ESSAYS IN PRODUCT MARKET COMPETITION

A Dissertation

by

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Submitted to the Office of Graduate and Professional Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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August 2019

Major Subject: Business Administration

ABSTRACT

The competitive environment of a firm shapes its financial policies. With the rise in the concentration of US industries, fewer listed firms, and reduced competition, questions about the effect of competition on firm behavior and policies are relevant and pertinent. In this research, I explore the effect of changes in competition on firm behavior. I do this in two settings.

First, I study if the product pricing effects of common ownership, when the same investors partially own two firms, are ubiquitous or if they vary based on the product market characteristics of the firm. I find that the anti-competitive effects of common ownership are present only in industries with similar products. Using a quasi-natural experiment, I find when firms with similar products experience an increase in common ownership, they have 3.2 percentage point higher industry-adjusted gross margin, reduce their R&D expenditures by 0.6 percentage point and have improved profitability. My findings show that common ownership worsens competition only when firms operate in relatively similar product spaces.

Second, along with my co-authors, I study how managerial traits affect firms' responses to competitive shocks. Specifically, motivated by studies that show overconfident agents are more competitive, we test whether overconfident CEOs respond differently and perform better when competition increases. Using tariff reductions as exogenous shocks to competition and a triple-difference specification on matched samples, we find that when competition increases, firms with overconfident CEOs slash their operating and gross profit margins, and increase advertising and research and development more intensively than rational CEOs do. Their actions lead to increased market share and value for their firms relative to firms led by rational CEOs. Our results imply that CEO overconfidence is beneficial when firms face increased competition.

DEDICATION

To my mom and dad,

you taught me to be curious and strong-willed and emboldened me every step of the way.

To life,

you led me down this path, albeit unknowingly.

ACKNOWLEDGMENTS

I am indebted to my advisor, Shane A. Johnson, who provided valuable feedback and advice every step of the way. I benefited tremendously from his knowledge and experience. His guidance and comments helped me immensely and made me a better researcher. I am truly grateful to my dissertation committee members, who were always a knock away with their invaluable advice and support. I want to thank my committee members individually for their help: Christa H.S. Bouwman for being a diligent mentor, helping me improve and polish my papers; Adam C. Kolasinski for helping me think outside of the box; Anwer Ahmed for encouraging me to think critically and offering constructive suggestions.

I want to express my gratitude to Marco Rossi and Mahdi Mohseni for providing me with helpful advice. A special thanks to all the finance faculty for their invaluable comments and feedback over the past few years. I am deeply thankful to the Department of Finance as well as Mays Business School for the generous resources they provided me to pursue my doctorate. Many thanks to Rebecca Itz for her superb logistical support.

I sincerely thank Imran Haque, James Nordlund, and Nan Yang for their warm friendship and collegiality, for being sounding boards for my research ideas and for generously sharing their know-how. It would not have been fun without you. I would also like to thank my friends and colleagues at A&M for their support and help during my Ph.D.

I could not have completed this journey without my family and friends by my side. I thank my parents, my sister, Bhawana and my brother, Arjun for their unconditional love and unwavering support. Bhawana, Lavi, and Sahithi you are my pillars of strength. Thank you for always being there and for uplifting me throughout this long journey. Arjun and Vaibhav, thank you for finding humor in my struggles and making the long days seemingly manageable. Keya, Karl, Claudia, Jeremy, Adam, and Adriana thank you for being my 'framily.' Khushbu, Prachi, Brandy, and Angie thank you for being there. Finally, thank you Natiq.

CONTRIBUTORS AND FUNDING SOURCES

Contributors

This work was supervised and supported by a dissertation committee consisting of Professors Shane A. Johnson (advisor), Christa H.S. Bouwman, and Adam C. Kolasinski of the Department of Finance and Professor Anwer Ahmed of the Department of Accounting.

The analyses depicted in the chapter titled, Competing Against Overconfident CEOs were conducted in part by Professor T. Colin Campbell of the Department of Finance, Real Estate, and Insurance and Risk Management at the University of Cincinnati. All other work conducted for the dissertation was completed by the student independently.

Funding Sources

Graduate study was supported by a fellowship from the Department of Finance at Mays Business School and Texas A&M University's Tuition Payment Program.

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1. INTRODUCTION

According to the theory of the firm, the primary objective of a firm is to maximize shareholder value. In order to maximize firm value, a firm must allocate its resources efficiently to compete effectively and maximize profits. Several factors determine a firm's ability to compete. Furthermore, firms respond to changes in competition by changing corporate policies. For instance, several paper documents that a firm's capital structure and product market outcomes are related. Chevalier (1995) finds that increase in leverage led to reduced product market competition in the supermarket industry. Kovenock and Phillips (1997) find that firms in concentrated industries close plants and reduce investments post leveraged buyouts. Xu (2012) finds that firms reduce leverage in response to an increase in competition. Moreover, product market competition affects disclosure policies (Ali, Klasa, and Yeung (2014), Darrough and Stoughton (1990), etc.), mitigates managerial slack (Giroud and Mueller (2010)), affects investment decisions (Akdogu and MacKay (2008), Frésard and Valta (2015)), and increases CEO turnover (Aldunate (2018)).

In this dissertation, I study two facets of product market competition and firms' responses to it. The first chapter of my dissertation examines the effects of ownership structure on the competitive environment and product market outcomes of a firm. With an increase in institutional ownership, as of 2014, 60% of all publicly listed firms share at least one blockholder with an industry-peer (He and Huang (2017)). The increase in common ownership, when peer-firms are (at least partially) owned by the same set of investors, reduces the incentive for a firm to compete and as a result, product prices increase (Rotemberg (1984), Farrell (1985)). Empirical studies have found mixed evidence on the effect of common ownership on product prices and corporate policies (see: Schmalz (2018) and Lewellen and Lowry (2019) for an excellent review of the literature). Given that competition between two firms is a function of their product characteristics (Chamberlin (1933), Robinson (1933)), I argue that the anti-competitive effects of common ownership are stronger for firms with similar products than for firms with differentiated products.

Using mergers and acquisitions of financial institutions as an exogenous shock to a common

ownership levels of a firm, I find that, compared to firms with differentiated products, firms with similar products have higher gross margins, lower R&D expenditures, and higher profitability when their common ownership increases. Moreover, I show that the effects of common ownership are present only in industries with high product similarity and are absent or opposite in industries with differentiated products. I conduct several robustness tests. Finally, using Bushee (1998)'s classification to identify institutional investor types, I find that the results are driven by long-term investors.

In the second chapter of my dissertation, co-authored with Shane A. Johnson, T. Colin Campbell, and Binday Adhikari, we examine how behavioral biases of managers can affect firm value when faced with an increase in competition. Empirical research shows that managerial biases, particularly CEO overconfidence, affects corporate policies. Overconfident CEOs are associated with corporate fraud and litigation (Schrand and Zechman (2012); Banerjee, Humphery-Jenner, Nanda, and Tham (2018)), value-destroying acquisitions (Malmendier and Tate (2008)), and weaker lending standards resulting in higher loan defaults (Ho, Huang, Lin, and Yen (2016)). Given the negative effects of overconfidence, the question arises why do firms employ overconfident CEOs? A few studies have attempted to explain this question, for instance, Hirshleifer, Low, and Teoh (2012) and Galasso and Simcoe (2011) find that firms with overconfident CEOs innovate more. Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011) find that moderately overconfident CEOs are less likely to be forced out. Phua, Tham, and Wei (2018) find that overconfident CEOs cultivate stronger commitments with suppliers and customers.

Motivated by studies that find that overconfident agents are more competitive (Camerer and Lovallo (1999)), in this paper, we hypothesize and test whether overconfident CEOs perform better when product market competition increases. Using import tariff reductions, which made U.S. domestic firms more susceptible to competition from foreign firms, we find that firms with overconfident CEOs respond more aggressively to changes in competition. These firms sharply cut prices (as proxied by gross margin and operating margin) in the years following tariff cuts. Moreover, during this period firms with overconfident CEOs increase R&D expenditures and advertising

expenditures, potentially to differentiate their products. These actions resulted in firms with overconfident CEOs gaining market share and increasing firm value. We conduct several placebo tests to establish that the results are driven by differences between overconfident and rational CEOs.

My dissertation contributes to the literature in several meaningful ways. First, the finding that the anti-competitive effects of common ownership accrue to firms that have similar products inform the debate on common ownership. To the extent that common ownership reduces competition, policymakers may consider taking steps to curb the anti-competitive effects of common ownership. Several academics suggest that antitrust agencies should consider the effects of common ownership when reviewing merger deals (Elhauge (2016)) and should limit institutional investors from investing in multiple firms in the same industry (Posner, Scott Morton, and Weyl (2017)). However, the findings of my paper suggest that the effects of common ownership are not uniform and are non-linear across industries. Therefore, any policy implication should take into account the product characteristics of the firms. I also show that using a 5% threshold to identify investors may fall short because it ignores potentially large dollar holdings in big firms.

The findings that overconfident CEOs may improve firm value adds to a growing literature that documents the potential upside of hiring overconfident managers. Prior work examining investment and other corporate policies confirm that overconfidence can lead to inferior outcomes. In a competitive setting, however, our results show that, compared to rational CEO, overconfident CEOs responses are value-increasing. Thus, their biases turn out to be beneficial because they 'win.' Our results underscore that the value of CEO overconfidence can depend critically on the level of competition that a firm faces. Finally, the second chapter of my dissertation highlights the importance of managerial characteristics on product market outcomes. Empirical work has documented that firms' characteristics affect their product market outcomes. Our paper finds that the competitive advantage of a firm may also depend on the manager of the firm. The finding that overconfident CEOs react differently to changes in import competition showcases the importance of considering heterogeneity in managerial characteristics in a firm's response to changes in product market competition due to import tariff reduction.

2. WHEN DOES COMMON OWNERSHIP MATTER?

2.1 Introduction

Recent empirical work finds that an increase in common ownership[1] is associated with higher product pricing in the airline (Azar, Schmalz, and Tecu (2018)) and the banking industries (Azar, Raina, and Schmalz (2016)).[2] These findings have sparked policy debates on how to curb the potential anti-competitive effects of common ownership. Some academics suggest that antitrust agencies like the Department of Justice (DoJ) and the Federal Trade Commission (FTC) should consider common ownership of firms when reviewing mergers and acquisitions (Elhauge (2016)). Others recommend limiting institutional investors from investing in multiple firms in an industry (Posner, Scott Morton, and Weyl (2017)).[3] However, competitive interactions among firms are often a function of their product characteristics (Chamberlin (1933), Robinson (1933)). Therefore, an important and unanswered question is whether the anti-competitive effects of common ownership are pervasive or do they depend upon other competitive features of a firm's product space. In this paper, I test whether the pricing effects of common ownership are concentrated in certain industries or exist across all or most industries. I find that the potential anti-competitive pricing effects of common ownership are strongest in industries with more similar products and are statistically indistinguishable from zero in industries with differentiated products.

Theoretically, common ownership among firms can result in higher price levels (Rotemberg (1984), Farrell (1985)). However, if a firm has well-differentiated products with no rivals in its product space, then it can earn monopoly profits. Therefore, having overlapping shareholders with industry peers should not affect price competition.[4] In contrast, firms offering *similar* products compete on prices to gain market share. The presence of common owners should reduce the

[1] Two firms are commonly owned when both the firms are (partially) held by one or more common investors.

[2] The debate on common ownership remains unsettled. Several papers have challenged the findings of these papers. See Lewellen and Lowry (2019) for a review.

[3] See Elhauge (2017) and the references therein for a review of the legal implications of this phenomenon.

[4] Firms in monopolistic competition may alter their behavior due to common owners. They can, for instance, have fewer incentives to differentiate their product quality and/or features and as a result, might reduce their R&D expenditure and advertising expenses.

incentives of these firms to compete on price. That is, if the firms compete in the same product space, incentives to not compete brought about by the presence of common owners, would be strong because the firms might potentially gain from tacit collusion. Based on the above argument, this paper tests the following hypothesis: firms with *similar* products experience stronger pricing effects due to common ownership.

When estimating the effects of common ownership on product price reverse causality is a concern. It is possible that common ownership does not drive higher product prices, instead common ownership is the outcome of investors seeking firms with higher margins and profitability. To address this concern, I use mergers and acquisitions (M&A) of financial institutions as a quasi-natural experiment, as outlined in He and Huang (2017). When two financial institutions merge, the merger affects the common ownership of the firms in their portfolios independent of firm characteristics. I use the portfolio holdings of the merging institutions one quarter prior to the merger announcement date to first identify treated and control firms and then use difference-in-differences estimation to test my hypothesis. I also use the mutual fund scandal, that surfaced in 2003, as an additional test for robustness. In September 2003, 20 mutual funds were implicated in illegal trading. Kisin (2011) documents that these funds experienced significant outflows, which forced them to sell their stakes in firms independent of firm characteristics. Therefore, any changes in the level of common ownership due to the actions of mutual funds involved in the scandal is exogenous to the firm. I follow Anton and Polk (2014) and use the variation in common ownership due to these mutual funds to instrument for the level of a firm's common ownership.

To test whether the effects of common ownership vary by product market characteristics of a firm, I regress industry-adjusted gross margin on common ownership interacted with product similarity. I follow Hoberg and Phillips (2016) to define average product similarity (ATSIM) as the average similarity between a firm and its industry peer. As firms do not report per unit prices or marginal costs, I use gross margin (measured as sales minus cost of goods sold as a percentage of sales) as a proxy for price levels. Gross margin captures the ability of a firm to price its products above the cost of goods sold and is indicative of market power. I find that the relationship between

gross margin and common ownership is stronger when the products are more similar. Specifically, a one standard deviation in common ownership increases gross margin by 3.2 percentage points (pp), but that effect rises by an additional 6.3 pp when product similarity is one standard deviation above its mean.

One might conjecture that these findings stem from cost reductions. However, in a perfectly competitive environment a firm should price at marginal cost. The ability of a firm to not pass its cost reductions on to consumers indicates market power, which is consistent with the argument that common ownership reduces competition and increases the market power of these firms. To further rule out the argument that cost reductions drive the gross margin results, I hand-collect data on the reasons for gross margin changes for 100 firm-years from the MD&A section (Item 7) of annual reports and perform a difference-in-means test of whether firms with higher levels of common ownership are more likely to mention price increases. I find that, compared to firms with no common ownership, firms with common ownership are 20% more likely to mention price increases. Due to the small sample size, the test for common ownership interacted with product similarity lacks statistical power.[5]

While price is one way to compete, firms can also compete on product features and quality. To the extent that common ownership has anti-competitive effects, firms with common owners should have fewer incentives to innovate. Thus, I hypothesize that firms with similar products and common ownership reduce research and development (R&D) expenditures. A competing hypothesis is that firms with common owners can invest in process improvements to reduce costs and further improve margins. I find that firms with similar products reduce their R&D spending by 0.4 percentage points with a one standard deviation increase in common ownership. This result is consistent with the anti-competitive effects of common ownership. Higher gross margins and reduced R&D expenditures translate to higher profitability. Firms with similar products earn 4.2 to 10.8 pp higher industry-adjusted EBITDA when the common ownership increases by one standard deviation. The mean level of common ownership is 13% with a standard deviation of 16% and the

[5]I am in the process of collecting data for a large sample.

mean of similarity score is 0.02 with a standard deviation of 0.03.

The results thus far show that the effects of common ownership on pricing depend on the product market characteristics of a firm. To test whether the above findings indicate that the effects of common ownership are concentrated in certain industries, I sort my data into quartiles based on the average product similarity. I find that the anti-competitive effects are not the same across industries – the effects are present in industries with high average product similarity. Gross margin, R&D to sales ratio, and EBITDA to sales ratio have no reliable relation with common ownership for industries with low average product similarity scores.[6] This finding suggests that concerns about, and potentially regulations of, common ownership should focus on some industries more than others.

This paper adds to the literature on common ownership. With the increasing concentration of US industries (Grullon, Larkin, and Michaely (2017)), lower investments despite high Tobin's Q (Gutiérrez and Philippon (2016)), and the rise of institutional holdings and common ownership (Gilje, Gormley, and Levit (2017)), questions about the anti-competitive effects of common ownership are pertinent. Currently, there is no consensus on the effects of common ownership. Several papers find that it affects firm policies and decisions. Matvos and Ostrovsky (2008) find that investors which own both acquirer and target are more likely to vote for the merger. He and Huang (2017) show that commonly owned firms have higher market share growth and cost synergies. Semov (2017) provides evidence that commonly owned firms hold less cash on hand and move together in the product space. Panayides and Thomas (2017) find evidence of cost reduction in manufacturing industries. Freeman (2017) documents that vertical common ownership improves customer-supplier relationships.

Others are skeptical of the effects of fund investors on the competitive landscape of various industries.[7] In fact, some industry experts claim that the concept lacks economic foundation – Barbara Novick (co-founder and vice chairman of BlackRock) notes, "These papers lack economic

[6] I find similar results if I use median score instead of mean score.

[7] See: O'Brien and Waehrer (2017); https://www.foley.com/horizontal-shareholding-is-oligopoly-pricing-a-symptom-or-the-disease-03-30-2017/

logic and factual support from the real world."[8] Several other papers have challenged the findings (see: O'Brien and Waehrer (2017), Gramlich and Grundl (2017), Dennis, Gerardi, and Schenone (2018)). For instance, Dennis, Gerardi, and Schenone (2018) find that common ownership does not have any pricing effect in the airlines' industry once the passenger count is accounted for. Similarly, Gramlich and Grundl (2017) find mixed evidence of pricing effects in the banking industry.

This paper makes two contributions to the literature. First, I show that the anti-competitive effect of common ownership occurs only in industries that have similar products. That the anti-competitive effects of common ownership accrue to firms that have similar products is an important finding because it indicates that any policy implications about common ownership should take into account industry characteristics. To the extent that common ownership reduces competition, policymakers may consider taking steps to curb the anti-competitive effects of common ownership. Curtailing ownership across multiple firms in an industry with a high level of product similarity might not eliminate portfolio diversification benefits for an investor because demand across such firms would be positively correlated. On the other hand, allowing investors to invest in multiple firms in industries with lower product similarity would allow them to reap the benefits of diversification without affecting the market power of the firm.

Second, I develop measures of common ownership that are firm-specific and take into account not only blockholders (investors that hold with 5% or higher shares outstanding) but also owners that have a substantial monetary stake in a firm.[9] For instance, in June 2011, none of the top ten investors in Microsoft were blockholders, but collectively they held 22% of its market cap, and the holding of the smallest investor of the top ten was $2 billion. My results suggest that when constructing measures of common ownership, it may be important to look beyond strictly defined blockholders. If non-blockholders with large monetary stakes are important, focusing strictly on blockholders underestimates the level of common ownership for large firms. Compared to my definition, using only blockholders underestimates the level of common ownership firms have. For instance, based solely on blockholders, 42% of firms in the Compustat universe are commonly

[8] https://www.wsj.com/articles/how-index-funds-democratize-investing-1483914571

[9] Section 2.2.2 details how I calculate substantial monetary stake.

owned. This number increases to 70% when one includes not only blockholders but also investors that may not have a large equity *percentage* stake but has a substantial *monetary* stake in the firm.

