Product Market Competition and Corporate Governance Structure Change: Evidence from the Telecommunications Industry

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Abstract

In this paper we investigate how product market competition and corporate governance structure are affected by technological, competitive, and regulatory shocks on telecommunications firms brought by the Telecommunications Act of 1996. We find that the effect varies across segments of the Telecommunications industry. Telecommunication equipment and service firms experience increased competition, but no relative strengthening in corporate governance. In contrast, entertainment firms do not experience a change in competition, but adopt stronger governance structures that better control owner-manager agency conflict. We conclude that competition and corporate governance are substitutes, and that both act to mitigate principal-agent problems.

1. Introduction

Corporate governance structures are increasingly studied by academics, regulators, and investors in the wake of scandals at companies like Enron, Tyco, and WorldCom. Given this heightened level of scrutiny, researchers have been investigating what factors affect changes in governance structure. Most recent literature on governance dynamics focuses on the effects of industry-wide deregulation shock on governance structures (Kole and Lehn, 1999; Lehn, 2002; Rennie, 2006). However, this literature tends not to consider the effects of simultaneous changes in product market competition or variation in the effects of industry shocks on different segments within industries.

In this paper, we provide evidence of an association between product market competition and corporate governance structure change. We do so by investigating the effects of competitive and regulatory shocks on telecommunications industry firms between 1993 and 1999. This time period encompasses three years before and after the Telecommunications Act of 1996. During the mid-1990s the telecommunication industry saw growth opportunities increase, barriers between sectors decrease, new entries occur, and competition intensify. The Telecommunications Act of 1996 also reduced regulatory monitoring. Together, these changes create a natural experiment for disentangling links between product market competition and governance structure change.

We have two principle objectives in this study. The first is to investigate the effects of industry shock on the governance structures of telecommunications firms. Prior evidence demonstrates that banks, electric utilities, and airlines adopt governance structures that more effectively control owner-manager agency conflict following

deregulation (Crawford, Ezzell, and Miles, 1995; Hubbard and Palia, 1995; Bryan and Hwang 1997; Bryan, Hwang, and Lilien, 1999; Kole and Lehn, 1999; Rennie, 2006). Our second objective is to investigate whether governance structure changes for different segments of the telecommunications industry depend on the amount of change in their product market competition. Harris and Kraft (1997) and Larson and Mudd (1999) suggest deregulation may increase competition among only some industry segments. Thus, study of a particular industry without specifically considering its different segments may conceal the presence of substantive change in corporate governance structure for specific segments.

We find that product market competition increases for telecommunications firms after 1996. In addition, we find that corporate governance appears to strengthen as the average proportion of CEO pay in options increase 11.4 percent and the size of a company's board decrease 8.6 percent. However, since these shifts are similar to those that occur for our matched sample of industrial firms, we cannot conclude that deregulation leads to improved firm governance. Upon further investigation, we find that various industry segments respond differently to deregulation shock and associated changes in product market competition. In industry segments where competition increases after deregulation, governance structure shifts are similar to those that occur for our matched sample of industrial firms. In contrast, in industry segments where competition does not change after deregulation, firms tend to adopt comparatively better corporate governance structures. We conclude that product market competition substitutes, not only for regulatory monitoring, but also for governance structures, and that, industry shocks can have uneven effects upon the different segments that comprise an industry.

We contribute to the body of knowledge by finding a differential response by firms to deregulation. We show that telecommunication firms in less competitive segments adopt stronger governance structures than telecommunication firms in more competitive segments. These results provide additional information on the relation between competition and corporate governance structure. Some research shows competition complements strong firm governance (Januszewski, Koke and Winter, 2001; Grosfeld and Tressel, 2002; Karuna, 2008), whereas other research shows strong governance is most important in industries with less competition (Giroud and Mueller, 2007; Giroud and Mueller, 2008). The relation between corporate governance and competition is not clear and we provide additional evidence on this relation. Our research also builds on Kole and Lehn (1999) and Rennie (2006) who show the effects of deregulation shock on the governance of firms in the airline and electric utility industries. We document that various industry segments respond differently to deregulation shock, and to the associated changes in product market competition.

The rest of the paper is structured as follows. In Section 2 we discuss the telecommunication industry and corporate governance change, and present our testable hypotheses. Our sample selection and methodology is described in Section 3. In Section 4 we report empirical evidence on the effects of technological, competitive, and deregulation shocks on the governance structures of telecommunication firms. In Section 5 we document similar evidence across various segments of the telecommunication industry. We offer our conclusions in Section 6.

2. The Telecommunication Industry, Governance Change, and Testable Hypotheses

2.1. Background

The Telecommunications Act of 1996 introduced partial deregulation into the telecommunications industry. This Act permitted telecommunications firms from one industry segment to compete with those from other segments. For example, radio and television broadcasters were permitted to own cable television systems. This Act also eliminated ownership restrictions and reduced regulatory oversight by the Federal Communications Commission. In addition, rate structures for cable operators were relaxed to promote competition and flexibility, and incentives were offered to encourage cable companies to compete with local telecommunications firms. Seven regional Bell telephone companies were permitted to market long distance telephone services, and long distance telephone firms and cable companies were allowed to compete with local telephone service providers.

The resulting industry shock from this deregulation obviously affected firms in the telecommunications industry. One such effect is on the governance structures of those firms [Rennie, 2006; Bryan, Hwang, and Lilian, 1999]. This is because technological or regulatory change that increases substitutability of product market goods or services, or lowers barriers to entry, may act to reduce industry concentration and thus increase product market competition. Jensen (1986) suggests product market competition may compel managers to act in value-enhancing ways to ensure their own survival. In this case, increased competition following technological or deregulation shock will affect owner-manager agency conflict, potentially substituting for regulatory monitoring or other governance structures that encourage managers to act in shareholder interests. In addition, Jensen and Meckling (1976) and Demsetz and Lehn (1985) suggest regulators monitor managers, thereby effectively substituting regulatory oversight for managerial monitoring by directors. This implies that less regulatory monitoring leads to increased firm governance structures to control owner-manager agency conflict. Smith and Watts (1992) hypothesize that regulation limits the growth opportunities of regulated firms, which in turn, simplifies managerial jobs and reduces the need for strong governance structures. In support, Joskow, Rose, and Wolfram (1996) show that regulators discourage the use of stock option grants for CEOs. Therefore, if deregulation leads to an increased use of stock options, owner-manager incentives will tend to be better aligned with the interests of shareholders. Conversely, Jensen and Meckling (1976) suggest product market competition does not affect agency conflict created by the separation of ownership and control. Based on this argument it may be suggested that changes in competition stemming from technological or deregulation shock should not affect governance structure.

