 1991) (holding that section 7 applied to nonprofit hospitals the court noted that HHI was the most widely used concentration measure).

62. AREEDA & HOVENKAMP, *supra* note 47, ¶ 931d3 at 190.

63. *See* MATTHEW JACKSON, SOCIAL AND ECONOMIC NETWORKS 35 (2008) (explaining the significance of SNA).

64. CHRISTINA PRELL, SOCIAL NETWORK ANALYSIS: HISTORY, THEORY & METHODOLOGY 19 (2011). *See generally* Eric Fischer et al., *Explaining Variation in State Involvement in Cyber Attacks: A Social Network*

mechanism by which to measure the effect disparate parts of a system may have on each other.[65] To construct a network, an adjacency matrix is used.[66] A simple example of a social network graph is located at Figure 1.

Figure 1: Example of a Social Network Graph[67]
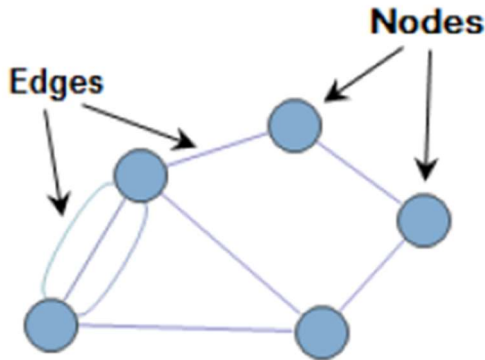
To understand a discussion of SNA some introductory definitions are necessary.[68] Each actor in a network is referred to as a node.[69] Nodes are connected by lines referred to as edges.[70] When two vertices are joined by an edge they are adjacent.[71] The number of edges in a network is the degree of a node.[72] Distance is the shortest path between two nodes.[73]

Centrality is the measure of an actor's position within a network.[74] Four principle measures of centrality are used in SNA: degree centrality, eigenvector centrality, betweenness centrality, and closeness centrality.[75] Degree centrality is "simply the number of immediate contacts an actor has in a network."[76] Degree centrality measures an actor's

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Approach, *in* SOCIAL NETWORKS: A FRAMEWORK OF COMPUTATIONAL INTELLIGENCE (Witold Pedryca & Shyi-Ming Cheneds eds., 2014) (using SNA to analyze the effect of network centrality on cyber-attack occurrences).

65.   STEPHEN P. BORGATTI ET AL., ANALYZING SOCIAL NETWORKS 2 (2013).

66.   *See id.* at 18 (noting that an adjacency matrix is a matrix in which the rows and columns represent nodes and an entry in the row and column combinations represent a tie).

67.   *What is a Network Graph? in Social Media - Six Degrees of Separation and Now Even Less*, SEMANTIC COMMUNITY, http://semanticcommunity.info/AOL_Government/Social_Media_-_Six_Degrees_of_Separation_and_Now_Even_Less (last visited Oct. 7, 2015).

68.   PRELL, *supra* note 64, at 9 (noting social network analysis borrows many terms from graph theory).

69.   *See* Ondrej Nowak*, Corporate Governance Networks and Interlocking Directorates in the Czech Republic*, 6 WORLD ACAD. SCI., ENG'G, & TECH. 1171, 1172 (2012) (discussing the basics of SNA).

70.   PRELL, *supra* note 64, at 9.

71.   BORGATTI ET AL., *supra* note 65, at 12.

72.   *Id.*

73.   JACKSON, *supra* note 63, at 32.

74.   *See* PRELL, *supra* note 64, at 97 (explaining the different measures of centrality).

75.   *See* JACKSON, *supra* note 63, at 37 (noting the different measures of centrality and their uses and meaning in network analysis). Degree centrality is calculated using the expression $C_d(v) = \deg(v)$, where C_d is the degree centrality and deg is the degree of a node. *Id.* at 39. In basic terms the degree centrality of a node is identical to the degree of the node. *Id.*

76.   PRELL, *supra* note 64, at 97.

involvement or activity and does not consider whether an actor is influential.[77] Eigenvector centrality (essentially a more refined version of degree centrality) is the sum of an actor's connections weighted by degree centrality.[78] Betweenness centrality is a measure of the connections that rely on an actor.[79] Betweenness centrality is the best measure of the "most important actors in the network."[80] Closeness centrality is a measure of how easily an actor can reach other actors.[81]

Centralization refers to "the extent a network is dominated by a single node."[82] The network density refers "to the proportion of the [edges] in a network that are actually present."[83] The higher the density, the more cohesive the network.[84] The diameter of a network is the longest geodesic within a network.[85] Fragmentation is the proportion of pairs of nodes that cannot reach each other by any path.[86]

II. ANALYSIS

This Part begins with a discussion of the scholarship of interlocking directorates. Section III.B then discusses this Note's hypothesis and methodology. Section III.C then discusses the data used in the SNA. Section III.D then discusses the network formation and gives a network graph of the corporate community. Section III.E then goes on to explain the regression model and results used in the Note. Finally, Section III.F discusses changes to section 8 of the Clayton Act.

A. Scholarship and Interlocking Directorates

Significant literature exists on interlocking directorates.[87] Some of this literature analyzes the reasons for interlocks, as well as the benefits and costs associated with interlocking directorates.[88] The literature also analyzes the effects of interlocking

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77. *Id.*

78. *Id.* at 101. Eigenvector centrality is calculated using an adjacency matrix $a_{v,t}$. The expression to calculate eigenvector centrality from that matrix is $x_v = \frac{1}{\gamma}\sum_{t \in M(v)} x_t = \frac{1}{\gamma}\sum_{t \in G} a_{v,t} x_t$, where M_v is a set of neighbors of v and γ is a constant. JACKSON, *supra* note 63, at 40.

79. *See* PRELL, *supra* note 64, at 104 (noting that "betweenness centrality calculates how many times an actor sits on the geodesic (shortest path) linking two actors together"). The betweenness centrality of a node v is given by the expression $g(v) = \sum_{s \neq v \neq t} \frac{\sigma_{st}(v)}{\sigma_{st}}$, where σ_{st} is the total number of shortest paths from node s to node t and $\sigma_{st(v)}$ is the number of those paths that pass through. JACKSON, *supra* note 63, at 39.

80. PRELL, *supra* note 64, at 107.

81. JACKSON, *supra* note 63, at 37; *see also* PRELL, *supra* note 64, at 107–08 (noting that closeness centrality is used both as a measure of independence and the ability to access information). Closeness centrality is calculated by the expression $C_C(v) = \sum_{t \in V/v} 2^{-d_G(v,t)}$, where C_C is closeness centrality and all other variables remain the same as in other measures of centrality. JACKSON, *supra* note 63, at 39.

82. BORGATTI ET AL., *supra* note 65, at 159–60.

83. *See* PRELL, *supra* note 64, at 167 (noting that density is calculated $d = ((L \div (n(n-1)) \div 2)$, where L is the number of lines and n is the number of nodes in the network).

84. *Id.*

85. *Id.* at 171.

86. *See* BORGATTI ET AL., *supra* note 65, at 154 (discussing different network level measures of analysis).