2.2 Data and Descriptive Statistics

This section describes the data – the sample construction process, variable definitions, and the summary statistics.

2.2.1 Sample Construction

I start with all publicly listed firms with positive assets, non-negative sales, and non-missing industry classification (4-digit SIC code and FIC400 code).[10] I drop firms that have missing stock price data on CRSP, and have no product similarity score in the Hoberg and Phillips data library.[11] I exclude industries with less than two firms, financial firms (SIC 6000-6999) and utility firms (SIC 4900-4999). The final sample has 59,987 firm-years. The sample period covers 1997–2015 because the product similarity data is available from 1997 to 2015.

2.2.2 Variable Definitions

Appendix A.1 contains detailed definition of all the variables used in this paper.

Dependent Variable

The primary variable of interest is the industry-adjusted gross margin (*Ind. Adj. Gross Margin*). Gross margin is sales minus cost of goods sold divided by sales. It captures the ability of a firm to price its good above cost of goods sold. I also study firms' R&D expenditure as a percentage of total sales to test if common ownership has differential effect on firms' innovation spending. I replace missing R&D expenditure with zero. To test whether common ownership impacts firms' profitability, I use the EBITDA to sales ratio and net income to sales ratio as dependent variables. All dependent variables are adjusted for the industry average, where the industry is defined alternately using the 4-digit SIC code (SIC) or the FIC400 (FIC).

[10] FIC stands for fixed industry classification. This classification was developed by Hoberg and Phillips (2010) and Hoberg and Phillips (2016). The data is available on their website http://hobergphillips.usc.edu/industryclass.htm

[11] Product similarity data is available at http://hobergphillips.usc.edu/

Calculating Common Ownership

A firm is commonly owned if its shareholders hold one or more of its industry peers. I use Thomson Reuters' (13-F) database to identify such shareholders. All financial institutions that manage $100 million or more have to report their holdings to the SEC using form 13-F. To calculate the level of common ownership at a given firm, it is important to identify which institutional investors should be classified as common owners. The empirical literature has either focused on blockholders (shareholders who own 5% or more common shares outstanding) or used an arbitrary percentage cutoff. While it is important that these investors hold substantial equity in the firm, the dollar value of the investment is also relevant as it is hard for an investor to be a blockholder in large firms. Focusing solely on equity stake ignores economically meaningful stakes in larger firms. For example, using only blockholders ignores common ownership links among large firms such as Apple Inc. Apple has only one blockholder in the third-quarter of 2010 but 325 investors with an average of $477.66 million (median of $129.66 million) per investor invested in the firm.[12] As a result, any measure of common ownership that relies solely on blockholders underestimates the level of common ownership in an industry.

Therefore, I use the following approach. For each quarter, I keep investors that either own 5% or more in the firm or that have substantial dollar amount invested in the firm. A holding is considered substantial if the dollar value of the holding is higher than the median dollar holding of a blockholder in any firm. For instance, in the third quarter of 2009, the median holding of a blockholder across all firms was $31 million. Therefore, for constructing common ownership measure as of September 2009, I consider all investors that were either blockholders or whose holdings were greater than $31 million. An investor is classified as a common owner if it owns at least one other firm in the same industry.[13] Using these institutional investors, I create three measures of common ownership.[14]

[12]The average and the median amount reported for Apple's investors excludes its sole blockholder.

[13]My results are similar if I use blockholders only. However, as mentioned earlier, using blockholders neglect economically meaningful holdings especially in large firms.

[14]Many empirical papers use the Modified Herfindahl Index Delta (MHHID) to capture common ownership. MHHID is an industry level measure that aggregates each firm's incentives to internalize the externalities it imposes on its

The first measure, *ComOwn*, is the total percentage of shares held by investors in a firm who own at least one industry-peer. I first calculate the percentage of shares held in each quarter, and then average over the fiscal year to get a firm-year measure. *ComOwn* captures the degree to which the firm is commonly owned. The second measure, *PropPeer*, is the proportion of industry-peers. I first identify the total number of unique industry peers a firm is connected to via common owners in each quarter. I then average it over the fiscal year to get an annual number. *PropPeer* is the number of unique industry peers a firm is connected to in a year divided by the total firms, excluding the firm itself, in that industry-year. Note that number of firms in an industry is available annually. Therefore, averaging the number of firms and then calculating the ratio is equivalent to averaging the ratio. For example, suppose an industry has ten firms and firm *i* is connected to three other firms in that industry. *PropPeer* is 3 divided by 9 (=10-1) i.e. 1/3. This measure captures how connected a firm is in a given industry. The third measure, *NumMgnr*, is the number of common owners a firm has in a given fiscal year. I first calculate the number of common owners a firm has in a quarter and then average it over the fiscal year to get a firm-year measure. This measure is analogous to He and Huang (2017)'s NumCross variable. An institutional investor is classified as a common owner if it owns at least one other firm in the same industry. For a given firm, this measure captures how many investors are invested in the firm as well as its industry peers. The more common owners a firm has, the more likely it is that its interests are aligned with industry peers.

Measuring Product Similarity

I use Hoberg and Phillips (2016)'s total similarity score to capture the extent to which a firm's product offerings are similar to its industry-peers. Average total similarity (ATSIM) measures how similar a firm's product description is relative to other firms. Specifically, for a given firm *i*, words in its business description, as reported in its annual report, is represented using a vector, V_i. In a

industry peers. I do not use MHHID as I want to measure common ownership at the firm-level. Moreover, MHHID uses market share as weight. My main variable of interest is gross margin. Because price levels affect market share, using MHHID would make it hard to disentangle whether the variation in market share or the variation in holdings is driving my results.

given fiscal year, pairwise product similarity between firm *i* and *j* is one minus the cosine distance of the V_i and V_j. This pairwise measure is aggregated to get an annual firm-level measure of product similarity. There are two ways to aggregate the measure – average over all the firms in the sample (*ATSIM*) or average over all the firms in a given industry, where industry is defined using either 4-digit SIC code (*ATSIM-SIC*) or FIC400 code (*ATSIM-FIC*). I test my hypotheses using both and find consistent results.

Control Variables

I control for the firm's size (natural log of total assets), its growth opportunities (market to book ratio), cash to asset ratio, how much it spends on advertising and R&D as a percentage of assets, and its leverage ratio (long term debt to total assets ratio). I also control for percentage of shares held by all institutional investors to control for any effect institutional investors might have on a firm's gross margin and profitability. I control for industry concentration using Herfindahl-Hirschman index (HHI) and number of firms in the industry. All control variables are measured at t-1.

2.2.3 Summary Statistics

Table C.1 gives the summary statistics. Panel A presents the descriptive statistics for the dependent as well as the key independent variables. Average industry-adjusted gross margin is 6% (4%), average industry-adjusted R&D to sales ratio is -10% (-7%) and average industry-adjusted EBITDA to sales ratio is 13% (10%), where industry is defined using 4-digit SIC code (FIC400). Average total similarity is 2%. 13% of a firm's shares are held by investors that hold at least one industry peer (*ComOwn*). On average a firm is connected to 21% of its industry-peers (*PropPeer*)[15] and have an average of five common owners (*NumMgnr*).

Panel B presents the descriptive statistics for firm characteristics. Average firm size is $2.82 billion. The average firm has a market to book ratio of 2. The mean cash to assets ratio is 21% and leverage ratio is 17%. In a typical firm, 42% of shares are held by all institutional investors

[15]The mean market share held by the peers is 52% (40% per common owner).

compared to 14% of shares held by blockholders. The average industry concentration (HHI) is 2700, which according to the FTC's definition is high. The average number of firms in an industry is around 50. 68% of the firms have at least one common owner.

2.3 Results

This section describes the empirical design and presents the panel regression results. In section 2.4, I use two quasi-natural experiments to establish causality.

2.3.1 Evidence of price increase

To test if the pricing effects of common ownership vary based on product market characteristics, I estimate the following regression equation:

$$\begin{aligned} \mathrm{Y_{it}} = \beta_1 \mathrm{CommonOwnership_{t-1}} + \beta_2 \mathrm{ATSIM_{t-1}} + \beta_3 \mathrm{CommonOwnership_{t-1}} \text{ x } \mathrm{ATSIM_{t-1}} \\ + \gamma' \mathrm{X_{t-1}} + \alpha_i + \eta_t + \mathrm{e_{it}} \end{aligned} \tag{2.1}$$

where Y is alternatively measured as industry-adjusted gross margin, industry-adjusted R&D to sales ratio, industry-adjusted EBITDA to sales ratio, and net income to sales ratio. Common ownership is one of the three measures discussed in section 2.2.2, ATSIM is the measure of average product similarity defined in section 2.2.2, X includes firm-level controls defined in appendix A.1, α_i are firm fixed effects, and η_t are year fixed effects. Standard errors are clustered by firms. To make it easier to interpret the results, coefficients on common ownership and the similarity measures are standardized (with mean zero and variance one) in the tables. The coefficient of interest is β_3, the coefficient on the interaction term between common ownership and ATSIM. It measures the extent to which common ownership has a differential effect on a firm's price levels based on its product similarity.

Table C.2 presents the results of the panel regressions. I first test the main dependent variable, industry-adjusted gross margin, where the industry is defined using 4-digit SIC code in Panel A and FIC400 in Panel B. Columns (1)-(3) use the average product similarity aggregated over all firms (*ATSIM*) whereas columns (4)-(6) use average product similarity aggregated over the spe-

cific industry (*ATSIM-SIC* or *ATSIM-FIC*). The interaction coefficient is positive and statistically significant, i.e., the effects of common ownership are stronger when a firm has higher product similarity. Specifically, a one standard deviation increase in common ownership increases the gross margin by 3 percentage points. However, the effect is stronger for firms with similar products. Firms with product similarity one standard deviation mean have an additional 2.8 to 12.3 percentage point higher gross margin. An increase in product similarity should lower a firm's ability to charge higher margins, i.e., firms with a high level of product similarity should have lower pricing power. However, the coefficient on the interaction term suggests that the anti-competitive effects of common ownership are stronger for firms with similar products.

One possible concern is that the higher gross margin is caused by reasons other than price increases. For instance, it is possible that the unit selling price and volume were constant, but the firm reduced costs. That is, the firm improved its margin because it lowered its cost per unit due to efficiency improvements. Note first that, in a competitive market, firms should pass any cost savings to consumers. A reduction in cost without a simultaneous decrease in price, therefore, indicates pricing power and stronger anti-competitive effects of common ownership for firms with homogeneous products.

To further rule out the argument that the higher gross margin could be due to cost reductions or economies of scale and not price increases, I hand-collected data on drivers of gross margin from Item 7 in firms' annual reports (form 10-K). Item 7 is the management discussion and analysis (MD&A) section where management discusses current results, outlines future expectations, and describes the key drivers for the firm's growth or the lack of it. To capture whether firms with higher common ownership are more likely to mention price increases than other firms, I randomly selected 100 firms in fiscal year 2005. The choice of the year was random and reflects a mid-point in my sample. For these firms, I analyzed the MD&A section and tabulated whether it mentioned price increases. For instance, the following is an excerpt from Celgene Corporation's 2005 annual report: "net sales were higher in 2005, as compared to 2004, primarily due to price increases implemented as we move towards a cost of therapy pricing structure as opposed to a price per

milligram." Using a difference in means test, I find that firms with common ownership are 20% more likely to mention a selling price increase in Item 7.[16]

2.3.2 Effect on R&D expenditure

Given the results in Section 2.3.1 that the anti-competitive effects of common ownership vary depending on the product market characteristics of the firms, I test whether common owners also affect other product market competition related firm policies. Specifically, I focus on R&D expenditure because innovation (product or process) is one of the key determinants of a firm's competitiveness. I test whether common ownership affects firms incentives to engage in R&D.[17]

The relationship between competition and innovation is not linear. Aghion, Bloom, Blundell, Griffith, and Howitt (2005) find that competition and innovation has an inverted-U shape relationship. A priori it is unclear whether a firm with homogeneous products and common ownership should increase its R&D expenditure or not. A firm can innovate to improve its product design or reduce its process costs. To the extent that an increase in common ownership reduces incentives to compete, firms with similar products would have fewer incentives to differentiate their products. On the other hand, firms might increase investments in R&D to improve their processes and reduce production costs, thereby improving their margins further. Given the two competing hypothesis, with an increase in common ownership, whether firms with homogeneous products invest more or less in R&D is an empirical question. Moreover, extant literature has documented mixed effects of common ownership on R&D expenditure. He and Huang (2017) find that common ownership increases innovation, Borochin, Yang, and Zhang (2018) find that R&D expenditures vary depending on the type of common owners.

To test this, I regress industry-adjusted R&D to sales ratio on common ownership, product

[16]Due to small sample size my tests are statistically insignificant for the interaction term. I am in the process of collecting more data.

[17]I also test firms' capacity (capital expenditure ratio) and spending on product differentiation (advertising expenditure ratio). In unreported results, I find that the coefficient on the interaction term for common ownership and product similarity is insignificant for capital expenditure ratio. To the extent that capital expenditure is a noisy proxy for the firm's capacity, this is not surprising. Consistent with the hypothesis that common ownership effects are stronger for firms with similar products, I find that the interaction coefficient of common ownership and product similarity is negative for advertising expenditure ratio. However, the coefficient is not always statistically significant.

similarity, their interaction, and firm level controls. Table C.3 presents the results. While the industry-adjusted R&D ratio has a mean of zero, for a one standard deviation increase in common ownership, firms with similar products reduce their R&D spending by 0.3-0.7 percentage point. The results are consistent if I scale R&D by assets instead of sales. This result suggests that, with an increase in common ownership, firms with high product similarity choose to reduce their R&D expenditure because they have fewer incentives to differentiate their product offerings. Common ownership leads to reduced competition because the firms' internalize the externalities they impose on their rivals and aim to seek higher industry profits. In this context, for firms with similar products, differentiating their products from its peers would be contrary to the objective function.[18]

2.3.3 Effect on profitability

I have shown that the anti-competitive effects of common ownership are stronger for firms with similar products. However, does the increased gross margin and reduced R&D expenditure translates into improved profit margins? It is plausible that the higher gross margin and reduced R&D expenditure does not yield any differential effect on a firm's bottom line compared to firms with differentiated products. To test this, I estimate equation 2.1 with the EBITDA to sales ratio and net income to sales ratio as the dependent variable. Tables C.4 and C.5 presents the results for EBITDA/SALE and NI/SALE, respectively. I find that firms with similar products have, on average, 4.2 to 21.5 percentage point higher EBITDA to sales ratio with a one standard deviation increase in common ownership.

2.4 Establishing Causality

The panel regression results do not rule out endogeneity issues, especially the concern that investment in a firm is an endogenous choice. Investors choose firms based on specific characteristics, and it is plausible that the level of common ownership does not drive the results documented

[18] A firm's R&D is positively related to its value, i.e., R&D is positively related to Tobin's Q. If with an increase in common ownership firms with similar products are reducing R&D and the effect is harmful to the firm's value, I should observe negative Tobin's Q for these firms. However, in unreported results, I find that Tobin Q of firms with high product similarity is not negatively affected by an increase in common ownership, i.e., the interaction coefficient is not significant. The result suggests that the investors do not view the reduction in R&D expenditure as harmful.

so far. Instead, it could be that institutional investors selected into firms with higher gross margins and profitability. To rule out reverse causality and alleviate endogenous selection concerns, I rely on two quasi-natural experiments. The first is the M&As of financial institutions and the second is the mutual fund scandal of 2003. As explained below, these quasi-natural experiments caused changes in firms' common ownership orthogonal to their characteristics.

2.4.1 Mergers of Financial Institutions

I use mergers and acquisitions (M&As) of financial institutions as an exogenous shock to the common ownership levels of firms. Two financial institutions merge for a variety of reasons – to reduce costs and improve performance by eliminating redundancies (Houston, James, and Ryngaert (2001)), to increase market power and gain economies of scale (Berger, Demsetz, and Strahan (1999)), consolidation of the financial industry, or regulatory changes. To the extent that factors orthogonal to the product market characteristics of the portfolio firms drive M&As between financial institutions, any changes in the common ownership of the portfolio firms as a result of the merger would be exogenous to firms' characteristics.[19]

Specifically, I follow He and Huang (2017) to identify exogenous variation in a firm's common ownership levels due to M&As between financial institutions and test if this variation drives the outcome variables. In order to do this, I first identify mergers that were between two financial institutions, i.e., SIC code for acquirer and target was between 6000-6999, announced between 2001 and 2008, and were completed within one year of announcement. There were ten such acquisitions between 2001 and 2008.[20] Appendix B.1 contains the list of acquisitions. For these ten M&As, I get the portfolio holdings data for the target and acquirer using Thomson Reuters' 13-F database. I then identify firms where these institutions were either blockholders or had substantial dollar holdings (see 2.2.2 for additional details on how common owners are identified).

I classify the portfolio firms as either treated or control. Firms are treated if they were in the

[19] See He and Huang (2017) for additional discussion on how considerations other than their portfolio holdings drive M&A between two financial institutions.

[20] To create a seven-year window around mergers, I need my data to start in 1997, and therefore the earliest acquisition that I can use is that in 2001.

portfolio of either party and experienced an increase in common ownership. Firms are controls if they were in the portfolio of either party and did not experience an increase in common ownership. More precisely, in the quarter prior to the announcement date, if firm *i* is in acquirer's (target's) portfolio and the target (acquirer) holds another firm in the same industry, then firm *i* is classified as treated. Similarly, if firm *j* is in acquirer's (target's) portfolio and the target (acquirer) does not hold any firm in the same industry, then firm *j* is classified as a control firm. By choosing firms from the same set of financial institutions, this design controls for investment styles. I drop firms that were in both the acquirer and the target portfolios because these firms cannot be classified as treated or control. For instance, if firm *i* is held by both acquirer and target it cannot experience an increase in common ownership due to another firm in the same industry because it is already connected to it either via acquirer or target.

To capture the effect of M&As on common ownership, I follow He and Huang (2017) and define the dependent variable in two ways. The first measure is *CODummy* which takes the value of 1 if the firm is held by either party that also holds another firm in the same industry in the quarter prior to date of announcement for the pre-period, i.e., post = 0 and in the quarter immediately after deal completion for the post period, i.e., post = 1. The second measure is *LnNumPeers* which is natural log of one plus the number of same industry peers a firm is connected to. These variables are different from the ones used in the panel regressions because this experiment would not affect *ComOwn* and *NumMgnr*. For instance, say firm *i* is held by the acquirer and firm *j* is held by the target. Firm *i* experiences an increase in common ownership because post acquisition it is now connected to its same industry peer *j*. However, its *ComOwn* and *NumMgnr* measures does not change. The only measure that would change is *PropPeer*. Therefore, I use *LnNumPeers*. Note that I have deal x firm fixed effects. Therefore, scaling by the number of firms does not change my results. Moreover, the change in common ownership is unidirectional because a firm either experiences an increase in the number of industry peers its connected to or it does not experience any change in its common ownership levels.