The empirical evidence investigating the effects of deregulation on the governance structures of deregulating firms generally indicate that firms move towards better governance structures. Kole and Lehn (1999) find evidence that deregulating the airline industry resulted in more concentrated equity ownership, higher CEO pay and options, and smaller boards. Crawford, Ezzell, and Miles (1995), Hubbard and Palia (1995), Bryan and Hwang (1997), and Bryan, Hwang, and Lilien (1999) find evidence that deregulating firms adopt stronger governance structures. Lehn (2002) provides evidence suggesting telecommunications firms adopt stronger internal governance structures post-1996. However, none of these studies explicitly control for trends in

governance that affect all firms, related changes in competition, or for the possibility that effects may vary by industry segment.

2.2 Testable Hypotheses

In this paper, we extend current literature by examining the association between competition and the governance structures for firms in the telecommunications industry and its different segments, while controlling for secular trends among firms in the general economy. Consistent with Kole and Lehn (1999), Core, Holthausen, and Larcker (1999), Lehn (2002), and Rennie (2006), we define governance structure change in terms of changes in the ownership, executive compensation, and board structure characteristics of firms. As suggested by Jensen and Meckling (1976), Demsetz and Lehn (1985), Stulz (1990), and Himmelberg, Hubbard, and Palia (1999), managers bear a greater proportion of any costs associated with over-investment and under-investment problems as their proportions of equity ownership increase. Consequently, similar to Jensen and Murphy (1990) and Grosfeld and Tressel (2002), we interpret greater proportions of CEO ownership as evidence of a reduction in agency costs, and therefore, governance structures that better control owner-manager agency conflict. Furthermore, executive compensation has been shown to affect the principal-agent problem by compensating managers for job complexity, increased risk of termination, and by aligning manager's incentives to those of stockholders. Consistent with Jensen and Murphy (1990) and Kole and Lehn (1999), we view greater proportions of CEO stock option grants to total pay as evidence of governance structures that better align CEO and shareholder interests. Lastly, Fama and Jensen (1983), Weisbach (1988), Hermalin and Weisbach (1991), Jensen (1993), and Yermack (1996) suggest smaller boards, and boards with greater proportions of outside to total directors, are more effective at monitoring managers on behalf of shareholders. Therefore, we also examine board size and the proportion of outside to total directors.

We start by investigating the telecommunications industry in total. As such, we perceive three possibilities. First, if the effect of increased product market competition dominates that of reduced regulatory monitoring, governance structures will become relatively less effective at controlling owner-manager agency conflict. We describe this as the *product market competition dominance hypothesis*. In contrast, if reduced regulatory monitoring dominates, governance structures will become stronger. We refer to this as the *regulatory monitoring dominance hypothesis*. Alternatively, we acknowledge that increased product market competition may substitute for decreased regulation, in which case we would not expect to see any governance structure change. We refer to this as the *substitution hypothesis*.

Next, we test whether product market competition and corporate governance structure change vary by telecommunications industry segment. Harris and Kraft (1997) and Larson and Mudd (1999) suggest deregulation may increase competition among some industry segments but not others. Similarly, we expect reduced regulatory monitoring in some industry segments to be offset by increased competition, potentially leading to little or no net change in the governance structures of firms in these segments. Conversely, we expect the reduced monitoring in other industry segments to be accompanied by a less dramatic change in competition, in which case there will be increased need for governance structures of firms that better control owner-manager agency conflict. Accordingly, we test for evidence of the *product market competition*

dominance hypothesis, the *regulatory monitoring dominance hypothesis*, and the *substitution hypothesis* for various telecommunications industry segments.

3. Sample Selection and Methodology

3.1. Sample Selection

Our initial sample consists of all 93 publicly-traded telecommunications companies listed in *Value Line* between 1993 and 1999.[1] In Table 1 we present the *Value Line* definitions of telecommunication industry segments by Standard Industrial Classification (SIC) codes. After screening for available data on CRSP, Compustat, ExecuComp, and proxy statements our final sample consists of the 62 telecommunications firm-year observations for the pre-deregulation period (1993-1995), and 123 firm-year observations for the post-deregulation period (1997-1999). Our data requirements include financial and governance data for at least two years for each of the pre-deregulation and post-deregulation periods. The increase in observations between these periods reflects the dramatic increase in new entries into the telecommunications industry after the deregulation of 1996.

To control for contemporaneous trends among comparable industrial firms, such as those identified in Hubbard and Palia (1995), Kole and Lehn (1999), Milliron (2000), and Rennie (2006), we also construct a control sample of industrial firms. Following the procedure recommended by Barber and Lyon (1996) and Kothari and Warner (1997), we match by choosing firms with prior three-year average return on assets (ROA) within 10% of our sample firm and then select the industrial firm closest in size, as measured by the book value of total assets. Matching occurs for the first year each telecommunications firm enters the sample. To avoid survivorship bias, matched control firms are used only once. By following this procedure, we generate a control group of 62 firm-year observations for 1993-1995, and 123 for 1997-1999.

3.2 Methodology

This paper employs a two-part study design corresponding to our two objectives. In the first model we investigate how changes in product market competition affects governance structure for firms in the telecommunications industry. This multivariate model controls for other factors that could affect changes in corporate governance, including fixed effects to control for firm invariant omitted variables.

$$(1) \quad Govchar_{it} = \beta_{0i} + \beta_1 Dereg_{it} + \beta_2 Dereg_{it} \times Telecom_{it} + \beta_3 Age_{it} + \beta_4 Age_{it}^{\ 2} + \beta_5 Size_{it} + \beta_6 Lev_{it} + \beta_7 MTB_{it} + \varepsilon_{it},$$

The dependent variable, $Govchar_{it}$, represents one of four governance characteristics; CEO ownership, CEO options proportion, board size, and outside directors. The independent variables include a deregulation indicator variable ($Dereg_{it}$), a

[1] Kole and Lehn (1999) compare governance structures of airlines with those of industrial firms and regulated utilities during the period 1971-1992, or 7 years before through 7 years after, and 7 years before through 14 years after, the Airline Deregulation Act of 1978. In this paper, we interpret medium- to long-term as 3 years before and 3 years after the Telecommunications Act of 1976.

telecommunications firm indicator variable ($Telecom_{it}$), and the control variables CEO age (Age_{it}), firm size ($Size_{it}$), leverage (Lev_{it}), and growth opportunities (MTB_{it}) for firm i in year t. Controls for CEO age, firm size, leverage, and growth opportunities are included to control for previously established links between each of these variables and governance structure. The variables used in our analysis are defined in Table 2.