87. *See* Roy C. Barnes & Emily R. Ritter, *Networks of Corporate Interlocking: 1962–1995*, 27 CRITICAL SOC. 192, 197 (2001) (noting that "interlock networks matter").

88. *See infra* Section III.A.1 (discussing the effects of interlocking directorates).

directorates on corporate performance.[89]

1. Effects of Interlocking Directorates

Within the literature there are four major categories of research: class hegemony, management control, financial control, and resource dependency.[90] The class hegemony model suggests that the United States possesses a cohesive upper class that self-reinforces by placing its members in important corporate board positions.[91] The management control model contends that directors are powerless to control the corporation, which is instead guided by the management.[92] The financial control model sees the corporation as giving up board seats in exchange for connections with the financial community, which assures a stable flow of available financing.[93] The resource dependency model suggests that interlocking firms believe that they will receive equal benefits from the relationship[94] by reducing the environmental uncertainty.[95] The resource dependence theory receives the strongest support in the literature[96] and argues that interlocks benefit society at large by stabilizing the supply of consumer products and adding efficiency to the production process.[97]

Many studies of corporate interlocks make little use of proper SNA.[98] When thinking about interlocking directorates, it is important to take into account that the economic and political environment in the United States is significantly different from those existing at the time of the passage of section 8 in 1914.[99] Interlocks can help firms decrease market uncertainty by increasing the ability to identify the most advantageous trade partners, the ability to know which competitors pose the largest threat, the ability to predict future sector movement, and the ability to anticipate sector responses.[100] A number of different benefits to interlocks are recognized in the literature, including: vertical coordination, expertise,[101]

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89. *Id.*

90. *See* Joanna Szalacha, *Interlocking Directorates and Possible Conflicts of Interest*, 174 POLISH SOC. REV. 205, 206 (2011) (discussing the literature of interlocking directorates).

91. *See* Max H. Bazerman & F. David Schoorman, *A Limited Rationality Model of Interlocking Directorates*, 8 ACAD. MGMT. REV. 206, 207 (1983) (noting the elite "belong to the same country clubs, attend the same social functions . . . and hold similar views of reality").

92. *See id.* (noting that the management control model sees directors as passive, unskilled, and uninquisitive).

93. *See id.* (noting significant evidence of extensive interlocks between banks and other firms exists).

94. *See id.* (noting that firms obtain benefits through vertical coordination, horizontal coordination, knowledge, expertise, and prestige).

95. *See* Phillip H. Phan et al., *The Performance Impact of Interlocking Directorates: The Case of Singapore*, 15 J. MANAGERIAL ISSUES 338, 340 (2003) (noting that common uncertainties include "technological shifts, deregulation, the globalization of capital and product markets, and political reform").

96. *See* Kevin Au et al., *Interlocking Directorates, Firm Strategies and Performance in Hong Kong: Towards a Research Agenda*, 17 ASIA PAC. J. MGMT. 29, 30 (2000) (noting the strong evidence for the resource dependence theory).

97. *See generally* Bazerman & Schoorman, *supra* note 91, at 213.

98. *See* JOHN SCOTT, SOCIAL NETWORK ANALYSIS 94 (2d ed. 2012) (discussing the often flawed use of SNA in scholarship of interlocking directorate).

99. Barnes & Ritter, *supra* note 87, at 194 (discussing the "changing patterns of interlocking").

100. RONALD S. BURT, CORPORATE PROFITS AND COOPTATION: NETWORKS OF MARKET CONSTRAINTS AND DIRECTORATE TIES IN THE AMERICAN ECONOMY 76–77 (1983).

101. *See* F. David Schoorman et al., *Interlocking Directorates: A Strategy for Reducing Environmental Uncertainty*, 6 ACAD. MGMT. REV. 243, 244–45 (1981) (arguing that the interlocking directorate can "aid in the identification of possible alternatives to a decision . . . increase the ability of the organization to collect information on the alternatives, and . . . help make the best decision given the alternatives and information available"); *see*

and reputation.[102] The reputation of a firm is important—when investors make decisions, "they consider the firm's strength and the quality of its management."[103] The actual impairment of competition from an interlock has not been documented.[104]

Beyond theory, there has been significant analytical work in the scholarship on interlocking directorates.[105] One preliminary study of the effects of interlocking directorates done in the Czech Republic found no "observable link between the financial performance of the company . . . and the number of interlocks."[106] Another study found a positive relationship between interlocks and firm performance.[107] An analysis testing the effect of centrality on future firm profitability found that central firms have a statistically significant increase in future profitability compared to noncentral firms.[108] An analysis of interlocks in firms in Singapore found that inter-industry interlocks had a statistically significant positive effect on firm performance while intra-industry interlocks did not.[109] Another study found a nonlinear relationship between interlocking directors and firm earnings.[110] A preliminary SNA indicates a positive relationship between interlocks and profitability among Fortune 500 companies.[111] A SNA of Chinese firms indicated that firms central in the corporate community have better future performance compared to non-central firms.[112] Questions exist about whether interlocks between competitors actually facilitate collusion.[113] Scholars suggest that in highly concentrated industries, interlocks are unnecessary to set prices.[114]

These findings have not been universal, as a substantial amount of the analytical scholarship in the area of interlocking directorates indicates that there is a negative effect

also Taveras, Jr., *supra* note 15, at 834 (arguing that the freedom to obtain the most qualified directors is the greatest benefit of interlocking directorates).

102. Szalacha, *supra* note 90, at 207; *see* Schoorman et al., *supra* note 101 (noting that directors can act as signaling devices for the value of the firm).

103. Mizruchi, *supra* note 1, at 276 (noting that reputation is often a prerequisite for securing resources).

104. AREEDA & HOVENKAMP, *supra* note 47, ¶ 1300.

105. *Supra* Section III.A.1.

106. *See* Nowak, *supra* note 69, at 1167 (discussing the basics of SNA).

107. Bikram De, *The Incidence and Performance Effects Of Interlocking Directorates in Emerging Market Business Groups: Evidence from India* 2 (Apr. 2012), http://saber.eaber.org/sites/default/files/documents/IGIDR_De_2003.pdf.

108. *See* David F. Larcker et al., *Boardroom Centrality and Stock Returns* 18 (Rock Ctr. for Corp. Governance, Working Paper Series No. 84, 2010), https://www.gsb.stanford.edu/faculty-research/working-papers/boardroom-centrality-stock-returns (noting that these benefits are not incorporated into the stock price). The author later hypothesizes this effect could result from a selection bias among firms who prefer to interlock with firms who will be profitable in the future. *Id.* at 21.

109. *See* Phan et al., *supra* note 95, at 345 (measuring performance by return on equity).

110. *See* Hafiza Aishah Hashim & Mohd Shaari Abdul Rahman, *Multiple Board Appointments: Are Directors Effective?*, 2 INT'L J. BUS. & SOC. SCI. 137, 142 (2011) (finding that the presence of interlocked directors is associated with higher earnings; however, too many interlocked directors deteriorate the quality of earnings).

111. *See* Alton Y. K. Chua & Radhika Shenoy Balkunje, Interlocking Directorates and Profitability: A Social Network Analysis of Fortune 500 Companies 1105, 1108 (2012) (presented at ACM International Conference on Advances in Social Networks Analysis and Mining) (noting that when controlling for "age, size and sectors of the companies, the relationship between interlocks and profitability . . . becomes statistically insignificant").