Using difference-in-differences estimation, I first test whether the M&As result in changes in

common ownership levels for treated firm vis-à-vis control firms. I estimate the following equation:

$$Y_{it} = \beta_1 \text{Post} + \beta_2 \text{Treated} + \beta_3 \text{Post x Treated} + \gamma' \text{X}_{\text{t-p}} + \alpha_{ij} + \eta_t + \text{e}_{\text{ijt}} \tag{2.2}$$

where, Y_{it} is either a *CODummy* (=1 if the firm is commonly owned, 0 otherwise) or *LnNumPeers* (natural log of the number of peers connected to a firm). Treated = 1 if the firm experienced an increase in common ownership due to the M&As, 0 otherwise. Post = 1 for the years post acquisition. Following He and Huang (2017), the control variables are lagged at t-p, where p = 4 for the pre-period and p = 0 for the post-period. The coefficient of interest is β_3, which captures the differential effect of common ownership based on the product market characteristics of the firm.

Table C.6 Panel A presents the results. β_3 is statistically significant in all columns. The coefficient of 0.088 in column 1 implies that acquisitions between financial institutions increase the likelihood that a firm in the institution's portfolio is commonly held by 8.8%.

Next, I test if the effect of common ownership on gross margin varies by the product similarity for the treated firms. To test this, I estimate the following multivariate difference-in-differences specification:

$$\begin{aligned} Y_{it} = {} & \beta_1 \text{Post} + \beta_2 \text{Treated} + \beta_3 \text{ATSIM} + \beta_4 \text{Post x Treated} + \beta_5 \text{Post xATSIM} \\ & + \beta_6 \text{Treated x ATSIM} + \beta_7 \text{Post x Treated x ATSIM} + \gamma' \text{X}_{\text{t-p}} + \alpha_{ij} + \eta_t + \text{e}_{\text{ijt}} \end{aligned} \tag{2.3}$$

where $beta_7$ is the coefficient of interest, X includes all the control variables used in the panel regressions, α_{ij} are either deal x firm fixed effects or deal and firm fixed effects, and η_t are year fixed effects. The sample period is three years around the acquisition. Post = 1 during the three years post-merger, 0 during the three years pre-merger. The year of acquisition is omitted from the analysis.

Table C.6 Panel B presents the results for industry-adjusted gross margin. Compared to control firms, treated firms experience an increase of 3.1 to 8.2 percentage point. That is, with an increase in common ownership levels, treated firms have a higher gross margin than control firms. Panel C

and D reports the results for R&D to sales ratio and EBITDA to sales ratio, respectively. Consistent with panel regression results, I find that the effects of common ownership are more pronounced in firms with similar products.

2.4.2 Mutual Fund Scandal

In 2003, twenty mutual fund families were implicated in illegal trading and eventually negotiated settlement (Zitzewitz (2009)). Appendix B.2 contains the names of these mutual fund families. Kisin (2011) documents that these funds experienced significant outflows from 2004-2006. As investors withdrew money, the funds were forced to sell their positions. Anton and Polk (2014) use the ratio of total value held by these institutional investors and the total value held by all institutional investors as of September 2003 to instrument for the level of common ownership in the years following the scandal. In the spirit of their paper, I instrument *ComOwn* with *ScandalComOwn*, the ratio of percentage of shares held by common mutual funds that were affected by the scandal and the percentage of shares held by all common owners. This instrument satisfies the exclusion restriction as Anton and Polk (2014) noted that the substantial outflows from these mutual funds forced them to sell their stakes in firms independent of firm characteristics. Therefore, any change caused in the level of common ownership due to the actions of scandal mutual funds is exogenous to the firm.

I use *ScandalComOwn* to instrument for *ComOwn* and use two-stage least squares (2SLS) regression analysis to estimate the effect of common ownership and product similarity on the firm's gross margin, R&D to sales ratio, EBITDA to sales ratio, and net income to sales ratio. The sample period is 2004-2006, i.e., the sample is limited to the years the affected funds experienced significant outflows. *ScandalComOwn* is calculated at the end of September 2003 and is used to instrument *ComOwn* from 2004-2006. Because my coefficient of interest is the interaction of common ownership (ComOwn) and product similarity (ATSIM), I run two first stage regressions – one for common ownership and the other for common ownership interacted with similarity score (Wooldridge (2010)). The regression includes all the control variables used in the panel estimation and year fixed effect. Since the instrument is invariable for a given firm, I cannot use firm fixed

effects in 2SLS estimation.

Table C.7 reports the results. Panel A presents the first stage regressions for *ComOwn* and *ComOwn x ATSIM* and the second stage results for the effect of common ownership and product similarity on gross margin. The instrument satisfies the relevance criteria – the coefficient on the instrument is significant. Specifically, in Table C.7 Panel A (columns 1 and 2), Sanderson-Windmeijer F-statistic for weak identification (Sanderson and Windmeijer (2016)) is 85 and 47 for the two first-stage regressions, respectively. Moreover, the Kleibergen-Paap F-statistic (Kleibergen and Paap (2006)) is 46.27 indicating that the instrument is not weak. The coefficient on *Scandal-ComOwn* in the first stage is negative, i.e., the outflow caused common ownership at the firms to decrease. Consistent with the panel regression results, I find that with one standard deviation increase in common ownership, firms with similar products have higher gross margin.

Panel B presents the results for R&D to sales ratio, EBITDA to sales ratio and net income to sales ratio. With a one standard deviation increase in common ownership, firms with homogeneous products have 2.2 to 4 percentage points lower R&D expenditure. Similarly, firms with similar products have higher profit margins with a one standard deviation increase in common ownership. That is, the effects of common ownership is stronger for firms with similar products than firms with differentiated products.

2.5 Does common ownership affect certain industries more?

The results thus far show that the effects of common ownership vary based on the product market characteristics of the firm. This finding raises the question whether the effects of common ownership are present across all industries or does common ownership affect some industries more than others? To test whether the anti-competitive effects of common ownership are concentrated in certain industries, I do the following. Each year I assign a similarity score equal to the average similarity scores of all the firms in that industry-year to the industry, and then sort the data into

similarity quartiles.[21] I estimate the following regression specification:

$$\begin{aligned} \mathrm{Y_{it}} = \beta_1 \mathrm{COSimilarityQuartile_{i1,t-1}} + \beta_2 \mathrm{COSimilarityQuartile_{i2,t-1}} \\ + \beta_3 \mathrm{COSimilarityQuartile_{i3,t-1}} + \beta_4 \mathrm{COSimilarityQuartile_{i4,t-1}} \\ + \delta \mathrm{TSIM_{it-1}} + \gamma' \mathrm{X_{it-1}} + \alpha_i + \eta_t + \mathrm{e_{it}} \end{aligned} \tag{2.4}$$

where, Y is alternatively measured as gross margin, R&D to sales ratio, EBITDA to sales ratio, and net income to sales ratio. All dependent variables are industry-adjusted, where industry is defined either using 4-digit SIC code or FIC400 code. *CO Similarity* $Quartile_{ij}$ measures firm-level common ownership for firm *i* in quartile *j* and is 0 otherwise, ATSIM controls for the similarity score of the firm, X includes all other firm-level control variables used in the panel regressions (see: appendix A.1 for variable definitions), α_i are firm fixed effects, and η_t are year fixed effects. As before, to make it easier to interpret the coefficients, common ownership measures are standardized (with mean zero and variance one) in the tables. The coefficients of interest are β_1, β_2, β_3, and β_4. For each industry quartile *j*, β_j captures the effect of common ownership on the industry-adjusted dependent variable.

As an example of how common ownership can matter in certain industries and not in others, consider the following. Dana Inc and Tenneco Inc both belong to SIC code 3714 (motor vehicle parts and accessories). In the second quarter of 2011, out of the top 10 institutional investors in these firms, four investors (Blackrock, Fidelity, State Street, and Vanguard) held shares in both the firms: 16.5% in Dana and 23.5% in Tenneco. However, the product similarity of these two firms is low. May be not surprisingly, this industry belongs to the lowest quartile, i.e., firms in it have the least similar products. In contrast, Microsoft and Oracle belong to SIC code 7372, which falls in the highest quartile of product similarity. In quarter two of 2011, these firms had seven common owners (Amvescap, Blackrock, Capital Research Global Investors, Capital World Investors, Mellon Bank, State Street, and Vanguard) out of top ten investors and they held 18.7% and 16.9% shares in Microsoft and Oracle, respectively. In recent years, Oracle seems to have been competing

[21] The results are similar if I use the median product similarity score instead of the mean.

more with Amazon's Web Services than with Microsoft, one of its main competitors.[22] In fact, in 2013, Oracle entered into a partnership with Microsoft.[23] Should the presence of common owners have similar effects on both of these firm pairs or should the effect be stronger for the latter pair of firms? I hypothesize that the presence of common owners should have a stronger effect on the latter pair of firms.

Table C.8 presents the results. Similarity quartile *j* is equal to *ComOwn* in columns 1 and 4, *peerProp* in columns 2 and 5, and *NumMgnr* in columns 3 and 6. For each firm, the variable takes the value of the common ownership measure if the firm belongs to an industry in the jth similarity quartile, else it is equal to 0. To conserve space, I do not report the coefficients on the control variables. Panel A presents the results for industry-adjusted gross margin. The results show that the pricing effects of common ownership are concentrated in firms that belong to industries in the 4th similarity quartile, i.e., the effects are concentrated in industries that have high similarity scores. For firms in industries with high similarity scores, a one standard deviation increase in common ownership increases the price levels by 1.2 to 3.7 percentage points whereas the effect is largely insignificant for other similarity quartiles. The difference in the coefficient for the highest similarity quartile and the lowest similarity quartile is statistically significant at 1%.

Table C.8 Panel B presents the results for R&D to sales ratio. The results are qualitatively similar if I scale R&D by assets instead. The effects of common ownership are limited to firms belonging to industries where the average similarity scores are high. With one standard deviation increase in common ownership, firms that belong to industries with highest level of similarity score have 0.7-1.6 percentage point lower R&D expenditure. Increase in common ownership does not have similar effect for firms in other industries. The statistical significance of the coefficients for quartiles 2 and 3 vary depending on the measure of common ownership and industry. Finally, Panel C and D of Table C.8 report the results for EBITDA to sales ratio and net income to sales ratio, respectively. Except the highest quartile, common ownership does not seem to have a robust effect on firms' profitability.

[22] http://www.businessinsider.com/microsoft-is-oracle-real-competitor-not-amazon-2017-10
[23] http://www.oracle.com/us/corporate/press/1964592

The OLS results do not rule out the concern that investors are choosing these firms because they are profitable. To rule out this concern, I repeat the analysis for firms that experienced an exogenous change in their common ownership levels due to mergers and acquisitions (M&A) of financial institutions. The experiment is identical to the setup outlined in 2.4.1.[24] Table C.9 presents the results. Industry is defined using 4-digit SIC in Panel A and FIC400 code in Panel B. The coefficients on the triple interaction terms capture how the effect of common ownership vary between treated and control firms post treatment across firms that belong to industries in different similarity quartiles. $SimQuartileDummy_{ij}$ is equal to 1 for firm *i* that is in industry quartile *j*, zero otherwise. *Treated* = 1 if the firm experienced an increase in common ownership due to the merger, 0 otherwise. *Post* = 1 for the post-acquisition period, 0 otherwise. The lowest quartile is the baseline and hence, omitted. While the results are similar (and sometimes stronger) with deal and firm fixed effect, I only report the most stringent specification where I include deal x firm fixed effects. Similar to the OLS regressions, the effect of common ownership is present only in industries with a high similarity score (quartile 4).

Taken together, the results in tables C.8 and C.9 show that the anti-competitive effects of common ownership are limited to industries with homogeneous products. This result has policy implications – if the level of common ownership does not matter for firms that are in certain industries, then any policy changes to curtail the harmful effect of common ownership must take into account the product market characteristics of the firms.

2.6 Robustness Tests

I perform several additional tests. I use GDP price index as a proxy for price levels and test if the pricing effects of common ownership vary based on the product similarity. I also rule out the possibility that my results are driven by transient or short term investors.

[24]The 2SLS estimation results in weak instrument problem. Since weak instrument can exacerbate the bias in the estimated coefficients, I only present the results from the M&A quasi-natural experiment here.

2.6.1 Evidence of price increase

To further test if the pricing effects of common ownership vary based on the product market characteristics, I use the price index for manufacturing and non-manufacturing industries used in Bureau of Economic Analysis (BEA)'s national income and product accounts (NIPA). BEA produces the chain-weighted GDP price index to measure changes in the price paid for goods and services.[25] The data captures year-on-year changes in prices at an industry level. Because my analysis is at a firm level, I merge the industry data to all the firms in a given industry. Given that my dependent variable does not change across firms in an industry, I cluster my standard errors by industry. I acknowledge that the mapping of industry-level variable to firm-level observation is not ideal as it could result in noisy estimates. However, noisy estimates would increase standard errors and would bias against finding any results.

While I get qualitatively similar results using OLS, I report the results for the quasi-natural experiment where two financial institutions merge. Table C.10 reports the result. The dependent variable is the natural log of the price index. The coefficient of interest is the coefficient on the triple interaction term Treated x Post x Similarity Quartile j. Again, for each industry quartile j, β_j captures the effect of common ownership on the industry-adjusted dependent variable. Akin to gross margin results, the pricing effects of common ownership are limited to firms in industries with the highest similarity quartile. For firms belonging to industries in the highest similarity quartile, an exogenous increase in common ownership leads to 7.2%–8.5% price increase. This result reiterates that the pricing effects of common ownership are contingent on the product market features.

2.6.2 Which investors are driving the results?

The results documented so far do not differentiate between the types of investors. The incentives of institutional investors vary depending on their investment horizon (see: Chen, Harford, and Li (2007) and the references therein). If firms are internalizing the externalities they impose

[25]The data is available here: https://www.bea.gov/industry/

on their industry peers, their incentives should be driven by long term investors. The presence of short-term investors or transient investors should not drive the results. To test this, I follow Bushee (1998) and Bushee (2001) and classify investors into three categories based on their portfolio turnover – dedicated, quasi-indexers, and transient.[26] Dedicated investors and quasi-indexers are long-term investors with the difference that the latter is diversified. Transient investors are short-term investors.[27]

Since common owners are expected to hold multiple firms in the same industry, I re-run my analysis using dedicated and quasi-indexers that are common owners as defined in Section 2.2.2. Specifically, I repeat the analysis using the setup outlined in Section 2.5 and equation 2.4. While the results are consistent across different measures of common ownership, to conserve space, I report results for *ComOwn*. Moreover, limiting the sample to mutual fund families that were either dedicated or quasi-indexer investors reduces the number of firms affected by the exogenous shock considerably. As a result, the exogenous tests do not have enough statistical power and therefore, I only report the OLS regression results.

Table C.11 reports the results. The effects are similar to those reported in the main results. The anti-competitive effects of common ownership are insignificant for firms in the lower quartile of product similarity. However, firms in the highest quartile of product similarity have 1.7 to 2.3 percentage points higher gross margin when the common ownership increases by one standard deviation. Moreover, firms in the highest quartile of prodcut similarity have lower R&D to sales ratio, higher EBITDA to sales ratio, and higher net income to sales ratio. The results in this section provides support to the hypothesis that the results are driven by long-term investors and not transient or other institutions.

2.7 Conclusion

I find that the anti-competitive effects of common ownership vary based on the product market characteristics of the firm. A one standard deviation increase in common ownership raises a firm's

[26]The data is available at http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html

[27]Some mutual fund families can mimic behavior of all three. Such mutual funds are unclassified and excluded from the analysis.

gross margin by an average of three percentage points, but the effect is three times larger for firms with product market similarity that is one standard deviation above mean. With an increase in common ownership, the firms with homogeneous products choose to invest less in R&D consistent with the hypothesis that they have fewer incentives to innovate. These firms experience higher profitability. I use two quasi-natural experiments to exogenously vary a firm's common ownership levels and establish causality. Further, I find that the anti-competitive effects of common ownership are present only in industries with similar products. The positive relation between common ownership and gross margin holds only for the industries in the top quartile of product similarity. The findings in this paper inform the debate on common ownership by showing that common ownership worsens competition only when firms operate in relatively similar product spaces.

3. COMPETING AGAINST OVERCONFIDENT CEOS

3.1 Introduction

The role of managerial traits, in particular overconfidence, in determining corporate policies and performance has been widely studied in finance.[1] Many prior studies find evidence that overconfident CEOs make suboptimal decisions about corporate polices, such as financing, investments, and financial reporting. For instance, overconfident CEOs exhibit heightened investment-cash flow sensitivity (Malmendier and Tate (2005)), engage in value-destroying acquisitions (Malmendier and Tate (2008)), and use external finance sub-optimally (Malmendier, Tate, and Yan (2011)). Overconfident CEOs are also associated with poorer quality financial reporting, corporate fraud, and litigation (e.g., Schrand and Zechman (2012); Banerjee, Humphery-Jenner, Nanda, and Tham (2018)). Bank CEO overconfidence predicts weaker lending standards and excess leverage, resulting in greater loan defaults and worse performance (Ho, Huang, Lin, and Yen (2016)).

Despite the potential negative effects of overconfidence, many companies employ CEOs who exhibit overconfidence. A small, but growing number of studies attempt to explain this phenomenon. Hirshleifer, Low, and Teoh (2012) and Galasso and Simcoe (2011) find that firms with overconfident CEOs are better innovators. The benefit of such CEOs, however, seems to be limited to industries in which patents are critical for value creation (Hirshleifer, Low, and Teoh (2012)). Phua, Tham, and Wei (2018) find that overconfident CEOs are better leaders as evidenced by stronger commitments by suppliers and employees. Another explanation is that overconfident CEOs are matched with growth firms through the selection process (Graham, Harvey, and Puri (2013)). Goel and Thakor (2008) and Campbell, Gallmeyer, Johnson, Rutherford, and Stanley

[1] Many researchers in finance use the terms overconfidence and overoptimism interchangeably. Others differentiate between the two by using overoptimism to refer to overestimation of a distribution's mean, and overconfidence to refer to underestimation of its variance. The empirical measure that we employ is from Malmendier and Tate (2005) and Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011), and was developed to capture biased expectations about the mean return on a firm's stock or investments. It should also capture biased estimates of the means of firm inputs like managerial ability, a firm's ability to compete, the payoffs to aggressive strategies, etc. because these are positively related to stock returns. We use the term overconfidence throughout the paper to indicate such effects.

(2011) develop theoretical models in which an overconfidence bias[2] offsets a CEO's risk aversion, thereby leading to investment choices closer to those preferred by well-diversified shareholders. Both models feature an interior optimum level of bias. Consistent with the proposition that some bias is beneficial, Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011) find empirically that moderately overconfident CEOs are significantly less likely to face forced turnovers than are CEOs with very low or very high levels of confidence bias.

We contribute to this literature by examining another potential benefit of CEO overconfidence. We hypothesize and test whether overconfident CEOs respond differently and perform better in the face of increased competition. We build on prior studies from the economics literature that find that overconfident agents tend to be more competitive. Camerer and Lovallo (1999)'s experiments show that people's overconfidence about their skills explains entry into competitive games. Niederle and Vesterlund (2007) find that differences in overconfidence explain why men are more likely to embrace competition than women are. This behavior is consistent with Reuben, Wiswall, and Zafar (2017)'s finding that overconfident agents (proxied as male) choose more competitive compensation schemes, and that overconfidence and competitiveness are associated with higher expectations of future earnings. Just, Cao, and Zilberman (2009) show that overconfident, risk-averse players can dominate rational, risk-averse players in a competitive market because they invest and produce more.