The sum of coefficients $\beta_1+\beta_2$ reflects governance characteristic change for telecommunications firms after deregulation. An F-test on the restriction, $\beta_1+\beta_2=0$, identifies the significance of this change. The coefficient, β_2, reflects governance characteristic change for telecommunications firms adjusted for secular trends among matched industrial firms. We interpret increases in CEO ownership, the proportion of CEO pay in options, the proportion of outside directors on boards, and decreases in board size as evidence of governance structure changes that better control owner-manager agency conflict.

In the second model we investigate how changes in product market competition affects governance structure characteristics separately for three segments of the telecommunications industry.[2]

$$(2)\quad \text{Govchar}_{it} = \beta_{0i} + \beta_1 Dereg_{it} + \beta_2 Dereg_{it} \times Ent_{it} + \beta_3 Dereg_{it} \times TE_{it} + \beta_4 Dereg_{it} \times TS_{it} + \beta_5 Age_{it} + \beta_6 Age_{it}^2 + \beta_7 Size_{it} + \beta_8 Lev_{it} + \beta_9 MTB_{it} + \varepsilon_{it},$$

For model (2), Ent_{it}, TE_{it}, and TS_{it} are indicator variables equal to one if the firm-year observation is in the entertainment, equipment, or service segments of the telecommunications industry, and where other variables are defined previously. The sums of coefficients $\beta_1+\beta_2=0$, $\beta_1+\beta_3=0$, and $\beta_1+\beta_4=0$ reflect governance characteristic change for entertainment, equipment, or service segment firms. F-tests on the restrictions $\beta_1+\beta_2=0$, $\beta_1+\beta_3=0$, and $\beta_1+\beta_4=0$ identify the statistical significance of these changes. The coefficients, β_2, β_3, and β_4, reflect governance structure characteristic change for entertainment, equipment, or service segment firms after controlling for secular trends among industrial firms.

4. Telecommunications Industry Evidence

The univariate evidence indicates that product market competition increases for both the sample of telecommunications firms and for the matched sample of industrial firms. In Figure 1 we find that product market competition increases for telecommunications and industrial firms between 1993 and 1999. Specifically, Figure 1 shows a trend toward a lower Herfindahl Hirschman index of industry concentration both for telecommunications and industrial firms.[3] We interpret reduced industry concentration as evidence of increased product market competition among both groups of firms.

[2] As shown in Table 1, there are six telecommunications industry segments: cable, entertainment, equipment, services, wireless network, and other. Insufficient data pre-1996 firms in the cable and wireless network industry segments in our study. However, we find evidence of differences between the entertainment segment and the equipment and services segments, and conclude that our study design is capable of demonstrating that differences in industry shock across segments are associated with differences in corporate governance structure change.

[3] Herfindahl Hirschman Index is measured as the sum of the squared market shares for each firm in the telecommunications industry, for comparable industrial firms, or for each sector in the telecommunications industry, as applicable.

We also find changes occur in the financial and governance structure characteristics of the sample firms between the pre-deregulation and post-deregulation periods. As shown in Table 3, Panel A, governance structure characteristics of both the sample of telecommunications firms and the matched sample of industrial firms changes during the 1990s. Stock ownership increases and board size decreases for both telecommunication and industrial firm CEOs. However, we find that CEO total pay, options grants, and the proportion of pay made up of options increase significantly after deregulation for the sample of telecommunications firms, but are unchanged for the matched sample. In sum, univariate evidence suggests a strengthening in governance structure characteristics for both telecommunication and industrial firms.

Summary statistics reported in Table 3, Panel B, also indicate that changes occur in the financial characteristics of telecommunications and industrial firms after deregulation. Both sets of firms realize an increase in size, increased leverage, and greater growth opportunities. However, the increase in firm size and growth opportunities are significantly greater for telecommunications firms. This highlights the acceleration of business opportunities for telecommunications firms due to deregulation.

We report multivariate, fixed effects evidence in Table 4. Consistent with the *regulatory monitoring domination hypothesis* we find evidence that telecommunication firms adopt governance structures that better control owner-manager agency conflict after deregulation. Specifically, in Column 2 we find that the proportion of CEO pay from option grants increases by 11.4 percent ($\beta_1+\beta_2 = 0.114$, p = 0.037). Similarly, the board size regression reported in Column 3 indicates telecommunications firms reduce the size of their boards by 8.6 percent after deregulation ($\beta_1+\beta_2 = -0.086$, p = 0.008).

However, we do not find an incremental increase for telecommunication firms above that for industrial firms. The coefficient, β_2, reflects governance characteristic change for telecommunications firms adjusted for matched industrial firms. In Columns 2 and 3, the β_2 coefficients are not statistically significant. Moreover, it can be suggested based on evidence in Column 1 that CEO ownership increases for industrial firms after deregulation ($\beta_1 = 0.018$, t = 3.81), but not for telecommunication firms ($\beta_1+\beta_2 = 0.004$, p = 0.498). Telecommunication firms have marginally less ownership ($\beta_2 = -0.014$, t = -2.33) than industrial firms after deregulation. Also, it is shown in Column 4 there is a higher proportion of outside directors for industrial firms ($\beta_1 = 0.034$, t = 2.30), but not for telecommunication firms ($\beta_1+\beta_2 = -0.010$, p = 0.551).

In sum, the results in Table 4 suggest telecommunications firms tend to adopt governance structures that better mitigate principal-agent problems after deregulation, but do not keep pace with secular trends toward even stronger governance structures among comparable industrial firms. This finding is consistent with the *product market competition dominance hypothesis*, where increased competition dominates reduced regulatory monitoring. However, we acknowledge that the variation in the effects of industry shock among different industry segments may be a factor. This issue is investigated in the next section.