112. *See* Liuchuang Li et al., *The Network of Interlocking Directorates and Firm Performance in Transition Economies: Evidence from China*, 29 J. APPLIED BUS. RES. 607, 617 (2013) (finding the effects are even more significant in non-state owned firms).

113. *Id.* (noting that the prohibition of interlocks among competitors has not deterred other price fixing conspiracies).

114. *Id.*

on either firm performance or competition.[115] There are some concerns with interlocking directorates in the literature: horizontal cooperation between competing firms resulting in harm to consumers,[116] value-decreasing management practices,[117] board of director effort tradeoffs,[118] and the spread of bad information.[119] In his review of the literature on the formation on director interlocks, Mark Mizruchi, a prominent scholar on corporate behavior, noted that one of the reasons for interlock formation was collusion.[120] In a SNA of the effects of interlocking directorates in Mexican companies, Mirzruchi found that a few individuals held a significant amount of power in the network resulting in difficulties "maintaining the independence, transparency and accountability of corporate affairs to shareholders."[121] Literature also exists suggesting no relationship exists between interlocks and firm profitability.[122] Some research suggests that interlocks are "both a cause and a result of profitably."[123] This Note hopes to provide clarity to these competing results by providing original research on the effect of a firm's position in the corporate community on corporate performance.

B. Hypothesis and Methodology

This Note hypothesizes that as a corporate board becomes more central within the corporate community, it will demonstrate higher levels of corporate performance. Extremely central states have the most board interlocks. As a result, those corporations would be in a better position to take advantage of the benefits of corporate interlocks, and those advantages would be expected to show up in corporate performance. To summarize this Note's hypothesis: H1: An increase in the interconnectedness of a company in the corporate community will lead to an increase in corporate performance.

This Note will test the hypothesis[124] by using a vector Maximum Likelihood Estimator (MLE) regression model available in the UCINET 6.0 program.[125] This Note

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115.   *See generally* Mizruchi, *supra* note 1 (discussing the literature of interlocking directorates).

116.   *See* Szalacha, *supra* note 90, at 207 (noting that interlocking directorates are theorized to allow communication of prices and research and development between firms).

117.   Larcker et al., *supra* note 108, at 3–7 (noting that backdating is an example of bad firm management practices spread by directors).

118.   *Id.* (noting that as board members take on additional boardroom jobs "a firm may suffer economically from the deteriorating quality of a director's work").

119.   *Id.* at 3.

120.   *See* Mizruchi, *supra* note 1, at 273 (noting that collusion had been a concern about interlocks since the passage of the Clayton Act in 1914).

121.   Carlos Rafael Anina-Vazquez & Shzad Uddin, *Network of Board of Directors in Mexican Corporations: A Social Network Analysis* 1 (2013), http://www.apira2013.org/proceedings/pdfs/K196.pdf.

122.   *See* Mizruchi, *supra* note 1, at 274–75 (noting that some studies have found no relationship, or even a negative relationship, between interlocks and profitability).

123.   *See* Benjamin M. Gerber, *Enabling Interlocking Benefits While Preventing Anticompetitive Harm: Towards an Optimal Definition of Competitors Under Section 8 of the Clayton Act*, 24 YALE J. ON REG. 107, 117 (2007) (discussing the empirical analysis of interlocking directorates).

124.   This analysis seeks to fill a gap in the existing literature on corporate interlocks and performance by employing a SNA methodology. *See* R. Jack Richardson, *Directorship Interlocks and Corporate Profitability*, 32 ADMIN. SCI. Q. 367, 367 (Sept. 1987) (noting there have been numerous studies on interlocking directorates with conflicting results, and as a result, further study is of great importance).

125.   *See* S.P. Borgatti et al., *UCINET for Windows: Software for Social Network Analysis*, ANALYTIC TECH. (2002), https://sites.google.com/site/ucinetsoftware/ (providing a software package for SNA).

used the MLE regression model because the data in the analysis are relational.[126] The MLE regression allows for the examination of relationships in a similar way to the Ordinary Least Squares regression model (OLS)without violating the fundamental assumption of independence.[127] The results can be interpreted the same way as an OLS regression model with coefficients and confidence levels.[128]

C. Data

The dependent variable in this analysis is corporate performance. A dependent variable is the "variable of primary importance in investigations."[129] In the models, corporate performance has been operationalized using three different measures: five year average[130] return on assets (ROA),[131] five year average[132] return on equity (ROE),[133] and the change in share price from 2009 to 2013.[134] Centrality is the independent variable of interest in this analysis.[135] The analysis uses four different measures of centrality—degree centrality, closeness centrality, eigenvector centrality, and betweenness centrality[136]—to measure the effect of interlocking directorates on corporate performance. This Note also uses a number of control variables including leverage,[137] the natural log[138] of market capitalization,[139] the number of directors on the board of directors[140], as well as dummy variables for the sector of the economy in which each corporation operates.[141] The control variables may also affect the dependent variable and are therefore necessary to isolate the

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126. The traditional OLS regression model cannot be used because the network data violates the OLS Gauss–Markov assumption of independence. *See* Carlos Toro-Vizcarrondo & T. D. Wallace, *A Test of the Mean Square Error Criterion for Restrictions in Linear Regression*, 63 J. AM. STAT. ASS'N 558, 563 (1968) (using a proof to demonstrate that an OLS regression was appropriate because of the independence of the data).

127. The regression calculates standard error through permutations rather than the Standard Error formula. Borgatti et al., *supra* note 125.

128. *See* Marijte A.J. van Duijn et al., *Comparison of Maximum Likelihood Estimation of Exponential Family Random Graph Models* 17 (Ctr. for Stat. and Soc. Sci. U. of Wash., Working Paper No. 74, 2007), https://www.csss.washington.edu/Papers/wp74.pdf (noting that the ease of interpretation of the coefficients of a MLE is one of the best cases for its use).

129. BRIAN EVERITT, CAMBRIDGE DICTIONARY OF STATISTICS 369 (4th ed. 2010) (using the response variable and dependent variable interchangeably).

130. *See* Richardson, *supra* note 124, at 371 (using averaged data to smooth the noise in an analysis of interlocks on corporate performance).

131. Information was obtained from the database for each of the variables by individually searching the companies which make up the Standard and Poor's (S&P) 100. *Companies*, S&P CAP. IQ MCGRAW HILL FIN., http://www.net advantage.standardandpoors.com/NASApp/NetAdvantage/Companies.do (last visited Oct. 7, 2015) [hereinafter S&P CAP. IQ MCGRAW HILL FIN.].

132. *See* Richardson, *supra* note 124 (using averaged data to smooth the noise in an analysis of Interlocks on corporate performance).

133. S&P CAP. IQ MCGRAW HILL FIN., *supra* note 131.

134. *Id.*

135. *See supra* Section II.C (explaining centrality).

136. *Id.* Centrality measures were calculated by the author using UCINET. Borgatti et al., *supra* note 125.

137. S&P CAP. IQ MCGRAW HILL FIN., *supra* note 131.

138. The natural log is used to make the coefficients easier to interpret. The scaling mechanism has no impact on the actual results.