Our identification strategy relies on exogenous shocks to firms' competitive environments caused by large cuts in import tariffs. Over the last three decades, the U.S. manufacturing sector experienced increased competition from foreign companies due to the removal or reduction of tariff-related trade barriers. Increased import competition led to significant decreases in the market shares and profit margins of U.S. companies (see e.g., Tybout (2003); Xu (2012)). Numerous studies also document effects of increased import competition on innovation and product quality (see, e.g., Aghion, Bloom, Blundell, Griffith, and Howitt (2005); Amiti and Khandelwal (2013); Bloom, Draca, and Van Reenen (2016)). The staggered nature of tariff cuts, which vary substantially in

[2]Goel and Thakor (2008) model bias about the variance and Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011) model bias about the mean.

magnitude, time, and industry, offers an ideal setting to test how different types of CEOs respond to competitive shocks.

We expect that overconfident CEOs, due to their competitiveness, take more aggressive actions in response to increased competition. Specifically, we hypothesize that overconfident CEOs respond to tariff cuts with more aggressive price cuts. We also hypothesize that overconfident CEOs invest more in research and development (R&D), which can increase product differentiation and/or reduce production costs, both of which can improve competitiveness. Similarly, we hypothesize that overconfident CEOs invest more in advertising to highlight the advantages of their products over that of the competitors and potentially build loyalty that protects market share. We note that it is far from obvious that overconfident CEOs will react to increases in competition in these ways. Indeed, a clear competing hypothesis is that overconfident CEOs overestimate their firms' abilities to compete in their current state, i.e., overconfident CEOs believe that their firms are already sufficiently strong and require no material changes to face increased competition.

Regardless of how overconfident CEOs react to increased competition, there are also competing hypotheses about the expected outcomes. On the one hand, an overconfident CEO who slashes prices and increases R&D and advertising may ultimately destroy firm value if their actions are too aggressive. If overconfident CEOs take no actions because they overestimate their firms' competitiveness in the current state, then such inaction should also lead to reduced firm value. On the other hand, aggressive actions may enable an overconfident CEO's firm to gain or retain market share and ultimately preserve or increase firm value. We test our predictions using a triple-difference specification on matched samples of firms affected (treated) and not affected (control) by tariff shocks and led by overconfident and rational CEOs. The triple-difference specification models the net effect of the following differences: 1) before and after tariff shocks, 2) between overconfident and rational CEOs, and 3) between tariff-shocked and non-shocked firms. Differences in the actions and outcomes across overconfident and rational CEOs may capture the differences in their response to the tariff shocks, but this difference could simply reflect any 'normal' difference, unrelated to competition, between these two types of CEOs. In the triple-difference specification,

the non-tariff-shocked firms' responses capture the differences between overconfident and rational CEOs unrelated to competitive shocks, which are then netted out.

We find that overconfident CEOs do respond differently to increased competition. First, overconfident CEOs respond to large tariff cuts by immediately slashing their operating profit margin and gross profit margins. The triple-difference estimate of the treatment effect on operating profit margin is -30 percentage points for the (-1,+1) year window around the tariff shock year, which is omitted. This effect for gross margin is -17 percentage points. Overconfident CEOs continue to exhibit significantly lower operating and gross profit margins when we widen the test window to the years (-4,+4).[3] Reduced margins reflect lower pricing relative to costs. Second, overconfident CEOs immediately increase investments in R&D. The triple difference estimate of the treatment effect on R&D-to-sales ratio is +7 percentage points for the (-1,+1) window around the tariff shock years. Unlike the margins, the increase in R&D loses statistical significance when we widen the event window to (-3, +3), which implies that overconfident CEOs increase R&D only immediately after the tariff reductions. Third, overconfident CEOs also increase advertising expenditures, but the increase comes later. The increase in advertising expense is statistically significant starting with the event window (-3,+3) around the tariff shock years.

Overall, our results strongly reject the proposition that overconfident CEOs are passive in the face of increased competition because they overestimate their firms' ability to compete in their current state. Instead, the results show that overconfident CEOs respond to increased competition quickly and aggressively, which is consistent with the economics literature that links overconfidence with competitiveness. Further tests show that our results do not merely reflect a general tendency of overconfident CEOs to overinvest. For instance, we do not observe significant increases in capital expenditures or acquisitions by overconfident CEOs following the tariff shocks. Investments in R&D are often aimed at reducing costs or increasing product differentiation. Advertising is often aimed at highlighting differentiated aspects of products. Thus, our evidence of

[3]As an alternative, we repeat our analysis using test windows that begin with the most recent pre-shock year (e.g., (-1, +2), (-1, +3), etc.). This minimizes the potential influence of unrelated changes that may have occurred in the sample firms during the pre-shock period, but decreases the number of observations used in each analysis. In untabulated analyses, we observe similar results to those presented using symmetric test windows.

immediate increases in R&D and subsequent increases in advertising is consistent with strategic responses to increased competition.

We next turn to the ultimate outcomes of the actions overconfident CEOs take. We find that firms led by overconfident CEOs gain significant market share after the tariff shocks. These gains show up quickly, with treatment effects of +19% for the (-1,+1) year window and +34% for the (-4,+4) window, as a percentage of their pre-shock market share. Given our findings that overconfident CEOs slash margins and increase R&D and advertising expenses, it is easy to envision these CEOs gaining market share but sacrificing firm value. However, we find this is not the case. Firms led by overconfident CEOs exhibit increased firm value as measured by Tobin's Q. The triple difference estimate of the treatment effect on Tobin's Q is +.354 for the (-1,+1) year window, and it remains positive and statistically significant through the (-3,+3) window. The estimate of the treatment effect on value remains large in magnitude (0.225) up to the (-4,+4) window, but its p-value rises to 0.106. Therefore, it appears that investors positively value the responses of overconfident CEOs to increased competition.

Our identification strategy and triple-difference specification on matched samples helps ensure that the results are not driven by pre-tariff shock differences between firms led by overconfident and rational CEOs. They are also unlikely to reflect 'normal' differences between such CEOs even in industries that do not face tariff shocks. Because we also match by CEO-type, the triple difference approach should also help to ensure that differences across firms that lead them to hire overconfident versus rational CEOs do not drive the results. Our conclusions would be invalid if (i) the treated firms with overconfident CEOs would have responded to the increased competition similarly and achieved the same outcomes that we document (relative to the treated firms with rational CEOs) even with rational CEOs in place, and (ii) if the same variable(s) lead firms both to choose overconfident CEOs and to fight competition aggressively with positive outcomes, but only in treatment firms, not in control firms. It is difficult to envision what would drive these conditions in (i) and (ii) to be jointly true, particularly given the potential downsides of overconfident CEOs found in prior studies.

Moreover, we conduct a battery of placebo tests to check if our results are driven by normal differences across firms in the absence of a competition shock or by artifacts of our research design. In one such test, we reassign actual tariff shocks to the treated firms but in non-tariff reduction years. In another test, we hold the actual tariff shock years constant, but randomly reassign the shocks across manufacturing firms that did not ultimately experience a tariff shock during the same year. Finally, we repeat the second placebo test, but randomly reassign the tariff shocks across non-manufacturing industries. In each case, we repeat our triple-difference analyses using each sample of placebo tariff shocks. If our results are an artifact of our research design, are caused by unobserved differences among the firms that hire overconfident and rational CEOs or by differences in the actions of overconfident and rational CEOs under normal conditions, we would expect to find similar results under these placebo tests. However, we find no significant impact of CEO overconfidence across these placebo tests.

We cannot rule out the possibility that some firms deliberately choose overconfident CEOs to exploit states of the world in which competition increases. However, we emphasize that even with an endogenous selection of overconfident CEOs, the exogenous nature of the tariff shocks still permits us to test differences in how overconfident CEOs versus rational CEOs behave in the face of increased competition. Malmendier and Tate (2005) make a similar point that endogenous CEO-firm matching does not alter their main conclusions about overconfidence and investment. Endogenous matching would be problematic if the research design required random or quasi-random assignments of CEO confidence types. Our research design takes the CEO types as given, and then studies how they react to exogenous shocks that increase competition.

Our study contributes to two main strands of literature. First, it joins a growing body of work that explores potential benefits of overconfident CEOs (Galasso and Simcoe (2011); Hirshleifer, Low, and Teoh (2012); Phua, Tham, and Wei (2018)). Given that we compare reactions and outcomes for overconfident and rational CEOs in a setting where competition increases, our results imply a somewhat unusual interpretation of the effect of overconfidence. By definition, an overconfident CEO overestimates the mean of an important firm input (e.g., ability) or output (e.g.,

return or value), and thus should turn out to be incorrect when compared to the realized value. Prior studies that examine investment, acquisitions, and other policy choices confirm that the bias of overconfident CEOs can lead to inferior decisions and outcomes. In a competitive setting, however, the means of the outcome variables are endogenous in the industry and depend directly on the actions taken by the competitors. Our results show that, compared to rational CEOs, overconfident CEOs respond to increased competition quickly and aggressively, and that such actions ultimately lead to increased firm value relative to the firms led by rational CEOs. In this sense, these CEOs' biases turn out to be beneficial because they 'win' the competitive contest (relative to rational CEOs) and thereby positively influence the realized outcomes even though they may have incorrectly estimated them. The combination of our results with the economics literature linking overconfidence and competition suggests that the value of CEO overconfidence can depend critically on the level of competition a firm faces.

Second, we contribute to the literature on the effects of import competition. Most prior studies on the effect of import competition examine the aggregate response of firms, or the heterogeneity of such responses based on firm-characteristics (e.g. Valta (2012); Xu (2012); Frésard and Valta (2015)). Our study shows that it is also important to examine heterogeneity in managerial characteristics. In other words, a firm's competitive advantage or disadvantage with respect to import competition may depend not only on what the firm does or has, but also on who manages the firm.

3.2 Hypotheses

As described in the introduction, a number of studies in the economics literature establish that overconfident agents tend to be more competitive. Starting from that premise, we formulate hypotheses about how overconfident CEOs react to increases in competition, and how their firms fare given those actions. Our identification strategy relies on exogenous reductions in tariffs as shocks to the competition that firms face, so we discuss our hypotheses in the context of tariff reductions.

Tariff reductions make the prices of goods from foreign firms lower. When we couple the tariff reductions with the fact that foreign firms often have production cost advantages over do-

mestic firms, it is clear that domestic firms likely face increased price competition from foreign firms following tariff reductions. Tybout (2003) and Xu (2012) find evidence consistent with this proposition.

We begin by formulating hypotheses about how overconfident CEOs respond on the pricing dimension. Ideally, we would observe and examine product prices, but there are no large-scale data or other sources that contain information on firms' product prices. Thus, we formulate our hypotheses in terms of firms' gross and operating profit margins. The gross profit margin reflects decisions about the prices a firm sets over the cost of production. The operating profit margin reflects decisions about the prices a firm sets over the costs of production, selling, and general administration. Conditional on costs, more aggressive pricing will lead to lower operating and gross profit margins. Thus, we hypothesize that overconfident CEOs, who are likely more competitive according to prior studies in the economic literature, respond to increased competition with more aggressive price reductions as evidenced by reduced gross and operating profit margins compared to those for firms led by rational CEOs.

A clear competing hypothesis to the margin reduction one is that overconfident CEOs overestimate the strength of their firms' current ability to meet increased competition without any changes to their firms, and thereby remain relatively passive in the face of increased competition. For example, an overconfident CEO may overestimate the loyalty of his firm's customers or their perceived value of his firm's products, and conclude that price reductions are unnecessary. Under this competing hypothesis, we would expect to observe that overconfident CEOs do not change (or might even increase relatively) their gross and operating profit margins so that their firms' post-tariff shock margins end up being greater than those of firms led by rational CEOs.

Product differentiation and cost advantages are other ways that firms can respond to new competitive threats. Firms often use investments in research and development to attempt to differentiate their products and/or to lower production costs. Increasing R&D for either of these reasons could be an effective response to increased competition. Thus, we hypothesize that after the tariff shock, overconfident CEOs increase R&D spending more aggressively than rational CEOs do. As with

the margin reduction hypothesis, the competing hypothesis is that overconfident CEOs overestimate the attractiveness or cost advantages of their existing products, and thus remain relatively passive when competition increases. In this case, firms led by overconfident CEOs should exhibit lower (or unchanged) post-tariff shock R&D spending than firms led by rational CEOs.

Firms can use advertising to attempt to increase demand generically for commodity-type products, but they can also use advertising to highlight differences between their products and those of competitors and/or to build brand loyalty. Highlighting differentiated product features and building loyalty should be effective responses to increased competition. We hypothesize that overconfident CEOs increase post-tariff shock advertising more aggressively than rational CEOs do. Similar to the case for R&D, a competing hypothesis is that overconfident CEOs remain relatively passive in the face of increased competition because they overestimate consumers' knowledge of their products and/or overestimate consumers' brand loyalty to them. Under this hypothesis, firms led by overconfident CEOs should exhibit lower (or the same) post-tariff shock advertising spending than firms led by rational CEOs.

The hypotheses above are about actions that CEOs take in response to increased competition. We next formulate hypotheses about the outcomes of the actions, specifically market share and firm value. As before, there are also competing hypotheses about the expected outcomes. We would expect that an overconfident CEO who reduces profit margins and increases R&D and advertising would ultimately gain market share. Thus, we hypothesize that firms led by overconfident CEOs gain more market share than firms led by rational CEOs. The competing hypothesis is that firms led by overconfident CEOs lose market share relative to firms with rational CEOs because the overconfident CEOs overestimate their firms' current ability to compete and thus are passive in response to increased competition; in contrast, firms led by the rational CEOs actively reduce pricing and invest in R&D and advertising so that they can maintain or increase market share.

Finally, we consider how firm value is affected when firms with overconfident versus rational CEOs face competitive shocks. Aggressive price reductions and investments in advertising and R&D by an overconfident CEO could end up increasing firm value in a competitive process. Thus,

we hypothesize that firms led by overconfident CEOs exhibit value increases above that of firms led by rational CEOs after the tariff shocks. For a competing hypothesis, we note that a firm could easily gain market share relative to its rivals by pricing its products too low and over-investing in advertising and R&D but destroy firm value in the process. If CEOs' overconfidence causes them to be too passive in response to increased competition, we should also observe lower firm values after the tariff shocks compared to firms led by rational CEOs.

3.3 Data and Empirical Design

To test the implications of CEO overconfidence on firm actions and outcomes under increased competition, the ideal experiment would be to randomly assign CEOs to similar firms experiencing a competitive shock (hereafter, referred to as treated firms) and observe changes in such firms' behaviors post shock. Random assignment of CEOs, however, is clearly not plausible. Indeed, it seems plausible that some firms may purposely select overconfident CEOs. Thus, we recognize that there can be endogenous matching between CEOs and firms, and then test for differences in the reactions by rational versus overconfident CEOs when competition increases exogenously.

We use tariff reductions as exogenous shocks that increase competition. We study two groups of firms – matched on firm and CEO characteristics – one of which is subject to tariff shocks, the other is not. We explain our measures and empirical specifications as follows.

3.3.1 Tariff Shocks

In the last few decades, the United States has increased global trade flows by reducing trade barriers, specifically, import tariffs. Such tariff reductions have made imports from foreign firms cheaper in the United States and made domestic firms more vulnerable to competition. For example, domestic firms have lost market share and reduced profit margins (see Tybout (2003), and the references therein). We use substantial tariff reductions as exogenous changes in the levels of competition within an industry.[4]

We follow Frésard (2010), Valta (2012), and Frésard and Valta (2015) to calculate annual tariffs

[4]Several other papers have used tariff changes as a shock to competition e.g. Xu (2012), Lileeva and Trefler (2010) among others

for manufacturing industries (SIC 2000 to 3999) from 1972 to 2005. We then use import data from Peter Schott's website to extend the sample through 2012 following Feenstra (1996), Feenstra, Romalis, and Schott (2002), and Schott (2010).[5] Import tariff is defined as the ratio of the total duties collected to the total value of imports for a given industry. Our overconfidence measures from ExecuComp are available only after 1992. However, we collect the full time series of tariff changes so that we can define economically large tariff reductions in relation to the full time series of tariff changes. To balance the need for economically substantial tariff cuts against sample size concerns created by the need for additional variables in our analysis (e.g., overconfidence measures), we focus on the tariff cuts that are at least 3.5 times larger than the median cut from 1990 to 2012. We ignore tariff changes in 1988-89 because there was a change in the import codes in 1989.[6] To ensure that we capture permanent tariff reductions only, we discard tariff cuts that were followed by equivalently large tariff increases in the two years following the initial cut. From this process, we identify 47 unique industries that experienced at least one substantial cut for our sample period between 1992 and 2012. Figure E.1 gives the distribution of cuts for the industry-years in our sample.

3.3.2 CEO Overconfidence

We follow Malmendier and Tate (2005) and Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011) to identify overconfident CEOs based on Execucomp data. The classification measure, based on option holdings, is obtainable for a large sample of CEOs over a long period, and has been validated using media-based measures by several other studies. We classify a CEO as overconfident if he or she holds vested options that are at least 67% in the money.[7] Specifically, for each CEO, we first calculate the realizable value per option as the ratio of the total realizable value of the exercisable options and the number of exercisable options. We then calculate the moneyness

[5]We thank Laurent Frésard and Philip Valta for making the tariff data from 1972-2005 public (`https://terpconnect.umd.edu/~lfresard/`). We also thank Peter Schott for making data available at `http://faculty.som.yale.edu/peterschott/sub_international.htm`.

[6]For more details, refer to the Internet Appendix of Frésard (2010).

[7]The 67% threshold was calculated by Malmendier and Tate (2005) using proprietary data and calibrating the model by Hall and Murphy (2002). Following Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011), we take the 67% threshold as given.

of vested but unexercised options by subtracting the realizable value per option from the end of year stock price to estimate an exercise price. We identify the years in which CEOs hold vested options that are at least 67% in the money. We classify CEOs as overconfident if they exhibit such behavior at least twice during their tenure, starting from the first time they display such behavior. The rest of the CEOs are classified as rational although we recognize that some of these CEOs could actually suffer from a pessimism bias.

Many prior studies of CEO overconfidence employ media-based measures in addition to the option holding-based measure that we use. Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011) conduct tests to validate the option-based measure, one of which validates it against a media-based measure. In Malmendier and Tate (2008), Malmendier, Tate, and Yan (2011), Galasso and Simcoe (2011), Hirshleifer, Low, and Teoh (2012), Banerjee, Humphery-Jenner, and Nanda (2015), and Banerjee, Humphery-Jenner, Nanda, and Tham (2018), media-based measures and the option holding-based measures yield similar results. As we discuss below, our sample criteria yield us 168 treated firms. We do not employ a media-based measure in our analyses because media-based measures used in prior studies almost uniformly result in much smaller samples, they represent noisier measures of overconfidence (Malmendier and Tate (2008)), and in prior studies yield results generally similar to those obtained by option-based measures.