5. Telecommunications Industry Segment Evidence

We present univariate evidence for three segments in the telecommunications industry, equipment, service, and entertainment in Figure 2 and Table 5. In Figure 2 we see that product market competition increases for equipment and service firms, but remains relatively unchanged for entertainment firms. To assess the statistical

significance of changes in competition between industry segments, we perform Wilcoxon rank sum tests on the Herfindahl Hirschman Index of industry concentration for each year. The median Herfindahl Hirschman Index decreases for equipment and service firms, suggesting product market competition increases for these industry segments. Results for entertainment firms suggest that product market competition does not change for this industry segment.

In Table 5, Panel A we find that stock ownership increases for entertainment and equipment firms after deregulation. Moreover, there is a higher proportion of CEO options for equipment and service firms. This evidence suggests the adoption of stronger corporate governance structures by firms in all three industry segments. However, increased ownership dominates for entertainment firms, while increased option use dominates for equipment and service firms. As shown in Table 5, Panel B, financial characteristics of telecommunications firms also vary by industry segment. Firm size and growth opportunities tend to increase for entertainment and service firms, whereas leverage and ROA tend to increase for equipment firms.

In Table 5, Column 1 we find evidence of a marked increase in CEO ownership for entertainment firms ($\beta_1 + \beta_2 = 0.046$, $p = 0.001$). Entertainment firms also have incrementally greater ownership than the sample of industrial firms ($\beta_2 = 0.031$, $t = 2.95$). These regression results suggest that entertainment firms increase CEO ownership by 3.1 percent more than industrial firms, resulting in a comparatively stronger governance structure. In comparison, equipment firms show lower ownership than industrial firms ($\beta_3 = -0.021$, $t = -2.62$) suggesting weaker governance structure, at least with regard to CEO ownership. These results demonstrate that in an industry segment, namely entertainment, where product market competition does not increase, firms respond to deregulation by increasing CEO ownership. This is consistent with Giroud and Mueller (2007) who show that when firms adopt anti-takeover laws those firms in non competitive industries experience a drop in performance while firms in competitive industries do not. This result is also consistent with Januszewski, Koke and Winter (2001), and with Giroud and Mueller (2008) who show a positive relation between governance and firm performance in non competitive industries and a weaker relation in more competitive environments. For equipment firms the proportion of CEO pay in options in Column 2 increases by 17.2 percent ($\beta_1 + \beta_3 = 0.172$, $p = 0.032$), however, the proportion of outside directors in Column 4 declines. Consequently, it is not clear whether governance structure strengthens for equipment firms. Finally, for service firms we find in Column 3 that board size declines by 11.4% ($\beta_1 + \beta_4 = -0.114$, $p = 0.013$) consistent with more effective monitoring.

In sum, we find that only entertainment firms adopt governance structures that better control owner-manager agency conflict relative to comparable industrial firms. The only regression in Table 6 that has a statistically significant β_2 coefficient is the CEO ownership regression. This is also the same industry segment that does not show an increase in competition. We note that industry shock in the telecommunications industry affects segments differently, and is accompanied by corresponding differences in corporate governance structure change. We conclude that competition impacts how an industry shock may affect how firms respond with changes in corporate governance. Product market competition may substitute not only for regulatory monitoring but also for governance structures.

6. Conclusions

In this paper we investigate the association between product market competition and corporate governance structure change by documenting the effects of technological, competitive, and regulatory shock on telecommunications firms. In general, we find that telecommunications firms adopt governance structures that better control agency conflict, however these governance changes do not better control agency conflicts than those found for a control sample of industrial firms. However, we find that governance changes differ by industry segment and the competitive environment within that segment. For example, the equipment and service segment experience intensified competition in the aftermath of reduced regulatory monitoring, and correspondingly do not strengthen their governance structures relative to a matched sample of industrial firms. In contrast, entertainment segment firms experience reduced regulatory monitoring, but unchanged competition, and adopt stronger governance structures relative to the matched sample. We conclude that competition may substitute, not only for regulatory monitoring, but also for those corporate governance traits that mitigate owner-manager agency conflict.

These results have implications for understanding the relation between product market competition and governance structure change. Existing research on corporate governance dynamics focuses on the effects of deregulation shock on entire industries. A typical assumption is that deregulation leads to lower regulatory monitoring. However, prior studies do not consider the potential effects of contemporaneous changes in product market competition or the effects of variation in shocks across different segments that comprise an industry. Our paper shows that governance structures may respond to reductions in regulatory monitoring and corresponding changes in product market competition, and that various industry segments may be affected differently by shocks to that industry.

References

Barber, B. and J. Lyon (1996), 'Detecting Abnormal Operating Performance: The Empirical Power and Specification of Test Statistics', *Journal of Financial Economics*, Vol.41, No.3 (July), pp. 359-399.

Bryan, S.H. and L. Hwang (1997), 'CEO Compensation in a Regulatory Environment: An Analysis of the Electric Utility Industry', *Journal of Accounting, Auditing and Finance*, Vol.12, No.3 (Summer), pp. 223-251.

Bryan, S.H., L. Hwang and S. Lilien (1999), 'The Change in Operating and Regulatory Environment and the CEO Compensation-performance Sensitivity: An Empirical Analysis of Electric Utilities', Working paper (City University of New York).

Core, J., R. Holthausen and D. Larcker (1999), 'Corporate Governance, Chief Executive Officer Compensation, and Firm Performance', *Journal of Financial Economics*, Vol.51, No.3 (March), pp. 371-406.

Crawford, A.J., J.R. Ezzell and J.A. Miles (1995), 'Bank CEO Pay-performance Relations and the Effects of Deregulation', *Journal of Business*, Vol.68, No.2 (April), pp. 231-256.

Demsetz, H. and K. Lehn (1985), 'The Structure of Corporate Ownership: Causes and Consequences', *Journal of Political Economy*, Vol.93, No.6 (December), pp. 1155-1177.

Fama, E. and M. Jensen (1983), 'Separation of Ownership and Control', *The Journal of Law and Economics*, Vol.26, No.2 (June), pp. 301-325.

Giroud, X. and H.M. Mueller (2007), 'Does Corporate Governance Matter in Competitive Industries?', Working Paper (New York University).

Giroud, X. and H.M. Mueller (2008), 'Corporate Governance, Product Market Competition, and Equity Prices' Working Paper (New York University).

Grosfeld, I., and T. Tressel (2002), 'Competition, Corporate Governance: Substitutes or Complements? Evidence from the Warsaw Stock Exchange', *Economics of Transition*, Vol.10, No. 3 (November), pp. 525-551.