139. *Id.*; *see Overview of BLS Statistics by Industry*, BUREAU LAB. STAT., http://www.bls.gov/bls/industry.htm (discussing different industry classifications) (last visited Oct. 7, 2015).

140. S&P CAP. IQ MCGRAW HILL FIN., *supra* note 131.

141. These sectors include Manufacturing, Natural Resources, Insurance, Finance, Pharmaceuticals, Healthcare Equipment, Transportation, Retail/Service, Technology Hardware, Telecommunications, and Technology Software. *Id.*

effect that centrality in the corporate community has on corporate performance. To ensure there was no multicollinearity in the independent variables, this Note ran a correlation test.[142] The correlation yielded no correlation coefficients above 0.60, which indicates an absence of multicollinearity.[143]

Table 1: Descriptive Statistics of the Dependent and Independent Variables

Variable	Mean	Median	Minimum	Maximum	Standard Deviation
5 Year ROA	8.008 %	7.883%	-0.563%	22.060	5.192%
5 Year ROE	23.497%	18.05%	-1.093%	94.572%	19.910%
4 Year Change in Stock Price	69.1%	59.55%	-45.8%	284.1%	64.1%
Betweenness Centrality	88.000	60.188	0	757.090	112.471
Degree Centrality	4.217	4	1	15	2.693
Closeness Centrality	294.530	281	204	657	68.913
Eigenvector Centrality	0.077	0.055	0.379	0	0.078

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142.   Calculated using UCINET. Borgatti et al., *supra* note 125.

143.   Multicollinearity occurs when the independent variables in an analysis are highly correlating, thus making it difficult to determine the effect of individual independent variables on the dependent variable. *See* H.M. Blalock Jr., *Correlated Independent Variables: The Problem of Multicollinearity*, 2 Soc. Forces 233, 233–34 (1963) (using a correlation to identify multicollinearity). Multicollinearity does not affect the predictive power of the model as a whole. *Id.*

Leverage	0.968	0.5436	0	6.102	1.172
Number of Directors	11.578	11	7	16	1.864
Natural Log of Market Capitalization	11.444	11.339	10.194	13.349	0.639
Manufacturing	0.193	0	0	1	0.394
Natural Resources	0.096	0	0	1	0.295
Insurance	0.060	0	0	1	0.238
Finance	0.157	0	0	1	0.363
Pharmaceuticals	0.072	0	0	1	0.259
Healthcare Equipment	0.012	0	0	1	0.109
Transportation	0.036	0	0	1	0.187
Retail/Service	0.133	0	0	1	0.339
Technology Hardware	0.108	0	0	1	0.311
Telecommunications	0.048	0	0	1	0.214
Technology Software	0.072	0	0	1	0.259

Calculated by the author using UCINET.[144]

D. Network

SNA is an appropriate and insightful means of analysis here because both boards and directors are searching for mutually beneficial connections.[145] The network graph of the corporate community used in the analysis is located below at Figure 2.[146] The network was calculated using an adjacency matrix[147] of the board interlocks of the S&P 100 using UCINET.[148] In the network of the corporate community, the nodes are corporate boards. If a board is interlocked with another board, there will be an edge connecting the two nodes. As the number of connections between the nodes increases the density of the edges within the network also increases.[149] The network was constructed using a technique known as "spring embedding" where more connected nodes are drawn close together while less

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144. Borgatti et al., *supra* note 125.
145. *See* JACKSON, *supra* note 63, at 153 (discussing strategic network formation).
146. Note that isolates (companies with no interlocks in the dataset) have been removed from the graph. Borgatti et al., *supra* note 125. The Network was calculated using UCINET. *Id.*
147. *See Entering Data for Analysis by UCINET Software: Fullmatrix Format*, ANALYTIC TECHNOLOGIES, http://www.analytictech.com/networks/dataentry.htm (last visited Oct. 7, 2015) (discussing the creation of adjacency matrices).
148. *See* Anina-Vazquez & Uddin, *supra* note 121 (noting that UCINET is "the most popular and extensively used software package" for SNA).
149. JACKSON, *supra* note 63, at 29.

connected nodes are drawn away from the center of the network.[150] Spring embedding is used to make the network graph easier to interpret. As a result, the companies in the center of the network are central to the corporate community. These corporations are also likely to be interlocked with other corporations that are central in the corporate community.

The descriptive statistics for Figure 1 are located in Table 1. The density of the network is 0.045, which indicates that the network has 4.5% of the total possible edges.[151] The S&P 100 is not a well-connected network. The average distance for the network is 3.450, while the standard deviation of the distance is 1.192. This indicates that among connected boards, almost no board is more than seven boards away from another. The average degree in the network is 3.774. The diameter of the network is 8.[152] The fragmentation of the network is 0.093, indicating that only 9.3% of nodes cannot reach another given node.[153] The most connected board within the S&P 100 (by all four measures of centrality) is IBM.[154] Only two nodes—Amazon and UnitedHealth—are completely isolated from the rest of the network.[155] There were seventeen corporations in the S&P 100 that are not interlocked with other S&P 100 corporations. They were removed from the data for purposes of the analysis, as isolates cannot be used in the calculation of centrality measures.[156]

Table 2: Descriptive Statistics of the Network of the S&P 100[157]

	Network 1
Density	0.045
Average Degree	3.774
Total Possible Degrees	82
Average Distance	3.450
SD of Distance	1.192
Diameter	8.0
Fragmentation	0.093

Calculated by the author using UCINET v6.0[158]

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150.   *See* Anina-Vazquez & Uddin, *supra* note 121 (using spring embedding to draw a network).
151.   *See* PRELL, *supra* note 64, at 167 (noting that density refers "to the proportion of the [edges] in a network that are actually present").
152.   Diameter is the largest distance between any two nodes in the network. JACKSON, *supra* note 63, at 34.
153.   *See* BORGATTI ET AL., *supra* note 65, at 154 (noting that fragmentation is the proportion of pairs of nodes that cannot reach each other by any path).
154.   *See infra* Figure 2.
155.   Isolates among the S&P 100 would be less likely as the sample of corporations included in the analysis increases.
156.   *See* JACKSON, *supra* note 63, at 37 (noting the requirements for calculating centrality).
157.   For statistical reasons, the isolates have been removed from the network. *See* PRELL, *supra* note 64, at 96–112 (noting the process for calculating centrality in UCINET).
158.   Borgatti et al., *supra* note 125.