3.3.3 Empirical Specification

Our triple difference specification compares pre-to-post differences in matched treated and untreated overconfident CEOs to the differences in matched treated and untreated rational CEOs. Treated firms are those in the manufacturing industries that face tariff reductions. Untreated firms are chosen from manufacturing industries (SIC codes 2000-3999) that are not shocked by tariff reductions in the relevant time windows that we study. We match on several important firm and CEO characteristics. Matching on firm characteristics allows us to compare firms that are similar to each other before the shock and differ only in tariff shock. Matching on CEOs' overconfidence levels and incentives allows us to ensure that we compare firms that hire and incentivize CEOs in a similar manner.

Specifically, for each treated firm we find a control firm based on minimizing the Mahanalobis distance in terms of firm and CEO characteristics. The Mahanalobis distance between two firms *j* and *k* is given by $\sqrt{((x_j - x_k)' W_x^{-1} (x_j - x_k))}$ where, *x* is a vector of covariates and *W* is the variance-covariance matrix of the covariates. Following Almeida, Campello, Laranjeira, and Weisbenner (2012) and Frésard and Valta (2015), we match on firm size (log of assets), leverage ratio (ratio of long term debt to total assets), growth opportunities (log of market to book assets), cash flow ratio (cash flow to total assets), and cash-to-asset ratio. We also match on the log of CEO delta and the log of CEO vega, which we calculate following Core and Guay (2002), Coles, Daniel, and Naveen (2006), and Coles, Daniel, and Naveen (2013). We exact match by the year and the CEO's overconfidence indicator (rational vs. overconfident). A tariff reduction is an industry-level event, so it precludes exact matching on the industry. We choose matching firms with replacement based on one year lagged covariates. Matching with replacement ensures the closest possible matches.

We use the matched sample to estimate the following triple difference-in-differences regression specification:

$$y_{it} = \beta_1\, post + \beta_2\, treated + \beta_3\, optimism + \beta_4\, post * treated + \beta_5\, treated * optimism + \beta_6\, post * optimism + \beta_7\, post * treated * optimism + \beta_8' X_{i,t-1} + \eta_t + \gamma_j + e_{it} \quad (3.1)$$

where *t* is the time index and *i* is the firm index, η_t are year fixed effects, and γ_j are industry fixed effects. The dependent variable is the firm action or outcome variable of interest. We study several dependent variables in line with our hypotheses. The action variables include gross and operating profit margins, advertising expense to sales ratio, and research and development (R&D) expense to sales ratio. We set advertising and R&D equal to zero when they are missing, and include dummy variables indicating these missing observations. The outcome variables of interest include market share, defined as the natural log of the ratio of firm sales and industry sales, and firm value as measured by Tobin's Q. Post equals 1 for the years after and 0 for the years before the

tariff shock. Treated is a dummy that identifies firms experiencing a tariff shock (treated = 1) and their matched control firm (treated = 0). Overconfidence equals 1 if the CEO is overconfident and 0 otherwise. X is a vector of control variables. We control for all covariates used in the matching process. We also include idiosyncratic volatility and dummy variables for the firm-years with CEO-Chair duality and CEO turnovers. We winsorize all continuous variables at the 1st and 99th percentiles. Tobin's Q has a more highly skewed distribution, so we winsorize it at the 5th and 95th percentiles. Appendix D.1 contains the definitions of all dependent and independent variables.

The coefficient of interest is the one on the triple interaction term, β_7. It captures how firm actions and outcomes after the tariff shocks vary across treated firms with overconfident CEOs and with rational CEOs using the differences between untreated rational and overconfident CEOs as baseline counterfactuals.

Given that the tariff shocks take place at the industry-level, we cluster standard errors by industry. We estimate regression results for four symmetric event windows centered on the tariff shock years, indicated as (-1,+1), (-2,+2), (-3,+3), and (-4,+4), respectively. Each window excludes the tariff shock year (year 0). When we estimate asymmetric windows all beginning at -1, the results are qualitatively and quantitatively similar to those reported. If we include only the endpoint years, e.g., only years -4 and +4 and not the intervening years, the number of observations falls, causing a loss of power and statistical significance on many of the coefficients.

3.3.4 Sample and Descriptive Statistics

Our sample starts in 1992, the first year Execucomp data is available, and ends in 2012, the last year for which we have tariff data. Because tariff shocks pertain to manufacturing industries only, we limit our analysis to firms in industries with SIC codes (SICH) between 2000 and 3999. We exclude industries with SIC codes ending in '0' and '9' because they do not identify economically meaningful industries (Clarke (1989)). We replace any missing SIC codes for a firm with its prior year's SIC code. We exclude firms with missing assets or negative sales and drop observations with missing values for covariates used in matching. We drop firm-years for which the CEO has fewer than two years of tenure because we need at least two observations to classify a CEO's confidence.

We require that both the treated and control firms have at least one year of data available before and after the tariff shock. Our final sample consists of 168 treated firms and their respective matches from non-tariff shocked industries.

Table F.1 reports the descriptive statistics for our sample. Panel B of Table F.1 presents descriptive statistics for the firm and CEO characteristics for treated and control firms for the year prior to the tariff shock. It also reports the p-values for the difference in means (covariate balance) tests between treated and matched control firms assuming unequal variances of the matching covariates. All the difference in means tests are statistically insignificant indicating that the treated firms and the matched control firms are similar in the observable covariates.

Before we turn to the triple difference regression results, we present tests for parallel trends across the treated and control firms in Panel C of Table F.1. We test for differences in the year-to-year changes in the outcome variables between years -4 and -1 relative to the corresponding tariff shock year. The pre-tariff-shock trends for all the action and outcome variables are statistically indistinguishable across treated and control firms, which indicates that the parallel trends assumption is satisfied.

3.4 Results

3.4.1 Actions in response to increased competition from tariff reductions

We first present results testing the hypothesis that overconfident CEOs respond to increases in competition with aggressive reductions in their gross and operating profit margins that reflect more aggressive pricing relative to production and sales costs. Table F.2 presents the results for operating and gross profit margins. We do not tabulate the control variables to conserve space. Panel A presents the results in which operating margin is the dependent variable. We find significantly negative coefficients on the triple interaction term for each of the four event windows. The coefficients range from -0.171 to -0.295 with p-values ranging between 0.004 and 0.012. The results suggest that overconfident CEOs respond very quickly to tariff reductions by reducing their

operating margin by 29.5 percentage points in the first year after the tariff reduction.[8] These cuts remain statistically significant up to the (-4,+4) window. We interpret these results as evidence of aggressive price reductions relative to production and sales costs. It is worth emphasizing that the triple-difference estimates reveal the additional reduction in profit margins by firms with overconfident CEOs compared to those with rational CEOs. Therefore, these results do not merely reflect the fact that increased competition reduces the profit margins of all domestic firms.

Panel B of Table F.2 presents the results where gross profit margin is the dependent variable. As with the operating profit margin, we find significantly negative coefficients on the triple interaction term across all the four event windows. These coefficients indicate that overconfident CEOs respond very quickly to tariff reductions by reducing their gross margin by 17.3 percentage points in the first year. These cuts remain significant in all four event windows with p-values for ranging from 0.017 to 0.045. We interpret these results as additional evidence of aggressive price reductions relative to production costs. Thus, the results for operating margin in Panel A are not driven solely by increases in selling, general, and administrative (SG&A) costs relative to sales.

We next present results for the hypotheses that overconfident CEOs respond to increases in competition with aggressive increases in R&D and advertising. Table F.3 shows the triple difference regression results for the R&D-to-sales ratio. We find significantly positive coefficients on the triple interaction term for the (-1,+1) and (-2,+2) year event windows around the tariff shock years. These results indicate that overconfident CEOs respond very quickly to tariff reductions by increasing R&D-to-sales by 7.4 percentage points in the first year (p-value = 0.007) and 4.2 percentage points during the (-2,+2) window (p-value = 0.072). The coefficients for the longer event windows are positive, but they are statistically insignificant. Thus, overconfident CEOs respond to increased competition with aggressive new investments in R&D mainly in the first two years after the tariff reductions.

[8]These effects are quite large economically, so it is worth emphasizing that they are not driven solely by the triple difference specification. On a univariate basis (untabulated), the mean operating profit margin for treated firms led by rational CEOs rises just over five percentage points from the pre-shock to post-shock periods, whereas the comparable figure for treated firms led by overconfident CEOs falls by just over 10 percentage points, for a total univariate difference of approximately negative 15 percentage points. By comparison, the triple difference regression coefficient estimate for the same time windows is approximately negative 17 percentage points.

Table F.4 contains results for the triple difference regressions for the advertising-to-sales ratio. We find that overconfident CEOs increase advertising, but with a delay, as a response to increased competition. The coefficients on the triple interaction term are positive but statistically insignificant for (-1,+1) and (-2,+2) windows. For (-3,+3) and (-4,+4) windows, the coefficients are 0.013 and 0.015, respectively, and both are statistically significant at the 5% level. Thus, overconfident CEOs increase advertising more intensively than do rational CEOs following a tariff shock, but the increases occur later in their competitive strategy. These results contrast with our earlier findings that overconfident CEOs respond to competitive shocks very quickly with price cuts and R&D (i.e., beginning in the first year after the tariff shock). Although we cannot see a way to test it, we conjecture that firms may increase advertising with a delay to highlight either product differentiation or price competitiveness that resulted from increases in R&D immediately after the tariff shocks (shown above in Table F.3).

Taken together, the results in Tables F.2 through F.4 firmly reject the broad hypothesis that overconfident CEOs remain passive in the face of increased competition because they overestimate their firms' abilities to compete in their current states. Instead, the results show that overconfident CEOs respond more aggressively to increased competition than their rational counterparts by slashing their operating and gross profit margins and increasing R&D and advertising. The changes in profit margins and R&D happen almost immediately, i.e., within a year after the tariff shock. On the other hand, advertising increases later by three to four years after the shock.

We next turn to our hypotheses about whether having an overconfident CEO benefits a firm that faces a sudden increase in competition. We investigate the impact of CEO overconfidence on the firm's market share and market value following a tariff reduction.

3.4.2 Outcomes following tariff shocks

Given the earlier results showing more aggressive competitive actions by overconfident CEOs, we next test how these actions affect firm outcomes, specifically, market share and firm value. We present the results of the triple difference regressions of market share in Table F.5. The dependent variable is the natural log of market share, so the coefficient on the triple interaction term is the

estimate of the treatment effect on the percentage increase in market share. We find that the coefficients remain positive across all the four time windows around the tariff shock years, and increase monotonically with the time windows. The coefficient for the (-1,+1) window is 0.194 (p-value = 0.099), which increases to 0.294 (p-value = 0.026), 0.338 (p-value = 0.027) and 0.342 (p-value = 0.036) for the (-2,+2), (-3,+3), and (-4,+4) windows, respectively. Thus, following tariff shocks that increase competition, firms led by overconfident CEOs show significant increases in market share relative to firms led by rational CEOs.

Given that overconfident CEOs slash operating and gross margins but increase advertising and R&D more aggressively than rational CEOs, the relative increases in market share are not too surprising. An important question, however, is whether these actions are optimal from a firm value standpoint. On the one hand, a firm could easily gain market share relative to its rivals by pricing its products too low and overinvesting in advertising and R&D, and yet destroy firm value in the process. Indeed, prior studies on overinvestment by overconfident CEOs suggest this is a quite plausible outcome. On the other hand, the competitive actions by overconfident CEOs could ultimately increase firm value relative to that of firms led by rational CEOs because more aggressive actions could make the overconfident CEO 'win' the competition against rational CEOs. Thus, we next test the hypothesis that firms led by overconfident CEOs exhibit increased firm value (measured by Tobin's Q) following the tariff shocks.

The results for the triple difference regressions for Tobin's Q are in Table F.6. We find evidence to support the hypothesis that the actions by overconfident CEOs are value increasing. The coefficient on the triple interaction term for the (-1, +1) window is 0.354 with a p-value of 0.066. The coefficient is 0.371 (p-value = 0.022) for the (-2, +2) window and is 0.278 (p-value = 0.062) the (-3, +3) window. For the (-4, +4) window, the coefficient is still large economically at 0.225, but the p-value rises to 0.106. These effects are quite large economically, so it is worth noting that they are not driven solely by the triple difference specification on a univariate basis (untabulated), the mean Tobin's Q for firms led by overconfident CEO rises 0.47 from pre-shock to post-shock, whereas the Tobin's Q for firms led by rational CEOs barely changes. Thus, increases in firm value

show up quickly by year +1 for firms led by overconfident CEOs, which implies that investors view the CEOs' aggressive actions that we find earlier as value increasing.

3.4.3 Placebo Tests and Other Analysis

We consider various endogeneity issues and alternative explanations that may affect our inferences. One concern is that, despite our careful use of exogenous shocks to competition and a matched-sample approach, our results may solely reflect matching of firm- and CEO-types. For instance, aggressive CEOs are matched with aggressive firms, which implies that these firms would have responded similarly to competition regardless of who the CEO was. Our triple difference specification includes CEO overconfidence as a matching variable, so our analysis compares an overconfident CEO (a rational CEO) in a treated firm to another overconfident CEO (a rational CEO) in a control firm. This strategy minimizes concerns about unobserved firm characteristics driving both selection of a CEO type and the aggressiveness of the firm's actions. Our conclusions would be invalid if (i) the treated firms with overconfident CEOs would have taken the same competitive actions and achieved the same outcomes that we document (relative to the treated firms with rational CEOs) even with rational CEOs in place, and (ii) if the same set of underlying variables cause the treatment firms, but not the control firms, both to choose overconfident CEOs and to fight competition aggressively achieving increased market share and firm value. We cannot envision what would satisfy both of these conditions jointly, especially given the potential downsides of overconfident CEOs documented in the prior literature.

A related concern is that our results reflect differences in the behaviors of overconfident and rational CEOs during normal firm conditions that are not fully removed in our triple-difference specification. This could occur, for instance, if a higher proportion of sample firms facing a tariff shock are from relatively innovative industries in which overconfident CEOs are more valuable unconditional on a shock to competition (Hirshleifer, Low, and Teoh (2012)). To examine this possibility, we classify innovative industries following Hirshleifer, Low, and Teoh (2012), and repeat our tests excluding firms in innovative industries. Although not reported in a table, we find that the results are quantitatively and qualitatively similar to those reported, with two exceptions.

Although the coefficient signs and magnitudes do not differ substantially from those presented, we find that the p-values increase to 0.173 and 0.143 for the coefficients of interest when we analyze gross margin in the (-1,+1) window and when we analyze R&D in the (-2,+2) window, respectively. Thus, the results do not appear to be driven by firms in innovative industries accounting for a disproportionate number of treated firms.

To further address related concerns, we conduct three sets of placebo tests. First, we use the actual treated firms, but we randomly assign pseudo tariff reduction years among them in place of the actual tariff reduction years. This research design for the placebo test matches our actual research design in all aspects except that we apply pseudo tariff reduction years to treated firms. The pseudo tariff reduction years are restricted to those years in which the firm was not actually subject to a tariff reduction. We require that the placebo reduction year be at least four years from an actual tariff reduction to avoid picking up the effects of a true tariff reduction. If our results were driven by systematic differences between treated and control firms that lead to differing CEO actions unconditional on the tariff shock (including industries innovation), we would expect to find similar results when analyzing these placebo tariff shocks. We present the results of the placebo tariff reduction tests for each of our dependent variables of interest in Table F.7. To conserve space, we tabulate only the coefficients on the triple interaction term and their respective p-values. We find no significant impact of CEO overconfidence on any of the dependent variables in the triple difference regressions in the post-placebo-tariff-reduction years, regardless of the event window. Moreover, the insignificant coefficients frequently do not even share the same sign with our main results and/or are generally much closer to zero in magnitude.

As an additional placebo test, we take the actual tariff reduction years as given, and construct placebo 'treated' and 'untreated' firms from among firms in manufacturing industries (firms in SIC codes 2000-3999) that are not treated by actual tariff reductions. Again here, the research design for the placebo test matches our actual research design in all aspects except that we apply it to randomly chosen firms from non-treated manufacturing industries. The results are reported in Table F.8. In Table F.9, we repeat the placebo test from Table F.8 except that we choose the

pseudo treated and untreated firms from among firms in non-manufacturing industries (firms outside SIC codes 2000-3999). In both Tables F.8 and F.9, we find no significant impact of CEO overconfidence on any of the dependent variables in the triple difference regressions except for one coefficient for advertising that is statistically significant but opposite in sign from the effect in our main regressions. In sum, multiple placebo tests show convincingly that our identification strategy and research design do not yield significant coefficients on the triple interaction terms in scenarios where they should not. Thus, the results we present in our main tests are very unlikely to be driven by any particular aspects of the research design.

Another related concern is that our results could be driven by CEOs who were hired after the tariff shock, and whose selection was driven by the shock. We attempt to remove this effect by controlling for CEO turnovers that occur during the tariff shock window throughout our analysis. To further rule out the concern, we repeat our analysis using only firms whose CEOs were already in place in the year prior to the tariff shock and remained through the fourth post-tariff shock year. Our results are substantively unchanged from those reported in the tables, with four exceptions. We no longer find significant evidence of overconfident CEOs increasing advertising expenses in the (-3, +3) window (p-value increases to 0.12), or gaining market share in the (-1, +1) window (p-value increases to 0.19). On the other hand, two results that were statistically insignificant in the main analysis become significant with the restricted sample: overconfident CEOs increase R&D spending in the (-3, +3) window and increase Tobin's Q in the (-4, +4) window. As such, our results are not driven by CEOs that were hired in response to the tariff shocks.

Finally, we want to consider the possibility that our results for R&D are merely reflective of a general tendency of overconfident CEOs to overinvest. Kang, Kang, Kang, and Kim (2018) find that overconfident CEOs increase total investment by more than rational CEOs do when economic uncertainty is high. One of the uncertainty shocks that they use is tariff shocks. They measure total investment as the sum of R&D, capital expenditures, and acquisitions.

In Table F.10, we report results of our triple difference regressions using total investment as the dependent variable. As shown in Panel A, we find that overconfident CEOs increase total invest-

ment significantly more than rational CEOs do for the (-1,+1) and (-2,+2) event windows. In Panels B through D, we present regression results for each of the three components of total investment– R&D, capital expenditures, and acquisitions–respectively. Panel B for R&D simply replicates the results that we presented earlier in the paper. In Panel C, we observe a small increase in capital expenditures for the (-1,+1) window, but statistically insignificant coefficients for all other windows. In Panel D, we observe no statistically significant changes in acquisition expenditures for any time window. Thus, the results for total investment in Panel A are driven almost entirely by R&D.

The results in Table F.10 show that our main findings are not merely reflective of a general tendency of overconfident CEOs to overinvest because we do not observe significant increases in capital expenditures or acquisitions. The increase in R&D that we find is consistent with a strategy to cut costs and/or differentiate products, both of which are especially important when competition rises. Thus, our results support the view that overconfident CEOs respond to tariff shocks with investments specifically tailored to address increased competition.

3.5 Conclusion

We examine differences in reactions by rational CEOs and overconfident CEOs when their firms face exogenous tariff shocks that increase competition. Using a triple-difference specification on matched samples of treated and untreated firms led by rational vs. overconfident CEOs, we find that firms led by overconfident CEOs slash their profit margins and increase advertising and research and development significantly more intensively than rational CEOs do. The aggressive competitive actions by overconfident CEOs lead to increased market share and value for their firms relative to firms led by rational CEOs. Our results contribute to the literature by documenting another setting in which CEO overconfidence is beneficial for shareholders. They also show that differences in firm management matter for how firms respond to tariff shocks.