Harris, R. and C. Kraft (1997), 'Meddling Through: Regulating Local Telephone Competition in the United States', *The Journal of Economic Perspectives*, Vol.11, No.4 (Fall), pp. 93-112.

Hermalin, B. and M. Weisbach (1991), 'The Effects of Board Composition and Direct Incentives on Firm Performance', *Financial Management*, Vol.20, No.4 (Winter), pp. 101-112.

Himmelberg, C., R. Hubbard and D. Palia (1999), 'Understanding the Determinants of Managerial Ownership and the Link between Ownership and Performance', *Journal of Financial Economics*, Vol.53, No.3 (September), pp. 353-384.

Hubbard, C. and D. Palia (1995), 'Executive Pay and Performance: Evidence from the U.S. Banking Industry', *Journal of Financial Economics*, Vol.39, No.1 (September), pp. 105-130.

Januszewski, S. I., J.F. Koke and J.K. Winter (2002) 'Product market competition, corporate governance and firm performance: an empirical analysis for Germany', *Research in Economics, Vol* 56 No. 3 (September), pp. 299-332.

Jensen, M. (1986), 'Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers', *The American Economic Review*, Vol.76, No.2 (May), pp. 323-329.

Jensen, M. (1993), 'Presidential Address: The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems', *The Journal of Finance*, Vol.48, No.3 (July), pp. 831-880.

Jensen, M. and W. Meckling (1976), 'Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure', *Journal of Financial Economics*, Vol.3, No.4 (October), pp. 305-360.

Jensen, M. and K. Murphy (1990), 'Performance Pay and Top-management Incentives', *Journal of Political Economy*, Vol.98, No.2 (April), pp. 225-264.

Joskow, P., N. Rose and C. Wolfram (1996), 'Political Constraints on Executive Compensation: Evidence from the Electric Utility Industry', *RAND Journal of Economics*, Vol.27, No.1 (Spring), pp. 165-182.

Karuna, C. (2008), 'Industry Product Market Competition and Corporate Governance', Working Paper, Working Paper (University of California Irvine).

Kole, S. and K. Lehn (1999), 'Deregulation and the Adaptation of Governance Structure: The Case of the U.S. Airline Industry', *Journal of Financial Economics*, Vol.52, No.1 (April), pp. 89-117.

Kothari, S. and J. Warner (1997), 'Measuring Long-horizon Security Price Performance', *Journal of Financial Economics*, Vol.43, No.3 (May), pp. 301-339.

Larson, A. and D. Mudd (1999), 'The Telecommunications Act of 1996 and Competition Policy: An Economic View in Hindsight', *Virginia Journal of Law and Technology*, Vol.4, No.1 (Spring), pp. 1522-1687.

Lehn, K. (2002), 'Corporate Governance in the Deregulated Telecommunications Industry: Lessons from the Airline Industry', *Telecommunications Policy*, Vol.26, Nos.5-6 (June-July), pp. 225-242.

Milliron, J. (2000), 'Board of Director Incentive Alignment and the Design of Executive Compensation Contracts', Working Paper (University of Chicago).

Rennie, C. (2006), 'Governance Structure Changes and Product Market Competition: Evidence from U.S. Electric Utility Deregulation', *The Journal of Business*, Vol.79, No.4 (July) pp. 1989-2017.

Smith, C. and R. Watts (1992), 'The Investment Opportunity Set and Corporate Financing, Dividend, and Compensation Policies', *Journal of Financial Economics*, Vol.32, No.3 (December), pp. 263-292.

Stulz, R. (1990), 'Managerial Discretion and Optimal Financing Policies', *Journal of Financial Economics*, Vol.26, No.1 (July), pp. 3-27.

Weisbach, M. (1988), 'Outside Directors and CEO Turnover', *Journal of Financial Economics*, Vol.20, Nos.1/2 (January/March), pp. 431-460.

Yermack, D. (1996), 'Higher Market Valuation of Companies with a Small Board of Directors', *Journal of Financial Economics*, Vol.40, No.2 (February), pp. 185-211.

Figure 1
Herfindahl Hirschman Index of Industry Concentration for Sample Telecommunications and Industrial Firms