Figure 2: Network Representation of the Network of Interlocking Directorate
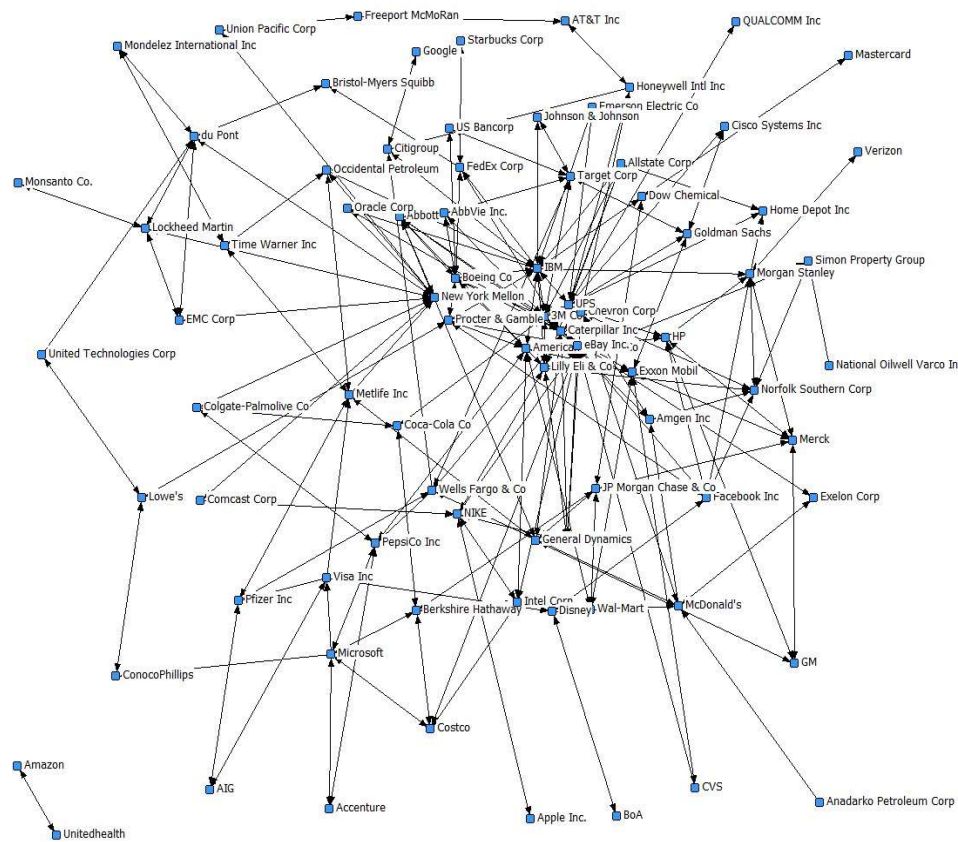
E. Regression

This Section explains the regression used to analyze the SNA. First, Section III.E.1 explains the model run in this Note. Next, Section III.E.2 gives regression results.

1. Regression Model

To test the Note's hypothesis, twelve MLE models were run.[159] The Note regresses betweenness, closeness, degree, and eigenvector centrality on corporate performance—measured using ROA,[160] ROE,[161] and four-year change in stock price.[162] The model

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159. The models were run using UCINET. *See* Borgatti et al., *supra* note 125.

160. *See generally* Li et al., *supra* note 112 (using ROA to measure the effect of interlocking directorates on corporate performance); Larcker et al., *supra* note 108.

161. *See generally* Richardson, *supra* note 124 (using ROE as a measure of corporate performance in evaluating the effect of interlocks on performance).

162. *See* Eugene F. Fama, *Efficient Capital Markets: II*, 46 J. FIN. 1575, 1575 (1991) (noting that the efficient market hypothesis is "the simple statement that security prices fully reflect all available information"). If the market price reflects all information of corporations, then it would be the ideal measure of corporate performance.

controls for leverage,[163] the number of the directors on the board,[164] the natural log of market capitalization,[165] as well as for the sector of each corporation in the network.[166] The regression equation is given below:

$$Corporate\ Performance = \beta 0 + \beta Centrality + \beta Leverage + \beta LNMarket + \beta \#Directors + \beta Manufacturing + \beta Natural\ Resources + \beta Insurance + \beta Financial + \beta Pharmaceutical + \beta Healthcare + \beta Transportation + \beta Retail/Service + \beta Tech.Hardware + \beta\ Telecommunication$$

The results of the regression models are reported in Tables 3, 4 and 5 below. The coefficients can be interpreted just like the standard OLS linear modeling technique.[167] The difference between the OLS regression model and the MLE regression model used in UCINET is that the MLE model calculates standard error by simulation rather than standard formula.[168] For this reason, standard errors cannot be reported in Tables 3, 4 and 5. The MLE regression establishes parameters that yield coefficients that best estimate the value of the dependent variable (corporate performance, in this case).[169] The statistical significance and the direction of the coefficients are used to evaluate the models.

2. Regression Results

Table 3: Regression Results[170]

Variable	ROE_1	ROE_2	ROE_3	ROE_4
Constant	-15.910	-25.402	-13.643	-20.518

Id. The hypothesis has come under fire since its inception—some argue that the market is not perfectly efficient in pricing information. Burton G. Malkiel, *The Efficient Market Hypothesis and Its Critics*, 17 J. ECON. PERSP. 59, 80 (2003).

163. *See* Mark Hirschey & W. Wichern, *Accounting and Market-Value Measures of Profitability: Consistency, Determinants and Uses*, 2 J. BUS. ECON. & STAT. 375, 380 (1984) (noting that leverage is an important determinant of firm performance).

164. The number of directors is used to control for the workload of the directors. *See* Li et al., *supra* note 112, at 617 (noting that the workload of a director can negatively impact their performance).

165. *See* De, *supra* note 107 (controlling for firm in a regression model on interlocks and firm performance); Sanjai Bhagat & Bernard Black, *The Non-Correlation Between Board Independence and Long-Term Firm Performance*, 27 J. CORP. L. 231, 243 (2002) (controlling for firm size by using the natural log of sales).

166. *See* Chua & Balkunje, *supra* note 111, at 1107–08 (controlling for the sector of the economy in an analysis of the effects of centrality on profitability); *see* Richardson, *supra* note 124, at 376 (noting that corporate profitability varies by industry).

167. *Tools>Statistics>Vector>Regression*, ANALYTIC TECHNOLOGIES, http://www.analytictech. com/ucinet/help/1oy.6x0.htm (last visited Oct. 7, 2014) (explaining the MLE regression used in UCINET).

168. *Id.*

169. *See* van Duijn et al., *supra* note 128, at 17 (noting that the ease of interpretation of the MLE is one of the best cases for its use).

170. The model was also run without control variables (not reported). Positive statistically significant relationships between degree centrality and ROE (.001 level), closeness centrality and change in stock price (.05 level) and eigenvector centrality and ROE (.01 level) were all found.