4. CONCLUSION

The two chapters in this dissertation examine the effect of changes in a firm's competitive environment on its profitability and value. Firms competitive environment affect their corporate policies. A firm aims to maximize shareholder value and considers the strategic interactions it has with its industry-peers before choosing a course of action. The objective of these chapters is to further our understanding of how competition affect firm behavior. They highlight the importance of taking into account firms' product characteristics and managerial characteristics in evaluating their responses and outcomes to changes in the competitive environment.

In the first essay, I study the effect of common ownership on firm outcomes. Two firms are commonly owned when they are at least partially owned by the same set of investors. The rise of institutional ownership has made this phenomenon particularly prevalent in the last decade. Several theoretical papers have concluded that common ownership reduces firms' incentives to compete. However, given that a firm's product characteristics affect its ability to compete, I hypothesize and find that the anti-competitive effects of common ownership are stronger for firms with similar products. I use two quasi-natural experiments to exogenously vary a firm's common ownership levels and find that firms with similar products have higher product prices when they experience an increase in common ownership. I conduct several robustness tests and find that long-term investors drive my results.

In the second essay, co-authored with Shane A. Jonhson, T. Colin Campbell, and Binay Adhikari, we study if managerial biases affect a firm's product outcomes when a firm is faced with import competition. Specifically, we examine the effects of CEO overconfidence on a firm's ability to compete. We find that, compared to firms with rational CEOs, firms with overconfident CEOs react more aggressively to changes in import competition. Overconfident CEOs respond to competition by aggressive price cuts as measured by gross margin and operating margins. They also increase R&D and advertising expenditures potentially to differentiate their products. These actions enable overconfident CEOs to gain market share and improve firm value.

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APPENDIX A

VARIABLE DEFINITIONS FOR SECTION 2

Table A.1: Variable Definitions

Explanatory Variables:	
ComOwn	The percentage of a firm's shares owned by institutional investors that hold at least one rival firm within the same industry. I first calculate the percentage of shares held in each quarter, and then average over the fiscal year to get a firm-year measure.
PropPeer	The number of unique industry peers a firm is connected to in a year divided by the total firms, excluding the firm itself, in that industry-year. I calculate the proportion of industry peers the firm is connected to in each quarter, and then average over the fiscal year to get a firm-year measure.
NumMgnr	The number of common owners a firm has in a year. I first calculate the number of common owners a firm has in a quarter and then average it over the fiscal year to get a firm-year measure. An institutional investor is a common owner if she holds at least one other firm in the same industry.
ATSIM	For a firm *i*, the pairwise similarity score with firm *j* is one minus the cosine distance of vector V_i and V_j, where V_i is the vector of *i*'s product description reported in its annual report. The pairwise measure is averaged over all firms.
ATSIM-SIC	For a firm *i*, the pairwise similarity score with firm *j* is one minus the cosine distance of vector V_i and V_j, where V_i is the vector of *i*'s product description reported in its annual report. The pairwise measure is averaged over all firms in the industry, where industry is defined using 4-digit SIC code.
ATSIM-FIC	For a firm *i*, the pairwise similarity score with firm *j* is one minus the cosine distance of vector V_i and V_j, where V_i is the vector of *i*'s product description reported in its annual report. The pairwise measure is averaged over all firms in the industry, where industry is defined using the FIC400 code.
Outcome Variables:	
Ind. Adjusted Gross Margin	Industry-adjusted gross margin is the firm's gross margin minus the average gross margin of the industry. The firm's gross margin is (SALE - COGS) / SALE.
Ind. Adjusted R&D to sales ratio	Industry-adjusted R&D to sales ratio is the firm's R&D to sales ratio minus the average R&D to sales ratio of the industry. The firm's R&D to sales ratio is XRD / SALE.
Ind. Adjusted EBITDA to sales ratio	Industry-adjusted EBITDA to SALE ratio is the firm's EBITDA to sales ratio minus the average EBITDA to sales ratio of the industry. The firm's EBITDA to sales ratio is EBITDA / SALE.
Ind. Adjusted NI to sales ratio	Industry-adjusted NI to SALE ratio is the firm's net income to sales ratio minus the average NI to sales ratio of the industry. The firm's net income to sales ratio is NI / SALE.

Control Variables:	
Log of Assets	Natural log of total assets (AT) of a firm.
Log of Market to Book	Natural log of a firm's market value of equity (CSHO * PRCC_F) plus book value of debt (DLTT + DLC) divided by its book value of assets (AT) (Chava, Huang, and Johnson (2017)).
Cash to Assets	A firm's cash and cash equivalents (CHE) to the firm's total assets (AT).
Advertising to Assets	A firm's advertising expenses (XAD) to the firm's total assets (AT). Missing XAD is replaced with zero.
R&D to Sales	A firm's research and development expenses (XRD) to the firm's total assets (AT). Missing XRD is replaced with zero.
Leverage Ratio	A firm's long term debt (DLTT) divided by its total assets (AT).
HHI	Herfindahl-Hirschman Index is the sum of the square of market shares of all the firms in an industry. Market share is defined as the sale of a given firm divided by total industry sales. Industry is defined using either 4-digit SIC code or FIC400 code. Because market share is in decimal points, HHI ranges from 0 to 1.
Pct shares held by Inst. Inv.	The percentage of shares held by all institutional investors in a given fiscal year. This measure is calculated quarterly and is then averaged over the firm's fiscal year.
Number of firms in the industry	Count of the number of firms in a given industry-year.
M&As of Financial Institutions:	
CODummy	CODummy is equal to 1 if the firm is held by the acquirer (target) and the acquirer (target) holds another firm in the same industry.
LnNumPeers	LnNumPeers is the natural log of one plus the number of same industry peers a firm is connected to.
Treated	In the quarter prior to the announcement date, if firm *i* is in acquirer's (target's) portfolio and the target (acquirer) holds another firm in the same industry, then firm *i* is classified as treated.
Control	If firm *j* is in acquirer's (target's) portfolio and the target (acquirer) does not hold any firm in the same industry, then firm *j* is classified as a control firm.
Mutual Fund Scandal IV:	
ScandalComOwn	The ratio of percentage of shares held by common mutual funds that were affected by the scandal and the percentage of shares held by all common owners. *ScandalComOwn* is used to instrument for *ComOwn*.
Block Diagonal Regression Variables:	
ComOwn Similarity Quartile j	For a firm, it is equal to *ComOwn* if the firm belongs to an industry that is in the similarity quartile j, 0 otherwise.
PropPeer Similarity Quartile j	For a firm, it is equal to *PropPeer* if the firm belongs to an industry that is in the similarity quartile j, 0 otherwise.
NumMgnr Similarity Quartile j	For a firm, it is equal to *NumMgnr* if the firm belongs to an industry that is in the similarity quartile j, 0 otherwise.
Sim Quartile j Dummy	For a firm, it is equal to 1 if the firm belongs to an industry that is in the similarity quartile j, 0 otherwise.

APPENDIX B

NAMES OF FINANCIAL INSTITUTIONS USED IN QUASI-NATURAL EXPERIMENTS IN SECTION 2

B.1 List of Mergers and Acquisitions

Below is the list of mergers and acquisitions that are used in the experiment outlined in Section 2.4.1

Acquirer Name	Target Name	Announcement Date	Effective Date
Wells Fargo & Co.	Benson Associates, LLC	26-Aug-03	26-Aug-03
Bank of America Corporation	Fleet Boston Corporation	27-Oct-03	1-Apr-04
Wells Fargo & Co.	Strong Financial Corp.	26-May-04	3-Jan-05
Transamerica Invt Mgmt	WestCap Investors, LLC	19-May-05	4-Aug-05
J.P Morgan Chase & Co.	BNY-Consumer Business	31-Mar-06	2-Oct-06
Morgan Stanley Group Inc	FrontPoint Partners, L.L.C.	31-Oct-06	4-Dec-06
Bank of NY Trust Co	Mellon Bank	3-Dec-06	2-Jul-07
RiverSource Investments	J. & W. Seligman & Co., Inc.	7-Jul-08	7-Nov-08
Bank of America Corporation	Merrill Lynch & Co Inc.	14-Sep-08	1-Jan-09
Barclays Bank PLC	Lehman Brothers Inc.	16-Sep-08	22-Sep-08

B.2 List of Mutual Funds Implicated in Scandal

This appendix gives the names of the 20 mutual fund families that were implicated and eventually negotiated settlement in the scandal in September 2003 (Zitzewitz (2009)).

1. AIM
2. Alliance
3. AXP
4. Bank of America
5. Bank One
6. Federated Investors
7. Fleet
8. Franklin
9. Fred Alger
10. Fremont
11. Invesco
12. Janus
13. MFS
14. Pilgrim Baxter
15. PIMCO
16. Putnam
17. RS Investments
18. Scudder
19. Strong Capital Management
20. Waddell & Reed

APPENDIX C

TABLES FOR SECTION 2

Table C.1: Summary Statistics

This table reports the descriptive statistics for the entire sample. Panel A presents the summary statistics for industry-adjusted dependent variables, similarity measures, and common ownership measures. Panel B reports the summary statistics for the control variables and other firm characteristics. Variable definitions are in Appendix A.1. All continuous variables are winsorized at the 1st and the 99th percentile.

Panel A: Summary statistics for the dependent variables, similarity and common ownership measures

	P25	Mean	Median	P75	Std. Dev.
Dependent Variables(SIC)					
Ind. Adj. Gross Margin	-0.06	0.06	0.04	0.23	2.04
Ind. Adj. R&D to Sale	-0.08	-0.10	-0.00	0.00	0.25
Ind. Adj. EBITDA to Sales Ratio	-0.02	0.13	0.06	0.49	3.26
Ind. Adj. NI to Sales Ratio	-0.01	0.14	0.07	0.59	3.74
Dependent Variables(FIC)					
Ind. Adj. Gross Margin	-0.07	0.04	0.03	0.20	2.15
Ind. Adj. R&D to Sale	-0.04	-0.07	-0.00	0.00	0.21
Ind. Adj. EBITDA to Sales Ratio	-0.03	0.10	0.05	0.34	3.36
Ind. Adj. NI to Sales Ratio	-0.01	0.13	0.05	0.39	3.73
Similarity Score					
ATSIM	0.00	0.00	0.00	0.00	0.00
ATSIM-SIC	0.00	0.02	0.01	0.03	0.03
ATSIM-FIC	0.00	0.02	0.02	0.04	0.03
Common Ownership Measures					
Pct. shares held by CO investors (SIC)	0.00	0.13	0.07	0.21	0.16
Pct. shares held by CO investors (FIC)	0.00	0.14	0.08	0.23	0.17
PropPeer under CO (SIC)	0.00	0.21	0.11	0.35	0.24
PropPeer under CO (FIC)	0.00	0.21	0.12	0.38	0.24
NumMgnr(SIC)	0.00	4.71	1.00	3.25	11.43
NumMgnr(FIC)	0.00	5.38	1.00	3.50	13.04
Number of observations	59987				

Panel B: Descriptive statistics for the control variables and other firm characteristics

	P25	Mean	Median	P75	Std. Dev.
Control Variables					
Total Assets (billion)	0.06	2.82	0.25	1.10	17.45
Log Assets	4.09	5.61	5.51	7.01	2.04
Market to Book	0.86	2.00	1.29	2.17	2.88
Log Market to Book	-0.15	0.35	0.25	0.77	0.72
Cash to Assets	0.03	0.21	0.12	0.32	0.24
Advertising to Assets	0.00	0.01	0.00	0.01	0.03
R&D to Assets	0.00	0.06	0.00	0.07	0.12
Leverage Ratio	0.00	0.17	0.10	0.28	0.20
Pct share held by inst.inv.	0.14	0.42	0.41	0.69	0.30
HHI (SIC)	0.13	0.27	0.21	0.36	0.19
HHI (FIC)	0.12	0.26	0.19	0.33	0.19
Num. of Firms in Industry (SIC)	9.00	48.76	19.00	65.00	64.20
Num. of Firms in Industry (FIC)	12.00	56.47	31.00	66.00	71.05
Other Firm Characteristics					
CO Dummy(SIC)	0.00	0.68	1.00	1.00	0.47
CO Dummy(FIC)	0.00	0.68	1.00	1.00	0.47
Pct share held by blockholders	0.01	0.14	0.11	0.22	0.14
Number of observations	59987				

Table C.2: Ind. Adj. Gross Margin

This table presents the results for the effect of common ownership and product similarity on price levels. The dependent variable is industry-adjusted gross margin. It is defined as (sales - cost of goods sold) / sales and is adjusted for the mean industry gross margin, where industry is defined using the 4-digit SIC code in Panel A and the FIC400 code in Panel B. Common ownership is measured as the total number of shares owned by institutional investors who hold at least one other industry peer (*ComOwn*) in columns 1 and 4, proportion of peers connected to a given firm (*PropPeer*) in columns 2 and 5, and number of common owners (*NumMgnr*) in columns 3 and 6. Product similarity is averaged over all firms (*ATSIM*) in columns (1)-(3) and over firms within the industry (*ATSIM-SIC* in Panel A and *ATSIM-FIC* in Panel B) in columns (4)-(6). Variable definitions are in Appendix A.1. All continuous variables are winsorized at the 1st and the 99th percentile. Standard errors are clustered by firm. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

Panel A: Dependent variable: Industry-Adjusted Gross Margin, where industry is defined using 4-digit SIC code

	ATSIM			ATSIM-SIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn	0.032**			0.036**		
	(0.046)			(0.044)		
ComOwn x ATSIM	0.063*			0.044**		
	(0.059)			(0.015)		
PropPeer		0.032			-0.006	
		(0.121)			(0.545)	
PropPeer x ATSIM		0.123**			0.028***	
		(0.026)			(0.009)	
NumMgnr			0.029**			0.035**
			(0.028)			(0.020)
NumMgnr x ATSIM			0.066**			0.046***
			(0.017)			(0.004)
ATSIM	0.057	0.099	0.071	0.007	0.002	0.009
	(0.504)	(0.224)	(0.404)	(0.821)	(0.950)	(0.771)
Log Assets	0.011	0.011	0.004	0.018	0.022	0.014
	(0.723)	(0.707)	(0.887)	(0.553)	(0.460)	(0.652)
Log Market to Book	0.087***	0.088***	0.083***	0.086***	0.089***	0.083***
	(0.003)	(0.002)	(0.004)	(0.003)	(0.002)	(0.004)
Cash to Assets	-1.015***	-1.011***	-1.009***	-1.014***	-1.018***	-1.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Advertising to Assets	0.629	0.621	0.646	0.645	0.629	0.646
	(0.187)	(0.193)	(0.177)	(0.177)	(0.189)	(0.177)
R&D to Assets	-1.566***	-1.558***	-1.571***	-1.568***	-1.564***	-1.567***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage Ratio	0.194	0.194	0.217*	0.213*	0.207	0.227*
	(0.126)	(0.127)	(0.092)	(0.098)	(0.107)	(0.078)
Pct share held by inst.inv.	-0.118*	-0.088	-0.039	-0.112*	-0.019	-0.045
	(0.078)	(0.170)	(0.527)	(0.093)	(0.772)	(0.472)
HHI	0.174*	0.179*	0.177*	0.185*	0.183*	0.194**
	(0.069)	(0.062)	(0.066)	(0.059)	(0.063)	(0.049)

Log(1+num firms in the industry)	0.119**	0.122**	0.123**	0.135***	0.142***	0.141***
	(0.014)	(0.012)	(0.012)	(0.008)	(0.006)	(0.006)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.48	0.48	0.48	0.48	0.48	0.48
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Dependent variable: Industry-Adjusted Gross Margin, where industry is defined using FIC400 code

	ATSIM			ATSIM-FIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn	0.016			0.022		
	(0.351)			(0.234)		
ComOwn x ATSIM	0.060*			0.037*		
	(0.086)			(0.079)		
PropPeer		0.030			-0.003	
		(0.167)			(0.789)	
PropPeer x ATSIM		0.119**			0.037***	
		(0.031)			(0.006)	
NumMgnr			0.023*			0.032**
			(0.085)			(0.035)
NumMgnr x ATSIM			0.102***			0.052***
			(0.000)			(0.007)
ATSIM	0.045	0.088	0.054	-0.044	-0.046*	-0.042
	(0.616)	(0.300)	(0.543)	(0.106)	(0.096)	(0.119)
Log Assets	0.006	0.005	-0.002	0.015	0.017	0.010
	(0.831)	(0.871)	(0.955)	(0.618)	(0.551)	(0.746)
Log Market to Book	0.087***	0.088***	0.083***	0.088***	0.090***	0.083***
	(0.003)	(0.002)	(0.004)	(0.003)	(0.002)	(0.004)
Cash to Assets	-0.920***	-0.915***	-0.906***	-0.913***	-0.915***	-0.907***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Advertising to Assets	0.396	0.395	0.438	0.433	0.425	0.444
	(0.408)	(0.410)	(0.362)	(0.370)	(0.380)	(0.357)
R&D to Assets	-1.699***	-1.692***	-1.694***	-1.686***	-1.683***	-1.686***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage Ratio	0.163	0.165	0.187	0.180	0.175	0.195
	(0.198)	(0.194)	(0.144)	(0.159)	(0.170)	(0.127)
Pct share held by inst.inv.	-0.113*	-0.109*	-0.065	-0.111*	-0.051	-0.069
	(0.089)	(0.095)	(0.283)	(0.095)	(0.446)	(0.255)
HHI	0.232***	0.231***	0.226***	0.236***	0.234***	0.238***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(1+num firms in the industry)	0.124***	0.124***	0.120***	0.129***	0.132***	0.129***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.45	0.45	0.45	0.45	0.45	0.45
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table C.3: Ind. Adj. R&D to sales ratio

This table presents the results for the effect of common ownership and product similarity on R&D expenditure. The dependent variable is industry-adjusted R&D to sales ratio. It is defined as the firm's R&D expenditure divided by total sales and is adjusted for the mean industry R&D to sales ratio, where industry is defined using the 4-digit SIC code in Panel A and the FIC400 code in Panel B. Common ownership is measured as the total number of shares owned by institutional investors who hold at least one other industry peer (*ComOwn*) in columns 1 and 4, proportion of peers connected to a given firm (*PropPeer*) in columns 2 and 5, and number of common owners (*NumMgnr*) in columns 3 and 6. Product similarity is averaged over all firms (*ATSIM*) in columns (1)-(3) and over firms within the industry (*ATSIM-SIC* in Panel A and *ATSIM-FIC* in Panel B) in columns (4)-(6). Variable definitions are in Appendix A.1. All continuous variables are winsorized at the 1st and the 99th percentile. Standard errors are clustered by firm. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

Panel A: Dependent variable: Industry-Adjusted R&D to sales ratio, where industry is defined using 4-digit SIC code