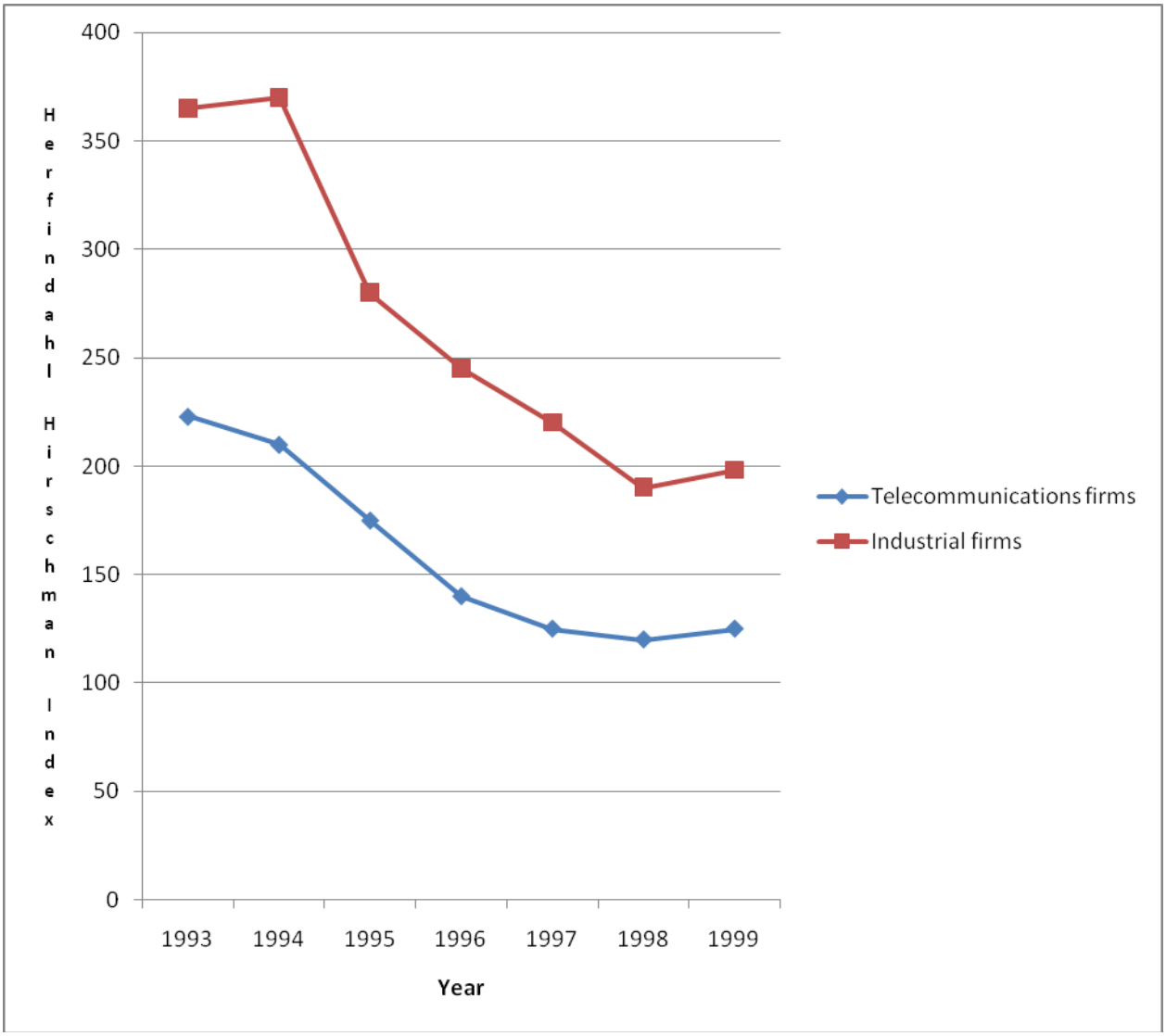

Figure 2
Herfindahl Hirschman Index of Industry Concentration for Entertainment, Equipment, and Service Industry Segment Firms

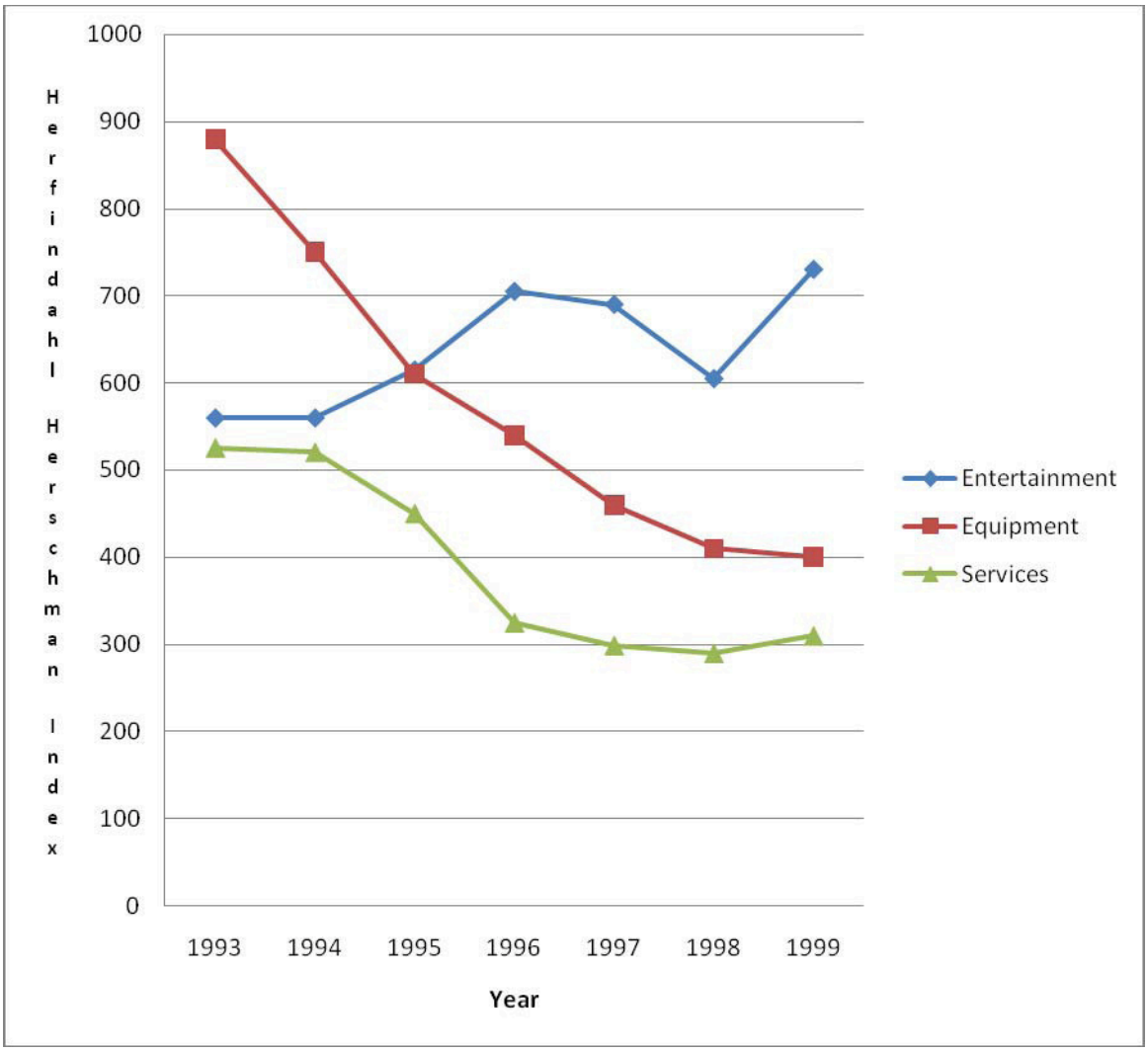

Table 1
Value Line Telecommunications Industry, Segments, and Standard Industrial Classification (SIC) Codes