Betweenness Centrality	0.023			
Degree Centrality				0.914
Closeness Centrality			-0.004	
Eigenvector Centrality		31.332		
Leverage	10.08**	9.845***	10.216***	9.94***
Manufacturing	0.69	5.33	-2.627	3.086
Natural Resources	-7.7377	-2.353	-10.865	-4.687
Insurance	-10.398	-5.98	-14.04	-8.255
Financial	-26.874	-20.988	-29.516	-23.94
Pharmaceutical	-2.287	0.262	-5.70	-1.22
Healthcare	-15.209	-12.347	-19.762	-13.71
Transportation	-10.641	-5.377	-11.887	-7.61
Retail/Service	-3.645	1.094	-7.241	-1.45
Tech. Hardware	-1.365	3.35	-3.49	1.588
Telecommunication	-21.23	-16.159	-35.493	-18.06
Tech. Software	-5.735	-0.0821	-8.41	-3.44
Number of Directors	0.156	0.175	0.33	0.133
LNMarket Capitalization	2.975	3.358	3.13	3.039
N	83	83	83	83
F Score	4.747	4.66	4.473	4.699
R squared	0.515	0.511	0.5	0.513

Calculated by author using UCINET v6.0[171]

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171. *Id.*

* Significant at .05 level
** Significant at .01 level
*** Significant at .001 level

Table 4: Regression Results

Variable	$\Delta Stock_1$	$\Delta Stock_2$	$\Delta Stock_3$	$\Delta Stock_4$
Constant	1.317	1.431	0.764	1.464
Betweenness Centrality	-0.001			
Degree Centrality				-0.027
Closeness Centrality			0.002*	
Eigenvector Centrality		-0.414		
Leverage	-0.049	-0.047	-0.041	-0.044
Manufacturing	-0.030	-0.06	-0.116	-0.129
Natural Resources	-0.453	-0.487	-0.556	-0.563
Insurance	-0.140	-0.163	-0.359	-0.237
Financial	0.161	0.108	0.078	0.051
Pharmaceutical	-0.199	-0.213	-0.235	-0.271
Healthcare	0.243	0.246	0.238	0.162
Transportation	0.643	0.587	0.558	0.542
Retail/Service	0.529	0.499	0.463	0.433
Tech. Hardware	-0.102	-0.144	-0.177	-0.209
Telecommunication	0.307	0.279	0.202	0.176
Tech. Software	0.217	0.178	0.037	0.124

Number of Directors	-0.048	-0.049	-0.047	-0.046
LNMarket Capitalization	-0.004	-0.01	-0.009	-0.005
N	83	83	83	83
F Score	1.376	1.337	1.689	1.404
R squared	0.235	0.230	0.274	0.239

Calculated by author using UCINET v6.0[172]

* Significant at .05 level
** Significant at .01 level
*** Significant at .001 level

Table 5: Regression Results

Variable	ROA_1	ROA_2	ROA_3	ROA_4
Constant	-5.16	-3.251	-5.834	-4.42
Betweenness Centrality	0.0234			
Degree Centrality				-0.131
Closeness Centrality			0.002	

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172. *Id.*

Eigenvector Centrality		-5.866		
Leverage	-0.061	-0.001	-0.062	-0.032
Manufacturing	-4.691	-5.927	-4.556	-5.243
Natural Resources	-4.852	-6.181	-4.722	-5.459
Insurance	-9.149	-10.403	-9.120	-9.700
Financial	-9.795	-11.192	-9.702	-10.382
Pharmaceutical	-2.006	-2.895	-1.853	-2.414
Healthcare	-3.597	-4.616	-3.307	-4.087
Transportation	-5.472	-6.605	-5.472	-5.99
Retail/Service	-4.164	-5.444	-3.993	-4.70
Tech. Hardware	-2.60	-3.722	-2.532	-3.161
Telecom	-10.761	-12.181	-10.584	-11.484
Tech. Software	-2.165	-3.853	-2.612	-3.125
Number of Directors	-0.184	-0.169	-0.195	-0.171
LNMarket Capitalization	1.828	1.773	1.814**	1.828**
N	83	83	83	83
F Score	2.900	2.948	5.782	5.617
R squared	0.394	0.398	0.584	0.577

Calculated by author using UCINET v6.0[173]

* Significant at .05 level
** Significant at .01 level
*** Significant at .001 level

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173. *Id.*

In part, the regression affirms this Note's hypothesis[174] that an increase in centrality in the corporate community leads to an increase in corporate performance. Controlling for market capitalization, leverage, industry and the number of directors, closeness centrality has a statistically significant—at the .05 level—effect on the change in stock price. In all but one of the models, there is no statistically significant effect of centrality on any measure of corporate performance. Model $\Delta Stock_3$ indicates that a one standard deviation increase in closeness centrality would lead to a 13.78% increase in share price over a four year period. That amounts to 21% of a standard deviation of the increase in share price. The R squared of model $\Delta Stock_3$ is 0.230, indicating that it explains 23% of the variation in the change in stock price. It is also worth noting that without the control variables in the model, there was a statistically significant positive relationship between degree centrality, eigenvector centrality, and closeness centrality on corporate performance.

Leverage has a positive statistically significant impact on ROE, while market capitalization has a positive statistically significant impact on ROA in two of the models.[175] None of the industry variables have a statistically significant impact on corporate performance.

The lack of significance in the model may be in large part influenced by the relatively small sample.[176] The small sample size yields only a snapshot of the corporate community at large. Due to the time intensive nature of data collection for an SNA, only the S&P 100 boards were feasible for this analysis. To get a more accurate idea of the effect of centrality on corporate performance, a larger corporate community should be studied over a number of years. It is of note that three of the four models testing the effect of centrality on ROE found a positive effect. Additionally, both betweenness centrality and closeness centrality have a positive effect on corporate performance in two of three models. It is important to note that there were no statistically significant results suggesting a negative relationship between centrality and corporate performance. The somewhat mixed results of the SNA is in line with the generally inconclusive results of the literature at large.[177] The results indicate that further study with a larger sample of corporations is essential to moving forward in this area of analysis.

F. Changing Section 8 of the Clayton Act

This Section first discusses the critics of section 8 of the Clayton Act. It then discusses the reasons for changing section 8. First it notes the arguments that section 8 should be changed to facilitate the benefits of interlocks. Finally it explains the arguments that section 8 should be changed because of the changing economic conditions since the passage of section 8.

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174. *Supra* Section III.B.

175. *Supra* Table 5, ROA$_3$ & ROA$_4$.

176. *See* Allen Fleishman, *Significant p-Values in Small Samples*, ALLEN FLEISHMAN BIOSTATISTICS INC. (Jan. 25, 2012), http://allenfleishmanbiostatistics.com/Articles/2012/01/13-p-values-in-small-samples/ (noting the difficulties of obtaining statistical significance in small samples sizes).

177. *See* Nowak, *supra* note 69, at 1171 (finding "no observable link between the financial performance of the company . . . and the number of interlocks"); Chua & Balkunje, *supra* note 111, at 1108 (noting, however, that when controlling for "age, size and sectors of the companies, the relationship between interlocks and profitability . . . becomes statistically insignificant"); Mizruchi, *supra* note 1, at 273 (noting literature suggesting no relationship between interlocks and firm profitability); Gerber, *supra* note 123, at 117 (noting some literature suggesting a problem of dual causation with interlocks and corporate performance).