	ATSIM			ATSIM-SIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn	-0.003			-0.003		
	(0.148)			(0.172)		
ComOwn x ATSIM	-0.004***			-0.005***		
	(0.004)			(0.001)		
PropPeer		-0.002			0.000	
		(0.188)			(0.752)	
PropPeer x ATSIM		-0.007***			-0.003***	
		(0.005)			(0.000)	
NumMgnr			-0.004*			-0.005*
			(0.058)			(0.051)
NumMgnr x ATSIM			-0.005**			-0.004***
			(0.016)			(0.004)
ATSIM	-0.014***	-0.017***	-0.015***	-0.002	-0.001	-0.002
	(0.001)	(0.000)	(0.001)	(0.517)	(0.722)	(0.467)
Log Assets	0.007***	0.007***	0.008***	0.006**	0.006**	0.007**
	(0.003)	(0.004)	(0.001)	(0.018)	(0.026)	(0.010)
Log Market to Book	-0.016***	-0.016***	-0.016***	-0.016***	-0.016***	-0.016***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash to Assets	0.129***	0.129***	0.128***	0.127***	0.127***	0.127***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Advertising to Assets	-0.113*	-0.112*	-0.114*	-0.116*	-0.115*	-0.116*
	(0.060)	(0.062)	(0.058)	(0.053)	(0.056)	(0.053)
R&D to Assets	0.325***	0.325***	0.325***	0.322***	0.322***	0.322***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage Ratio	-0.012	-0.012	-0.014	-0.014	-0.013	-0.016
	(0.237)	(0.239)	(0.164)	(0.166)	(0.180)	(0.118)
Pct share held by inst.inv.	0.003	-0.000	-0.002	0.004	-0.004	-0.001
	(0.597)	(0.980)	(0.739)	(0.584)	(0.539)	(0.827)
HHI	-0.055***	-0.055***	-0.055***	-0.056***	-0.056***	-0.057***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Log(1+num firms in the industry)	-0.043***	-0.043***	-0.043***	-0.046***	-0.046***	-0.046***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.63	0.63	0.63	0.63	0.63	0.63
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Dependent variable: Industry-Adjusted R&D to sales ratio, where industry is defined using FIC400 code

	ATSIM			ATSIM-FIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn	-0.001			-0.002		
	(0.634)			(0.372)		
ComOwn x ATSIM	-0.006***			-0.003**		
	(0.000)			(0.015)		
PropPeer		-0.003*			0.000	
		(0.053)			(0.745)	
PropPeer x ATSIM		-0.011***			-0.001	
		(0.000)			(0.107)	
NumMgnr			0.000			-0.001
			(0.880)			(0.771)
NumMgnr x ATSIM			-0.010***			-0.004**
			(0.000)			(0.031)
ATSIM	-0.013***	-0.017***	-0.014***	0.002	0.002	0.002
	(0.001)	(0.000)	(0.001)	(0.272)	(0.283)	(0.300)
Log Assets	0.006**	0.006**	0.006***	0.004*	0.004*	0.004*
	(0.015)	(0.012)	(0.009)	(0.074)	(0.087)	(0.066)
Log Market to Book	-0.017***	-0.017***	-0.017***	-0.018***	-0.018***	-0.017***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash to Assets	0.114***	0.113***	0.113***	0.112***	0.113***	0.112***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Advertising to Assets	-0.048	-0.048	-0.052	-0.053	-0.052	-0.053
	(0.431)	(0.431)	(0.391)	(0.388)	(0.397)	(0.382)
R&D to Assets	0.298***	0.298***	0.298***	0.295***	0.295***	0.295***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage Ratio	-0.012	-0.012	-0.013	-0.014	-0.014	-0.015
	(0.209)	(0.198)	(0.163)	(0.127)	(0.136)	(0.116)
Pct share held by inst.inv.	0.009	0.010*	0.004	0.009	0.003	0.005
	(0.183)	(0.097)	(0.435)	(0.179)	(0.578)	(0.387)
HHI	-0.033***	-0.033***	-0.032***	-0.035***	-0.035***	-0.035***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(1+num firms in the industry)	-0.027***	-0.027***	-0.026***	-0.028***	-0.029***	-0.029***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.50	0.50	0.50	0.50	0.50	0.50
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table C.4: Ind. Adj. EBITDA to sales ratio

This table presents the results for the effect of common ownership and product similarity on EBITDA to SALE ratio. The dependent variable is industry-adjusted EBITDA to sales ratio. It is defined as the firm's EBITDA divided by its sales and is adjusted for the mean industry EBITDA to sales ratio, where industry is defined using the 4-digit SIC code in Panel A and the FIC400 code in Panel B. Common ownership is measured as the total number of shares owned by institutional investors who hold at least one other industry peer (*ComOwn*) in columns 1 and 4, proportion of peers connected to a given firm (*PropPeer*) in columns 2 and 5, and number of common owners (*NumMgnr*) in columns 3 and 6. Product similarity is averaged over all firms (*ATSIM*) in columns (1)-(3) and over firms within the industry (*ATSIM-SIC* in Panel A and *ATSIM-FIC* in Panel B) in columns (4)-(6). Variable definitions are in Appendix A.1. All continuous variables are winsorized at the 1st and the 99th percentile. Standard errors are clustered by firm. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

Panel A: Dependent variable: Industry-Adjusted EBITDA to sales ratio, where industry is defined using 4-digit SIC code

	ATSIM			ATSIM-SIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn	0.042			0.049*		
	(0.110)			(0.078)		
ComOwn x ATSIM	0.108**			0.063**		
	(0.025)			(0.014)		
PropPeer		0.046			-0.018	
		(0.141)			(0.295)	
PropPeer x ATSIM		0.215***			0.042***	
		(0.007)			(0.008)	
NumMgnr			0.030			0.039
			(0.187)			(0.104)
NumMgnr x ATSIM			0.101***			0.063***
			(0.008)			(0.006)
ATSIM	0.002	0.073	0.028	-0.014	-0.021	-0.011
	(0.987)	(0.551)	(0.829)	(0.772)	(0.673)	(0.823)
Log Assets	0.045	0.046	0.037	0.049	0.056	0.045
	(0.355)	(0.346)	(0.453)	(0.305)	(0.243)	(0.356)
Log Market to Book	0.148***	0.150***	0.145***	0.147***	0.152***	0.144***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.003)	(0.006)
Cash to Assets	-2.199***	-2.191***	-2.193***	-2.208***	-2.214***	-2.205***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Advertising to Assets	1.187	1.172	1.214	1.194	1.168	1.195
	(0.170)	(0.177)	(0.162)	(0.168)	(0.178)	(0.168)
R&D to Assets	-2.253***	-2.238***	-2.264***	-2.279***	-2.272***	-2.277***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Leverage Ratio	0.226	0.225	0.258	0.249	0.240	0.266
	(0.236)	(0.237)	(0.182)	(0.197)	(0.214)	(0.170)
Pct share held by inst.inv.	-0.065	-0.026	0.054	-0.051	0.094	0.048
	(0.536)	(0.797)	(0.576)	(0.625)	(0.353)	(0.614)
HHI	0.454***	0.462***	0.458***	0.462***	0.458***	0.474***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)

Log(1+num firms in the industry)	0.268***	0.269***	0.274***	0.278***	0.285***	0.286***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.49	0.49	0.49	0.49	0.49	0.49
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Dependent variable: Industry-Adjusted EBITDA to sales ratio, where industry is defined using FIC400 code

	ATSIM			ATSIM-FIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn	0.024			0.037		
	(0.395)			(0.215)		
ComOwn x ATSIM	0.111**			0.054*		
	(0.027)			(0.070)		
PropPeer		0.071**			0.005	
		(0.029)			(0.764)	
PropPeer x ATSIM		0.232***			0.052***	
		(0.003)			(0.010)	
NumMgnr			0.014			0.029
			(0.528)			(0.230)
NumMgnr x ATSIM			0.160***			0.067**
			(0.000)			(0.013)
ATSIM	0.037	0.119	0.058	-0.077*	-0.081*	-0.074*
	(0.783)	(0.347)	(0.663)	(0.069)	(0.064)	(0.079)
Log Assets	0.026	0.021	0.016	0.036	0.040	0.032
	(0.592)	(0.654)	(0.737)	(0.438)	(0.389)	(0.498)
Log Market to Book	0.140***	0.141***	0.138***	0.142***	0.145***	0.138***
	(0.006)	(0.006)	(0.008)	(0.006)	(0.005)	(0.008)
Cash to Assets	-2.054***	-2.041***	-2.039***	-2.047***	-2.050***	-2.042***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Advertising to Assets	0.860	0.861	0.924	0.911	0.901	0.922
	(0.318)	(0.318)	(0.283)	(0.293)	(0.299)	(0.286)
R&D to Assets	-2.390***	-2.376***	-2.387***	-2.383***	-2.380***	-2.381***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage Ratio	0.254	0.259	0.285	0.280	0.275	0.295
	(0.176)	(0.167)	(0.133)	(0.139)	(0.147)	(0.121)
Pct share held by inst.inv.	-0.087	-0.121	0.004	-0.080	0.000	-0.000
	(0.381)	(0.236)	(0.967)	(0.424)	(0.997)	(1.000)
HHI	0.380***	0.381***	0.369***	0.386***	0.385***	0.388***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(1+num firms in the industry)	0.196***	0.196***	0.190***	0.198***	0.203***	0.200***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.47	0.47	0.47	0.47	0.47	0.47
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table C.5: Ind. Adj. NI to sales ratio

This table presents the results for the effect of common ownership and product similarity on net income. The dependent variable is industry-adjusted NI to sales ratio. It is defined as the firm's net income divided by total sales and is adjusted for the mean industry NI/SALE, where industry is defined using the 4-digit SIC code in Panel A and the FIC400 code in Panel B. Common ownership is measured as the total number of shares owned by institutional investors who hold at least one other industry peer (*ComOwn*) in columns 1 and 4, proportion of peers connected to a given firm (*PropPeer*) in columns 2 and 5, and number of common owners (*NumMgnr*) in columns 3 and 6.Product similarity is averaged over all firms (*ATSIM*) in columns (1)-(3) and over firms within the industry (*ATSIM-SIC* in Panel A and *ATSIM-FIC* in Panel B) in columns (4)-(6). Variable definitions are in Appendix A.1. All continuous variables are winsorized at the 1st and the 99th percentile. Standard errors are clustered by firm. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

Panel A: Dependent variable: Industry-Adjusted NI to sales ratio, where industry is defined using 4-digit SIC code

	ATSIM			ATSIM-SIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn	0.040			0.048		
	(0.183)			(0.136)		
ComOwn x ATSIM	0.116**			0.071**		
	(0.030)			(0.014)		
PropPeer		0.046			-0.021	
		(0.187)			(0.266)	
PropPeer x ATSIM		0.224**			0.043**	
		(0.012)			(0.018)	
NumMgnr			-0.012			-0.005
			(0.712)			(0.889)
NumMgnr x ATSIM			0.105**			0.080***
			(0.016)			(0.003)
ATSIM	0.042	0.118	0.072	0.001	-0.006	0.004
	(0.777)	(0.401)	(0.629)	(0.985)	(0.921)	(0.941)
Log Assets	-0.057	-0.057	-0.058	-0.050	-0.044	-0.047
	(0.321)	(0.320)	(0.323)	(0.377)	(0.440)	(0.420)
Log Market to Book	0.216***	0.218***	0.219***	0.215***	0.220***	0.219***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash to Assets	-1.984***	-1.976***	-1.987***	-1.990***	-1.996***	-1.995***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Advertising to Assets	1.428	1.413	1.457	1.444	1.417	1.450
	(0.141)	(0.146)	(0.133)	(0.137)	(0.144)	(0.135)
R&D to Assets	-2.634***	-2.620***	-2.643***	-2.654***	-2.647***	-2.646***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Leverage Ratio	0.263	0.263	0.281	0.291	0.281	0.294
	(0.241)	(0.241)	(0.215)	(0.200)	(0.215)	(0.196)
Pct share held by inst.inv.	-0.011	0.028	0.131	0.002	0.154	0.124
	(0.928)	(0.807)	(0.227)	(0.984)	(0.179)	(0.253)
HHI	0.390**	0.399**	0.388**	0.405**	0.401**	0.409**
	(0.023)	(0.020)	(0.025)	(0.021)	(0.022)	(0.019)

Log(1+num firms in the industry)	0.293***	0.293***	0.302***	0.311***	0.318***	0.324***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.48	0.48	0.48	0.48	0.48	0.48
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Dependent variable: Industry-Adjusted NI to sales ratio, where industry is defined using FIC400 code

	ATSIM			ATSIM-FIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn	0.020			0.035		
	(0.522)			(0.303)		
ComOwn x ATSIM	0.118**			0.056*		
	(0.036)			(0.095)		
PropPeer		0.071*			0.003	
		(0.052)			(0.866)	
PropPeer x ATSIM		0.236***			0.053**	
		(0.008)			(0.022)	
NumMgnr			-0.014			0.002
			(0.663)			(0.946)
NumMgnr x ATSIM			0.164***			0.064**
			(0.000)			(0.038)
ATSIM	0.073	0.158	0.096	-0.073	-0.077	-0.070
	(0.636)	(0.274)	(0.527)	(0.134)	(0.128)	(0.149)
Log Assets	-0.079	-0.084	-0.085	-0.066	-0.062	-0.065
	(0.163)	(0.136)	(0.143)	(0.239)	(0.263)	(0.250)
Log Market to Book	0.210***	0.212***	0.211***	0.212***	0.215***	0.212***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash to Assets	-1.820***	-1.806***	-1.809***	-1.809***	-1.811***	-1.810***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Advertising to Assets	1.158	1.159	1.224	1.218	1.206	1.227
	(0.224)	(0.224)	(0.199)	(0.204)	(0.208)	(0.200)
R&D to Assets	-2.823***	-2.811***	-2.818***	-2.808***	-2.805***	-2.804***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage Ratio	0.274	0.280	0.296	0.305	0.299	0.309
	(0.212)	(0.203)	(0.182)	(0.170)	(0.178)	(0.166)
Pct share held by inst.inv.	-0.037	-0.075	0.065	-0.030	0.050	0.061
	(0.742)	(0.514)	(0.532)	(0.790)	(0.661)	(0.560)
HHI	0.434***	0.437***	0.421***	0.446***	0.445***	0.444***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(1+num firms in the industry)	0.234***	0.234***	0.231***	0.242***	0.247***	0.246***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.45	0.45	0.45	0.45	0.45	0.45
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table C.6: M&A of Financial Institutions

This table reports the results for the difference-in-differences analysis using the M&A of financial institutions as an exogenous shock to a firm's common ownership level. Treated firm is a firm in the portfolio of target or acquirer that experienced an increase in common ownership post M&A. Control firm is a firm in the portfolio of either target or acquirer that did not experience a change in its common ownership levels post acquisition. Panel A reports the results of whether the M&A of financial institutions affect common ownership levels of portfolio firms. Panel B presents the results for the industry-adjusted gross margin. Panel C, D and E presents the results for R&D ratio, EBITDA to sales ratio, and NI to sales ratio, respectively. Variable definitions are in Appendix A.1. All continuous variables are winsorized at the 1st and the 99th percentile. Standard errors are clustered by firm. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

Panel A: Does M&A of financial institutions affect Common Ownership?

	CODummy		LnNumPeers	
	(1)	(2)	(3)	(4)
Treated=1 x Post=1	0.088**	0.096***	0.318***	0.310***
	(0.011)	(0.004)	(0.000)	(0.000)
Post=1	-0.216***	-0.223***	-0.266***	-0.284***
	(0.000)	(0.000)	(0.000)	(0.000)
Treated=1	0.000	0.017	0.000	-0.155***
	(.)	(0.563)	(.)	(0.000)
Log Assets	-0.100***	-0.075***	-0.214***	-0.145***
	(0.000)	(0.000)	(0.000)	(0.000)
Log Market to Book	-0.098***	-0.054***	-0.195***	-0.132***
	(0.000)	(0.002)	(0.000)	(0.000)
Cash to Assets	-0.056	-0.067	0.084	-0.039
	(0.502)	(0.395)	(0.612)	(0.788)
Advertising to Assets	-1.317**	-1.725***	-0.902	-0.971
	(0.013)	(0.001)	(0.400)	(0.281)
R&D to Assets	0.126	0.075	0.035	0.187
	(0.566)	(0.732)	(0.942)	(0.734)
Leverage Ratio	0.128**	0.088	0.264**	0.140
	(0.042)	(0.146)	(0.031)	(0.217)
Pct. share held by inst.inv.	0.053	0.058	0.079	0.071
	(0.340)	(0.262)	(0.430)	(0.441)
HHI	0.023	-0.028	0.005	-0.235**
	(0.847)	(0.779)	(0.978)	(0.046)
Num. of firms in the industry	-0.018	-0.007	-0.084	-0.058
	(0.606)	(0.838)	(0.119)	(0.219)
N	15337	15337	15337	15337
Adjusted R^2	0.71	0.54	0.84	0.75
Deal x Firm FE	Yes	No	Yes	No
Deal FE	No	Yes	No	Yes
Firm FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes

Panel B. Does the effect of Common Ownership on Ind. Adj. Gross Margin vary?

	SIC		FIC	
	(1)	(2)	(3)	(4)
Post x Treated x ATSIM	0.082*	0.075*	0.032**	0.031**
	(0.054)	(0.065)	(0.033)	(0.031)
Post	0.007	0.009	0.003	0.003
	(0.574)	(0.488)	(0.722)	(0.689)
Treated	0.000	-0.016	0.000	0.005
	(.)	(0.212)	(.)	(0.547)
Post x Treated	0.046	0.048	0.004	0.005
	(0.172)	(0.154)	(0.785)	(0.672)
Post x ATSIM	-0.001	-0.002	-0.013**	-0.012**
	(0.791)	(0.695)	(0.020)	(0.024)
Treated x ATSIM	0.076	-0.040**	0.025	-0.013
	(0.101)	(0.016)	(0.231)	(0.105)
ATSIM	-0.002	0.009	0.003	0.007
	(0.827)	(0.274)	(0.701)	(0.319)
Log Assets	0.006	0.006	0.005	0.008
	(0.705)	(0.651)	(0.697)	(0.502)
Log Market to Book	0.038**	0.043***	0.032***	0.036***
	(0.013)	(0.002)	(0.007)	(0.003)
Cash to Assets	-0.112	-0.056	0.048	0.052
	(0.123)	(0.375)	(0.316)	(0.221)
Advertising to Assets	0.229	0.207	-0.401	-0.454
	(0.500)	(0.461)	(0.276)	(0.221)
R&D to Assets	-0.265	-0.179	0.039	0.043
	(0.338)	(0.444)	(0.770)	(0.683)
Leverage Ratio	0.048	0.022	0.057*	0.027
	(0.409)	(0.660)	(0.099)	(0.409)
Pct. share held by inst.inv.	-0.038	-0.053*	-0.020	-0.042
	(0.282)	(0.097)	(0.507)	(0.165)
HHI	0.147**	0.163***	-0.025	-0.014
	(0.043)	(0.009)	(0.332)	(0.523)
Num. of firms in the industry	0.068**	0.077**	0.019**	0.020***
	(0.014)	(0.011)	(0.031)	(0.010)
N	15337	15337	15337	15337
Adjusted R^2	0.89	0.89	0.68	0.69
Deal x Firm FE	Yes	No	Yes	No
Deal FE	No	Yes	No	Yes
Firm FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes

Panel C. Does the effect of Common Ownership on Ind. Adj. R&D to sales ratio vary?