Value Line telecommunications industry segment	SIC Code	SIC industry name	N (pre-1996)	N (post-1996)
Cable	4841	Cable and other Pay Television	0	5
Entertainment	2711	Newspapers: Publishing	0	0
	4832	Radio Broadcasting Stations	2	3
	4833	Television Broadcasting Stations	3	8
	7812	Motion Picture and Video Tape	0	3
	7900	Amusement and Recreational	2	3
Equipment	3357	Fiber Optic Cable	3	6
	3572	Computer Storage Devices	0	3
	3576	Computer Communications Equipment	0	2
	3661	Telephone and Telegraph Apparatus	5	12
	3663	Radio and TV Broadcasting Equipment	8	18
	3669	Communications Equipment	0	0
	3674	Semiconductors and Related	1	0
	7370	Services, Computer Programming	3	9
	7373	Computer Integrated System Design	0	0
Service	1623	Power and Communication Transmission	0	0
	4812	Radio/Telephone Communications	10	12
	4813	Telephone Communications	11	15
	4899	Communications Services	0	0
	7359	Equipment Rental and Leasing	0	2
	7389	Business Services	0	0
Wireless Network	3571	Electronic Computers	0	0
	3575	Computer Terminals	0	0
	7371	Computer Programming Services	0	3
	7372	Prepackaged Software	0	0
Other	1623	Water, Sewer, Pipeline Construction	1	3
	3060	Fabricated Rubber PDS, NEC	0	3
Total			49	110

Table 2
Variable Definitions

Variable	Definition
	Governance Characteristics Variables (Govchar)
CEO ownership	CEO ownership is the percent of CEO equity to total equity outstanding.
CEO options proportion	CEO options proportion is current year option grants to total CEO compensation.
Board size	Board size is the number of directors on the board.
Outside directors	Outside directors is the proportion of outside directors on the board.
	Deregulation and Industry Variables
Dereg	Deregulation indicator variable, equal to one if the year is later than 1996, and zero otherwise.
Telecom	Telecommunications firm indicator variable, equal to one for, and zero otherwise.
	Control Variables
Age	CEO age is the age of the CEO in years.
Size	Firm size is measured as the natural log of the market value of total assets, expressed in millions of 1997 constant dollars.
Leverage	Leverage is total debt scaled by the market value of firm assets.
MTB	Growth opportunities are measured using the market to book ratio.

Table 3
Governance and Financial Characteristics of Sample Firms

Mean (median) governance and financial characteristics of sample firm-year observations are shown. The sample consists of telecommunications and prior performance- and size-matched industrial firms for the pre-1996 (1993 through 1995) and post-1996 (1997 through 1999) periods for which data are available in CRSP, Compustat, ExecuComp, and proxy statements in Lexis Nexis or Global Access. There are 62 telecommunications firm-year observations and 62 industrial firm-year observations for the pre-1996 period, and 123 telecommunications firm-year observations and 123 industrial firm-year observations for the post-1996 period. Numbers of observations are shown below means. Mean difference in differences tests are also reported. Statistical significance is shown in bold.

	Telecommunications firms		Industrial control firms		Mean
	Pre-1996	Post-1996	Pre-1996	Post-1996	difference
	(1)	(2)	(3)	(4)	(5)
Panel A: Governance characteristics					
CEO ownership	**0.027****	**0.057****	**0.020*****	**0.053*****	-0.017
	(0.001)[b]	**(.004)**[a]	**(0.003)**[b]	**(0.007)**[a]	(0.2673)
CEO options proportion	**0.248*****	**0.425*****	0.190	0.260	**0.288*****
	(0.102)***	**(0.481)***[c]	(0.180)	**(0.211)**[c]	**(0.0001)**
Board size	**11***	**9***	**10*****	**9*****	**2.118****
	(11)***	**(8)*****	**(10)****	**(9)****	**(0.0013)**
Outside directors	0.762	0.703	**0.717*****	**0.754*****	0.030
	(0.786)[b]	**(0.727)**[b]	**(0.750)***[b]	**(0.778)***[b]	(0.1872)
CEO age	54	54	55	57	**4****
	(55)	**(56)**[b]	(54)	**(57)**[b]	**(0.0167)**
Panel B: Financial characteristics					
Size	**14,195*****	**25,447*****	**2,953*****	**5,523*****	**25,246*****
	(2,776)[c]	**(3,542)**[c]	**(937)**[c]	**(524)**[c]	**(0.0001)**
Leverage	**0.228*****	**0.236*****	**0.240***	**0.298***	**-0.155*****
	(0.204)	**(0.209)**[b]	**(0.237)***	**(0.313)***[b]	**(0.0001)**
MTB	**2.276*****	**3.492*****	**1.538***	**1.564***	**1.319*****
	(1.933)*[c]	**(2.678)***[c]	**(1.425)**[c]	**(1.337)**[c]	**(0.0001)**
Stock returns	**0.361***	**0.867***	**0.095*****	**0.089*****	**0.730*****
	(0.275)[c]	**(0.412)**[c]	**(0.079)**[c]	**(0.008)**[c]	**(0.0038)**
ROA	0.065	0.054	0.054	0.037	0.016
	(0.062)	**(0.070)**[b]	**(0.060)***	**(0.038)***[b]	(0.2422)
Panel C: Competition					
Herfindahl-Hirschman Index	**41.842*****	**39.930*****	115.246	48.550	16.620
	(37.779)[c]	**(12.301)**[c]	**(48.849)**[c]	**(44.880)**[c]	(0.5226)
Industry concentration ratio	**0.642*****	**0.660*****	**0.782****	**0.761****	**-0.135*****
(4 largest firms)	**(0.675)**[c]	**(0.754)**[c]	**(0.809)**[c]	**(0.783)**[c]	**(0.0007)**
N	49	110	43	102	304

*,**,*** means (medians) differ for telecommunications firms, or for industrial firms, between the pre- and post-1996 periods, or significance of Pr>|t| for differences in differences means tests, at the 10 percent, 5 percent, or 1 percent level.
[a],[b],[c] means (medians) differ for the pre-1996 period, or post-1996 period, between telecommunications and industrial firms, at the 10 percent, 5 percent, or 1 percent level.

Table 4
Fixed Effects Regressions of Governance Structure Characteristics on Deregulation and Interaction Term

Governance structure characteristics are regressed on a deregulation dummy, interaction term, and controls. Regressions are two-way fixed effects for sample firms for the period 1993-1999, excluding 1996. Firm dummy variables are not reported. Deregulation is the time dummy variable in these regressions. t-statisics are below coefficients and p-values below F statistics.