1. Critics of Section 8

Critics of section 8 of the Clayton Act frequently note that its definition of competition is amorphous and problematic.[178] Even scholars who argue for changes to section 8 of the Clayton Act admit the potential harms resulting from interlocks.[179] Although there has been discussion about the difference between "actual" and "potential" competitors in the literature, there has been less scholarship on the meaning of competition in the section 8 context.[180] Some have noted that it is curious that interlocks have been singled out amidst all of the potential modes of collusive agreements between competitors.[181] A scholar noted that the "evils" prevented under section 8 are all prohibited elsewhere in the antitrust law.[182]

Critics of section 8 argue that it should be altered or repealed.[183] Proponents of the market concentration test for section 8 argue that interlocking is an innocuous corporate action when compared to a horizontal merger, and as a result, the merger standard is sufficient to prevent anticompetitive consumer harm.[184] Some have also argued for replacing the qualitative test for competition currently employed under section 8 with a more quantitative analysis based on the Horizontal Merger Analysis used in section 7.[185] However, some proponents of change believe that the section 7 standard is too time and resource intensive for decisions about interlocking directorates.[186] These proponents of change argue that an appropriate test would allow for the retention of the benefits of corporate interlocks, limiting their anticompetitive costs by preventing interlocks where there are high cross elasticities of demand.[187] Still others argue that the Supreme Court should adopt the reasonable interchangeability test used in *American Bakeries* for section 8 cases which would prevent firms who sell products that are reasonably interchangeable from interlocking.[188]

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178.   Ace Group, *Interlocking Directorates: A Sleeping Bear Awakens*, ACE REPORT (Feb. 2011), http://www.acegroup.com/bm-en/media-centre/interlocking-directorates-a-sleeping-bear-awakens.aspx.

179.   *See* Gerber, *supra* note 123, at 111–12 (discussing the harms of interlocking directorates); Taveras, Jr., *supra* note 15, at 840–41 (noting that there is still harm to consumers where two firms in direct competition interlock, while arguing against more stringent prohibitions on interlocks).

180.   *See* PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW: AN ANALYSIS OF ANTITRUST PRINCIPLES AND THEIR APPLICATION ¶ 1302, at 326–31 (2d ed. 2003) (discussing the definition of "competition" under section 8).

181.   *See* Taveras, Jr., *supra* note 15, at 842 (noting that, of the available options for horizontal collusion—trade meetings, lunches and secret meetings—interlocks are perhaps the least effective because they are "obvious").

182.   *See id.* at 834–35 (noting that "price-fixing, resale-price maintenance, and group boycotts" are all prohibited by the Sherman or Federal Trade Commission Act).

183.   Ace Group, *supra* note 178.

184.   Gerber, *supra* note 123, at 108–09.

185.   *Id.* at 128 (noting that merely copying the section 7 analysis is inappropriate because regulations on mergers and interlocks seek to prevent fundamentally different evils).

186.   *See* Taveras, Jr., *supra* note 15, at 832 (evaluating potential changes to the section 8 definition of competition).

187.   *See* Gerber, *supra* note 123, at 109 (discussing how courts can avoid unnecessary inference with corporate directorship).

188.   *See* John T. Murray, *The Definition of Competitors Under Section 8 of the Clayton Act: The Emergence of Supply Side Competition Analysis*, 41 WASH. & LEE L. REV. 135, 140 (1984) (noting that if the products sold are reasonably interchangeable, a presumption exists that the two firms are in competition); Am. Bakeries Co. v. Gourmet Bakers, Inc., 515 F. Supp. 977, 980 (D. Md. 1981) ("'Relevant market test' may be applied to determine whether corporations (1) sell products which are physically or functionally identical (i.e., reasonably interchangeable) (2) within the same geographic area.").

2. Reasons to Change Section 8

A number of arguments exist for changing section 8 of the Clayton Act. This Section examines the argument for changing section 8 to facilitate the benefits of interlocks. Finally, it notes the argument for changing section 8 because of the changing conditions since the passage of section 8.

a. Facilitating the Benefits of Interlocks

Critics note that section 8 prevents the acquisition of value-adding directors[189] as well as other benefits of interlocking.[190] For example, corporate interlocks have been found to reduce transaction costs and therefore increase overall efficiency within the economy.[191] The per se rule of section 8 prohibiting interlocks in competing companies provides for overdeterrence of interlocks resulting in deadweight loss to the economy.[192] Price fixing, a practice also prohibited by a per se rule, has significantly more anticompetitive effect than interlocking.[193] Additionally, other countries do not have antitrust laws similar to section 8 prohibiting interlocking directorates in competing industries.[194] This disparity in the law puts the United States at a competitive disadvantage with the rest of the world.[195]

The MLE run in Part III demonstrates that closeness centrality has a statistically significant positive effect on the five-year change in stock price of a corporation.[196] Closeness centrality is a measure of how easily a corporation in the corporate community is able to access other members of the corporate community.[197] The SNA therefore indicates that corporations with greater abilities to reach other corporations through interlocks are likely to have better corporate performance. This result supports the resource dependency model of interlocking directorates where corporations use interlocking boards to insulate against environmental uncertainties.[198] The SNA demonstrates that boards who are better able to collect information from across the corporate community are associated with better corporate performance. By removing the unnecessary restrictions and implementing an alternative system, U.S. corporations would be able to take advantage of the possible benefits of interlocking directorates while avoiding anticompetitive harms.[199]

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189.   *See* Gerber, *supra* note 123, at 113–15 (noting that in some industries "the executive talent is in some instances quite shallow").

190.   *See id.* at 114 (noting that benefits include "monitoring, cooperation, legitimacy, and expertise").

191.   Bazerman & Schoorman, *supra* note 91, at 213.

192.   *See* Gerber, *supra* note 123, at 108 (noting that the per se rule for interlocking directorates is not cost justified).

193.   *See id.* at 110 (noting that "to permit an interlock is most often a lower-stakes inquiry").

194.   Ace Group, *supra* note 178.

195.   *Id.*

196.   *See supra* Table 4.

197.   Prell, *supra* note 64, at 107–08.

198.   *See* Bazerman & Schoorman, *supra* note 91, at 212 (noting that corporations use interlocking directors to reduce uncertainty from the threats of the economic environment).

199.   *See* Gerber, *supra* note 123, at 128–29 (noting the requirements for a change in section 8).

b. Changing Conditions Since the Passage of the Clayton Act

At the time of the passage of the Clayton Act in 1914, the economic conditions of the country were significantly different than they are today.[200] Since that time, interstate and intercontinental travel has gone from the exception to an expectation in business. Long distance communication has moved from burdensome and unreliable to instantaneous. The publication of information about corporate activities has also drastically changed, moving from radio and newspaper to Twitter, internet news, and 24 hour news stations. The idea that corporate boards are meeting in a smoke-filled room to secretly collude in anticompetitive ways[201] is less plausible in the current business environment than at the time of the passage of the Clayton Act.[202] While section 8 has been amended since its passage, the amendments have not been sufficient to recognize the changes in the fundamental way people and businesses communicate and share information.

III. RECOMMENDATION

Part IV of this Note recommends altering section 8 of the Clayton Act. It recommends that the Supreme Court adopt the Seventh Circuit's section 8 jurisprudence from *Robert F. Booth Trust v. Crowley*. It also recommends that Congress alter section 8 to adopt a hypothetical horizontal merger standard.

A. Changing Section 8 of the Clayton Act to Allow for Benefits of Interlocks

This Section will recommend changing the per se standard of interlocking directorates of section 8 to a hypothetical horizontal merger standard. These changes will allow for the benefits of interlocks without any anticompetitive harms. This Section recommends two methods for altering section 8's prohibition on interlocks among competing corporations. First, it recommends that the Supreme Court overrule previous section 8 jurisprudence which held that a market definition analysis was not applicable to section 8 cases, and instead adopt the Seventh Circuit's section 8 jurisprudence from *Robert F. Booth Trust v. Crowley* by applying a hypothetical horizontal merger standard to horizontal interlocks. Second, this Section recommends that Congress amend section 8 of the Clayton Act to include an abbreviated hypothetical horizontal merger analysis for interlocking directorates in place of the current per se rule.