	CEO ownership (1)	CEO options proportion (2)	Board size (3)	Outside directors (4)
Deregulation dummy (β_1)	**0.018****	0.068	-0.049	**0.034***
	(3.81)	(1.34)	(-1.64)	**(2.30)**
Deregulation x telecom.(β_2)	**-0.014***	0.046	-0.037	**-0.044***
	(-2.33)	(0.68)	(-0.92)	**(-2.21)**
Age	-0.002	-0.003	0.019	-0.006
	(-0.66)	(-0.07)	(0.84)	(-0.52)
Age squared	0.000	0.000	-0.002	0.000
	(1.26)	(0.16)	(-0.87)	(0.60)
Log of firm size	**-0.012****	-0.003	**0.085****	0.009
	(-4.03)	(-0.08)	**(4.28)**	(0.86)
Leverage	0.002	0.045	0.123	0.056
	(0.016)	(0.36)	(1.68)	(1.54)
MTB	0.001	0.013	0.008	**0.008****
	(1.28)	(1.34)	(1.41)	**(2.98)**
F-test on H_0: $\beta_1+\beta_2=0$ (p-value)	0.004	**0.114***	**-0.086****	-0.010
	(0.498)	**(0.037)**	**(0.008)**	(0.551)
N	333	333	333	333
R squared	0.96	0.56	0.89	0.82
F	62.66	2.88	10.44	10.74
p-value	(0.001)	(0.001)	(0.001)	(0.001)

*,** p-values in bold are significantly different from zero at the 5 percent, 1 percent level.

Table 5
Governance and Financial Characteristics of Telecommunications Firms by Industry Segment

Mean (median) governance and financial characteristics of sample firm year observations are shown. CEO total pay and CEO options grants are reported in thousands of 1997 dollars. Stock returns are one-year holding period stock returns net of value-weighted stock market returns. Return on assets is the three-year average of earnings before interest, taxes, depreciation, and amortization, all scaled by total assets. Other variable definitions are provided in Table 2. Numbers of observations are shown below means.

	Entertainment		Equipment		Service	
	Pre-1996	Post-1996	Pre-1996	Post-1996	Pre-1996	Post-1996
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Governance characteristics						
CEO ownership	**0.050****	**0.187****	**0.030****	**0.033****	0.007	0.010
	(0.021)*	**(0.145)***	(0.006)	(0.007)	(0.000)	(0.000)
CEO options	0.294	0.279	**0.215****	**0.502****	**0.309****	**0.424****
proportion	(0.000)	(0.000)	**(0.047)****	**(0.550)****	(0.293)	(0.350_
Board size	9.750	8.958	9.321	7.844	13.161	12.021
	(10)	(8)	**(9)***	**(7)***	**(14)***	**(11)***
Outside directors	0.620	0.657	**0.790****	**0.747****	0.782	0.762
	(0.667	(0.714)	(0.789)	(0.750)	(0.833)	(0.762)
CEO age	50	55	**55***	**54***	56	55
	(51)	(55)	(55)	(56)	(57)	(57)
Panel B: Financial characteristics						
Size	**14,899***	**28,241***	6,599	14,683	**34,148***	**60,520***
	(2,890)	(4,202)	(1,471)	(1,499)	(22,164)	(34,911)
Leverage	0.268	0.262	**0.094****	**0.100****	0.300	0.386
	(0.217)	(0.256)	(0.100)	(0.019)	(0.335)	(0.355)
MTB	**2.608***	**5.750***	3.403	4.318	**1.695****	**2.405****
	(2.123)	(2.805)	(3.323)	(3.010)	**(1.644)****	**(2.285)****
Stock returns	**0.267***	**0.758***	0.729	0.557	0.220	1.249
	(0.117)	(0.451)	(0.698)	(0.156)	**(0.186)****	**(0.497)****
ROA	0.023	0.015	**0.103****	**0.053****	0.052	0.031
	(0.017)	(0.027)	(0.092)	(0.085)	(0.059)	(0.054)
N	12	24	28	64	31	47

*,** medians differ for the pre-1996 from the post-1996 period at the 5 percent, 1 percent level.

Table 6
Fixed Effects Regressions of Governance Structure Characteristics on Deregulation and Interaction Terms

Governance structure characteristics are regressed on a deregulation dummy, interaction terms, and controls. Regressions are two-way fixed effects for sample firms for the period 1993-1999, excluding 1996. Firm dummy variables are not reported. Deregulation is the time dummy variable in these regressions. t-statisics are below slope coefficients and p-values below F statistics.

	CEO ownership (1)	CEO options proportion (2)	Board size (3)	Outside directors (4)
Deregulation dummy (β_1)	**0.015****	0.066	-0.049	**0.034***
	(3.47)	(1.31)	(-1.66)	**(2.28)**
Deregulation x entertainment (β_2)	**0.031****	0.030	0.012	0.020
	(2.95)	(0.25)	(0.16)	(0.58)
Deregulation x Equipment (β_3)	**-0.021****	0.106	-0.032	**-0.069****
	(-2.62)	(1.17)	(-0.60)	**(-2.60)**
Deregulation x Service (β_4)	-0.014	-0.001	-0.065	-0.041
	(-1.87)	(-0.01)	(-1.29)	(-1.64)
Age	-0.000	-0.007	0.022	-0.001
	(-0.08)	(-0.18)	(0.94)	(-0.13)
Age squared	0.000	0.000	-0.000	0.000
	(0.60)	(0.28)	(-0.99)	(0.17)
Log of firm size	**-0.012****	0.004	**0.087****	0.007
	(-4.15)	(0.12)	**(4.35)**	(0.74)
Leverage	0.006	0.033	0.128	0.067
	(0.58)	(0.26)	(1.75)	(1.84)
MTB	0.000	0.012	0.007	**0.007***
	(0.30)	(1.23)	(1.13)	**(2.51)**
F test on H_0: $\beta_1+\beta_2=0$	**0.046****	0.096	-0.037	0.054
	(0.001)	(0.400)	(0.579)	(0.109)
F test on H_0: $\beta_1+\beta_3=0$	-0.006	**0.172***	-0.081	-0.035
	(0.429)	**(0.032)**	(0.086)	(0.131)
F test on H_0: $\beta_1+\beta_4=0$	0.001	0.065	**-0.114****	-0.007
	(0.842)	(0.404)	**(0.013)**	0.743
N	333	333	333	333
R squared	0.97	0.78	0.88	0.83
F	52.50	2.69	10.96	11.62
p-value	(0.001)	(0.001)	(0.001)	(0.001)

*,** p-values in bold are significantly different from zero at the 5 percent, 1 percent level.