1. Extending Robert F. Booth Trust v. Crowley

One way that section 8 of the Clayton Act could be changed would be for the Supreme Court to adopt the Seventh Circuit's section 8 jurisprudence from *Robert F. Booth Trust v. Crowley* by applying a hypothetical horizontal merger standard to horizontal interlocks. In 2012, the Seventh Circuit in *Robert F. Booth Trust v. Crowley* used a hypothetical

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200. *See generally* Barnes & Ritter, *supra* note 87 (noting that the economic and social conditions at the time of the passage of the Clayton Act are significantly different than the current conditions).

201. *Contra* AREEDA & HOVENKAMP, *supra* note 47, ¶ 1300 at 322 (noting that no link between interlocks and anticompetitive behavior has been found).

202. Ace Group, *supra* note 178 (noting changes in the economic environment from the passage of the Clayton to present).

horizontal merger standard to resolve a section 8 case."[203] This Note recommends that the Supreme Court overrule previous section 8 jurisprudence[204] by adopting the rule from *Crowley* and applying the hypothetical horizontal merger standard to future section 8 cases.

Under the rule in *Crowley*, the court, just like in horizontal merger cases, would determine the relevant product and geographic markets and then calculate the HHI concentration of a hypothetical merger between the interlocking firms.[205] Just as in a section 7 horizontal merger analysis, a Moderately Concentrated Market[206] will require scrutiny for competitive harm, and a Highly Concentrated Market[207] will be presumed to enhance market power.[208]

A finding of market power can be rebutted by "showing that the [hypothetical horizontal] merger would be unlikely to enhance market power."[209] This ability to rebut the presumption of market power allows courts to take into account the peculiarities of a specific industry, such as one where the barriers to entry are especially low and therefore the industry is not susceptible to monopolization.[210] By using the merger standard as expressed in the *Horizontal Merger Guidelines*, courts could offer the opportunity for increased corporate performance with a small chance of anticompetitive harm.

2. Legislative Revision to Section 8 of the Clayton Act

A change in the standard used for addressing the legality of an interlock could also come from legislation. A legislative change would allow for the largest changes to the standard applied in section 8 cases as courts are still bound to interpret the statute as it is written; whereas Congress can rewrite a statute in any way it sees fit. For this reason, Congress would have greater flexibility in its adoption of the hypothetical horizontal merger test. The greater flexibility of the legislative process would allow for the use of a more abbreviated horizontal merger analysis, which would reduce the considerable costs of an antitrust suit.[211]

This Note proposes that an interlock is presumed to be legal. This presumption could be rebutted by the government or a private party through the filing of a suit showing that the market was already highly concentrated or that the hypothetical horizontal merger would be highly concentrated[212] in a merger between the interlocking corporations. At that point, the interlocking corporations could dispute the showing of a highly concentrated market in the hypothetical merger. If the interlocking corporation did not dispute the finding of a highly concentrated market, they could rebut the presumption that the highly

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203.   Robert F. Booth Trust v. Crowley, 687 F.3d 314, 319–20 (7th Cir. 2012) (holding that a failure to make a demand on the board of directors precluded derivate suit under section 8).

204.   *See* Protectoseal Co. v. Barancik, 484 F.2d 585, 588–89 (7th Cir. 1973) (rejecting the application of a section 7 standard because the inquiry into competition would no longer be simple and objective); TRW, Inc. v. FTC, 647 F.2d 942, 947 (9th Cir. 1981).

205.   HORIZONTAL MERGER GUIDELINES, *supra* note 37 (noting that at that time the agencies also consider evidence that the merger will enhance competition).

206.   *Supra* Section II.B.

207.   *Id.*

208.   *Id.*

209.   HORIZONTAL MERGER GUIDELINES, *supra* note 37, at 3.

210.   *See* E. THOMAS SULLIVAN ET AL., ANTITRUST LAW, POLICY, AND PROCEDURE: CASES MATERIALS AND PROBLEMS 638–40 (7th ed. 2013) (noting the effects of barriers to entry on market power).

211.   *See* Robert F. Booth Trust v. Crowley, 687 F.3d 314, 317 (7th Cir. 2012) (noting the high cost of antitrust cases).

212.   *See supra* Section II.B (exploring the law of horizontal mergers under section 8).

concentrated market in the hypothetical merger would lead to anticompetitive effects. The interlocking corporation could do this by showing, for example, that the barriers to entry are low or that there is already significant excess capacity in the market. If the interlocking corporations fail to rebut the presumption of a highly concentrated market or to dispute the finding of a highly concentrated market in the hypothetical merger, the interlocking director must step down from one of the interlocked boards.

B. Effects of a Hypothetical Horizontal Merger Standard

Both the legislative and the judicial changes to section 8 of the Clayton Act would provide certainty to corporations looking for directors. This would differ significantly from the current jurisprudence, which provides little certainty on which directors will and will not be allowed.[213] By replacing the current per se qualitative competitive analysis with a hypothetical horizontal merger analysis, the harmful interlocking corporations would be able to take advantage of any benefits to interlocking while preventing the anticompetitive costs to consumers.

IV. CONCLUSION

Currently, section 8 of the Clayton Act prohibits any "person[]" from serving as a "director or officer in any two corporations that are engaged in . . . commerce [or if the corporations are] competitors" so that the elimination of competition by agreement between them would constitute a violation of any of the antitrust laws.[214] Current section 8 jurisprudence judges competition on qualitative factors[215] and not based on a market analysis.[216] This current stance prevents corporations from taking advantage of the benefits of board interlocks.[217] The SNA run in this Note suggests a positive correlation between a board's centrality and corporate performance.[218] This Note recommends that the Supreme Court overturn previous section 8 jurisprudence and instead adopt a hypothetical horizontal merger standard for the definition of competition. This Note further recommends that Congress alter section 8 to replace the per se rule prohibiting interlocking boards in competing corporations with an abbreviated hypothetical horizontal merger standard, which would allow two firms' boards to interlock where a hypothetical merger between the corporations would be allowed under section 7 of the Clayton Act. This new standard would allow any benefits of interlocking directorates while protecting against anticompetitive harms where interlocked directorates could influence output or price and cause harm to consumers.

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213.   TRW, Inc. v. FTC, 647 F.2d 942, 947 (9th Cir. 1981) (noting three qualitative criteria for determining whether corporations are in competition and therefore prohibited from interlocking).

214.   15 U.S.C. § 19(a)(1) (2014).

215.   *See TRW*, 647 F.2d at 947 (noting the qualitative factors for determining competition under Section 8).

216.   *See* United States v. Sears, Roebuck & Co., 111 F. Supp. 614, 617 (D. Md. 1953) (rejecting the market analysis in section 8 cases).

217.   *See* Gerber, *supra* note 123, at 113–15 (noting the benefits of interlocking directorates).

218.   *See supra* Part III (discussing interlocking directorates and performance).