	SIC		FIC	
	(1)	(2)	(3)	(4)
Post x Treated x ATSIM	-0.018*	-0.017*	-0.006**	-0.006**
	(0.056)	(0.053)	(0.020)	(0.016)
Post	0.004	0.006	0.001	0.001
	(0.450)	(0.332)	(0.541)	(0.440)
Treated	0.000	-0.007	0.000	-0.001
	(.)	(0.176)	(.)	(0.576)
Post x Treated	0.004	0.003	-0.002	-0.002
	(0.666)	(0.722)	(0.510)	(0.544)
Post x ATSIM	-0.003	-0.002	0.001*	0.001*
	(0.341)	(0.528)	(0.098)	(0.095)
Treated x ATSIM	-0.001	0.009	0.000	0.004**
	(0.916)	(0.133)	(0.999)	(0.038)
ATSIM	-0.000	-0.001	0.001	-0.000
	(0.994)	(0.734)	(0.622)	(0.981)
Log Assets	-0.006	-0.010	-0.006***	-0.006***
	(0.337)	(0.107)	(0.004)	(0.003)
Log Market to Book	-0.019**	-0.020***	0.000	0.001
	(0.011)	(0.004)	(0.877)	(0.724)
Cash to Assets	0.121***	0.110***	0.010	0.008
	(0.001)	(0.001)	(0.332)	(0.375)
Advertising to Assets	-0.312	-0.224	0.054	0.058
	(0.174)	(0.215)	(0.515)	(0.454)
R&D to Assets	0.174	0.091	0.099**	0.062
	(0.134)	(0.356)	(0.043)	(0.158)
Leverage Ratio	-0.012	-0.015	-0.010*	-0.010**
	(0.577)	(0.448)	(0.059)	(0.048)
Pct. share held by inst.inv.	0.019	0.023	0.008*	0.008**
	(0.284)	(0.144)	(0.078)	(0.043)
HHI	-0.042	-0.039	-0.015**	-0.012**
	(0.195)	(0.148)	(0.018)	(0.031)
Num. of firms in the industry	-0.016	-0.016	-0.008***	-0.007***
	(0.159)	(0.116)	(0.003)	(0.005)
N	15337	15337	15337	15337
Adjusted R^2	0.76	0.77	0.65	0.66
Deal x Firm FE	Yes	No	Yes	No
Deal FE	No	Yes	No	Yes
Firm FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes

Panel D. Does the effect of Common Ownership on Ind. Adj. EBITDA to sales ratio vary?

	SIC		FIC	
	(1)	(2)	(3)	(4)
Post x Treated x ATSIM	0.144**	0.145**	0.066**	0.065**
	(0.021)	(0.014)	(0.013)	(0.010)
Post	0.042	0.037	0.032*	0.029*
	(0.107)	(0.129)	(0.052)	(0.070)
Treated	0.000	0.003	0.000	0.041***
	(.)	(0.905)	(.)	(0.008)
Post x Treated	0.018	0.028	-0.037	-0.025
	(0.687)	(0.533)	(0.115)	(0.256)
Post x ATSIM	-0.010	-0.014	-0.035***	-0.033***
	(0.416)	(0.235)	(0.001)	(0.001)
Treated x ATSIM	0.085	-0.084***	0.075	-0.029*
	(0.368)	(0.001)	(0.106)	(0.054)
ATSIM	-0.044	-0.016	0.001	0.009
	(0.169)	(0.530)	(0.939)	(0.537)
Log Assets	-0.042	-0.027	-0.027	-0.017
	(0.156)	(0.318)	(0.234)	(0.437)
Log Market to Book	0.093***	0.106***	0.058**	0.067***
	(0.007)	(0.001)	(0.015)	(0.004)
Cash to Assets	-0.336*	-0.181	-0.064	-0.044
	(0.058)	(0.298)	(0.473)	(0.578)
Advertising to Assets	-0.087	-0.226	-1.053	-1.043
	(0.912)	(0.717)	(0.113)	(0.106)
R&D to Assets	-0.828	-0.605	-0.328	-0.243
	(0.103)	(0.167)	(0.275)	(0.305)
Leverage Ratio	0.089	0.060	0.074	0.044
	(0.414)	(0.534)	(0.266)	(0.457)
Pct. share held by inst.inv.	-0.066	-0.100	-0.136**	-0.173**
	(0.431)	(0.191)	(0.039)	(0.013)
HHI	0.255*	0.296**	0.037	0.026
	(0.096)	(0.022)	(0.542)	(0.546)
Num. of firms in the industry	0.129**	0.135**	0.058***	0.049***
	(0.016)	(0.011)	(0.001)	(0.001)
N	15337	15337	15337	15337
Adjusted R^2	0.84	0.85	0.67	0.69
Deal x Firm FE	Yes	No	Yes	No
Deal FE	No	Yes	No	Yes
Firm FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes

Panel E. Does the effect of Common Ownership on Ind. Adj. NI to sales ratio vary?

	SIC		FIC	
	(1)	(2)	(3)	(4)
Post x Treated x ATSIM	0.186***	0.185***	0.076**	0.076**
	(0.007)	(0.004)	(0.015)	(0.011)
Post	0.068**	0.064**	0.047**	0.044**
	(0.017)	(0.020)	(0.019)	(0.024)
Treated	0.000	0.060**	0.000	0.080***
	(.)	(0.031)	(.)	(0.000)
Post x Treated	-0.041	-0.028	-0.082***	-0.067**
	(0.438)	(0.592)	(0.004)	(0.016)
Post x ATSIM	-0.015	-0.019	-0.046***	-0.043***
	(0.264)	(0.130)	(0.000)	(0.000)
Treated x ATSIM	0.050	-0.122***	0.097*	-0.027
	(0.649)	(0.000)	(0.068)	(0.161)
ATSIM	-0.048	-0.015	-0.003	0.009
	(0.183)	(0.597)	(0.890)	(0.601)
Log Assets	-0.052	-0.033	-0.034	-0.018
	(0.107)	(0.285)	(0.190)	(0.448)
Log Market to Book	0.099**	0.116***	0.081***	0.096***
	(0.010)	(0.001)	(0.002)	(0.000)
Cash to Assets	-0.298	-0.097	-0.086	-0.042
	(0.126)	(0.614)	(0.462)	(0.702)
Advertising to Assets	0.275	0.090	-1.249*	-1.180*
	(0.773)	(0.906)	(0.094)	(0.092)
R&D to Assets	-1.100*	-0.801	-0.482	-0.349
	(0.052)	(0.104)	(0.172)	(0.221)
Leverage Ratio	0.094	0.065	0.077	0.057
	(0.427)	(0.537)	(0.344)	(0.419)
Pct. share held by inst.inv.	-0.123	-0.170*	-0.206***	-0.254***
	(0.210)	(0.062)	(0.008)	(0.002)
HHI	0.303*	0.352**	0.037	0.027
	(0.080)	(0.016)	(0.598)	(0.592)
Num. of firms in the industry	0.160**	0.174***	0.056***	0.049***
	(0.011)	(0.006)	(0.006)	(0.005)
N	15337	15337	15337	15337
Adjusted R^2	0.83	0.84	0.66	0.67
Deal x Firm FE	Yes	No	Yes	No
Deal FE	No	Yes	No	Yes
Firm FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes

Table C.7: Mutual Fund Scandal

This table presents the 2SLS estimates. Panel A presents the results for the first stage. It also presents the second stage for industry-adjusted gross margin. Industry is defined using the 4-digit SIC code in columns (1)-(3) and the FIC400 code in columns (4)-(6). Panel B presents the results for industry-adjusted R&D to sales ratio, industry-adjusted EBITDA to sales ratio and industry-adjusted net income to sales ratio. Industry is defined using the 4-digit SIC code in columns (1)-(3) and the FIC400 code in columns (4)-(6). Variable definitions are in Appendix A.1. To conserve space, the variable names in Panel A are shortened: SCO (ScandalComOwn), CO(ComOwn). All continuous variables are winsorized at the 1st and the 99th percentile. Standard errors are clustered by firm. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

Panel A: 2SLS estimation results for Ind. Adj. Gross Margin

	1st Stage		2nd Stage(SIC)	1st Stage		2nd Stage(FIC)
	CO	CO x ATSIM		CO	CO x ATSIM	
CO			-0.598			-0.198
			(0.216)			(0.600)
CO x ATSIM			0.401**			0.287*
			(0.046)			(0.060)
SCO	-0.086***	-0.087***		-0.086***	-0.058*	
	(0.000)	(0.001)		(0.000)	(0.081)	
SCO x ATSIM	-0.016*	0.225***		-0.017*	0.284***	
	(0.089)	(0.000)		(0.094)	(0.000)	
ATSIM	0.047***	0.156***	-0.062	0.072***	0.189***	0.001
	(0.000)	(0.000)	(0.207)	(0.000)	(0.000)	(0.983)
Log Assets	-0.055***	-0.050***	-0.099***	-0.066***	-0.067***	-0.076***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log Market to Book	-0.075***	0.006	-0.086	-0.079***	-0.016	-0.135*
	(0.000)	(0.822)	(0.254)	(0.000)	(0.583)	(0.067)
Cash to Assets	-0.119**	0.061	-0.578**	-0.248***	0.124	-0.375
	(0.012)	(0.435)	(0.016)	(0.000)	(0.147)	(0.172)
Advertising to Assets	-0.753***	-0.481	-1.071	-0.738***	-0.172	-1.829***
	(0.005)	(0.213)	(0.167)	(0.005)	(0.730)	(0.004)
R&D to Assets	0.113	-0.559***	-2.760***	-0.008	-0.733***	-1.860**
	(0.219)	(0.001)	(0.000)	(0.925)	(0.000)	(0.023)
Leverage Ratio	-0.137***	0.234**	-0.040	-0.131**	0.155	0.156

	(0.009)	(0.026)	(0.870)	(0.011)	(0.179)	(0.496)
%share held by inst.inv.	1.434***	0.219***	0.928	1.486***	0.297***	0.402
	(0.000)	(0.005)	(0.161)	(0.000)	(0.000)	(0.444)
HHI	-1.008***	0.314***	-1.069*	-0.976***	0.533***	-1.006**
	(0.000)	(0.000)	(0.055)	(0.000)	(0.000)	(0.029)
Log(1+#firms in ind.)	-0.049***	0.027*	0.017	-0.033***	0.038**	0.019
	(0.000)	(0.066)	(0.686)	(0.000)	(0.021)	(0.599)
GrossMargin(2003)	-0.082**	0.066	1.890***	-0.090***	0.069	1.918***
	(0.028)	(0.376)	(0.000)	(0.010)	(0.374)	(0.000)
ComOwn(2003)	3.925***	1.014***	2.645	3.704***	0.862***	1.028
	(0.000)	(0.000)	(0.109)	(0.000)	(0.000)	(0.400)
N	8166	8166	8166	8166	8166	8166
Adjusted R^2			0.06			0.07
Year FE			Yes			Yes
1st Stage Test Statistics						
Sanderson-Windmeijer	85	47		96	59	
2nd Stage Test Statistics						
KPF-stat			46.72			42.66

Panel B: 2SLS estimation results for Ind. Adj. R&D to sales ratio, EBITDA to sales ratio, and net income to sales ratio

	SIC			FIC		
	R&D/SALE	EBIDTA/SALE	NI/SALE	R&D/SALE	EBIDTA/SALE	NI/SALE
ComOwn	0.063	-1.210**	-1.383**	-0.064	-0.512	-0.482
	(0.255)	(0.012)	(0.011)	(0.110)	(0.208)	(0.269)
ComOwn x ATSIM	-0.040**	0.490**	0.570**	-0.022*	0.368**	0.410**
	(0.040)	(0.019)	(0.016)	(0.087)	(0.030)	(0.025)
ATSIM	0.016***	-0.065	-0.067	0.004	0.095*	0.107**
	(0.000)	(0.215)	(0.265)	(0.410)	(0.057)	(0.049)
Log Assets	0.014***	-0.130***	-0.135***	-0.002	-0.074***	-0.075***
	(0.000)	(0.000)	(0.000)	(0.616)	(0.004)	(0.008)
Log Market to Book	-0.043***	-0.209**	-0.269***	-0.036***	-0.258***	-0.289***
	(0.000)	(0.020)	(0.010)	(0.000)	(0.005)	(0.005)
Cash to Assets	0.150***	-1.584***	-1.469***	0.016	-1.179***	-0.925**
	(0.000)	(0.000)	(0.000)	(0.507)	(0.001)	(0.013)
Advertising to Assets	0.242*	-2.728***	-2.810***	0.276**	-3.401***	-3.400***
	(0.091)	(0.002)	(0.005)	(0.010)	(0.000)	(0.000)
R&D to Assets	0.337***	-3.076***	-3.640***	0.094**	-1.296	-1.606
	(0.000)	(0.001)	(0.001)	(0.031)	(0.191)	(0.147)
Leverage Ratio	0.064**	-0.263	-0.539	0.000	0.035	-0.146
	(0.020)	(0.340)	(0.103)	(0.991)	(0.898)	(0.642)
Pct share held by inst.inv.	-0.104	2.190***	2.415***	0.113*	1.183**	1.143*
	(0.191)	(0.001)	(0.001)	(0.058)	(0.036)	(0.059)
HHI	0.088	-2.014***	-2.309***	0.046	-1.637***	-1.689***
	(0.144)	(0.000)	(0.000)	(0.255)	(0.001)	(0.002)
Log(1+num firms in the industry)	-0.054***	0.068	0.058	-0.025***	0.020	0.023
	(0.000)	(0.160)	(0.298)	(0.000)	(0.645)	(0.619)
GrossMargin(2003)	-0.039*	2.203***	2.484***	-0.130***	2.274***	2.420***
	(0.052)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ComOwn(2003)	-0.310	4.947***	5.596***	0.162	2.076	2.009
	(0.128)	(0.003)	(0.003)	(0.242)	(0.115)	(0.156)
N	8166	8166	8166	8166	8166	8166
Adjusted R^2	0.21	0.02	0.01	0.16	0.04	0.04
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
KPF-stat	30.74	99.56	99.56	38.69	89.83	89.83

Table C.8: Industry Quartile Analysis

This table presents the results for the hypothesis that the effects of common ownership are concentrated in firms belonging to industries with high product similarity. The dependent variable is Gross Margin in panel A, R&D to sales ratio in panel B, EBITDA to sales ratio in panel C, and net income to sales ratio in panel D. All dependent variables are industry-adjusted, where industry is defined using 4-digit SIC code in columns (1)-(3) and the FIC400 code in columns (4)-(6). Common ownership is equal to a firm's common ownership level if the firm belongs to an industry in the jth quartile of similarity, 0 otherwise. It is measured as the total numbers of shares owned by institutional investors that holds at least one other industry peer (*ComOwn*) in columns 1 and 4, proportion of peers connected to a given firm (*PropPeer*) in columns 2 and 5, and number of common owners (*NumMgnr*) in columns 3 and 6. The regression includes all firm level control variables used in panel regressions. Variable definitions are in Appendix A.1. All continuous variables are winsorized at 1st and 99th percentile. Standard errors are clustered by firm. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

Panel A. Dependent variable: Industry-adjusted Gross Margin

	SIC			FIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn Similarity Quartile 1	-0.006***			-0.002		
	(0.009)			(0.415)		
ComOwn Similarity Quartile 2	-0.003			-0.008***		
	(0.356)			(0.001)		
ComOwn Similarity Quartile 3	0.016***			0.002		
	(0.000)			(0.423)		
ComOwn Similarity Quartile 4	0.037***			0.012***		
	(0.000)			(0.007)		
PropPeer Similarity Quartile 1		-0.009***			-0.003*	
		(0.000)			(0.095)	
PropPeer Similarity Quartile 2		-0.006**			-0.006***	
		(0.013)			(0.001)	
PropPeer Similarity Quartile 3		0.008***			0.002	
		(0.008)			(0.389)	
PropPeer Similarity Quartile 4		0.027***			0.015***	
		(0.000)			(0.000)	
NumMgnr Similarity Quartile 1			-0.003			0.002
			(0.232)			(0.436)
NumMgnr Similarity Quartile 2			-0.005*			-0.004
			(0.055)			(0.147)
NumMgnr Similarity Quartile 3			0.009***			0.004
			(0.006)			(0.150)
NumMgnr Similarity Quartile 4			0.021***			0.015***
			(0.000)			(0.000)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.69	0.69	0.69	0.59	0.59	0.59
Control Var	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
p-value(4-1)	0.00	0.00	0.00	0.00	0.00	0.00

Panel B. Dependent variable: Industry-adjusted R&D to sales ratio

	SIC			FIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn Similarity Quartile 1	0.006***			0.001		
	(0.000)			(0.516)		
ComOwn Similarity Quartile 2	0.002*			0.001		
	(0.100)			(0.304)		
ComOwn Similarity Quartile 3	-0.006***			-0.004**		
	(0.001)			(0.017)		
ComOwn Similarity Quartile 4	-0.016***			-0.010***		
	(0.000)			(0.000)		
PropPeer Similarity Quartile 1		0.005***			0.003**	
		(0.000)			(0.017)	
PropPeer Similarity Quartile 2		0.003**			0.002**	
		(0.011)			(0.032)	
PropPeer Similarity Quartile 3		-0.004***			-0.002	
		(0.008)			(0.156)	
PropPeer Similarity Quartile 4		-0.012***			-0.008***	
		(0.000)			(0.000)	
NumMgnr Similarity Quartile 1			0.006***			0.003**
			(0.000)			(0.016)
NumMgnr Similarity Quartile 2			0.003***			0.002
			(0.006)			(0.215)
NumMgnr Similarity Quartile 3			-0.004**			-0.001
			(0.012)			(0.452)
NumMgnr Similarity Quartile 4			-0.012***			-0.007***
			(0.000)			(0.002)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.63	0.63	0.63	0.50	0.50	0.50
Control Var	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
p-value(4-1)	0.00	0.00	0.00	0.00	0.00	0.00

Panel C. Dependent variable: Industry-adjusted EBITDA to sales ratio

	SIC			FIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn Similarity Quartile 1	-0.013			-0.003		
	(0.213)			(0.759)		
ComOwn Similarity Quartile 2	-0.004			-0.004		
	(0.755)			(0.756)		
ComOwn Similarity Quartile 3	0.032*			0.021		
	(0.070)			(0.238)		
ComOwn Similarity Quartile 4	0.130***			0.098**		
	(0.000)			(0.010)		
PropPeer Similarity Quartile 1		-0.033***			-0.014	
		(0.001)			(0.183)	
PropPeer Similarity Quartile 2		-0.025**			-0.012	
		(0.019)			(0.267)	
PropPeer Similarity Quartile 3		-0.002			0.006	
		(0.890)			(0.604)	
PropPeer Similarity Quartile 4		0.090***			0.078***	
		(0.000)			(0.001)	
NumMgnr Similarity Quartile 1			-0.004			-0.007
			(0.730)			(0.451)
NumMgnr Similarity Quartile 2			-0.012			-0.009
			(0.244)			(0.403)
NumMgnr Similarity Quartile 3			0.015			0.012
			(0.225)			(0.322)
NumMgnr Similarity Quartile 4			0.059***			0.054**
			(0.003)			(0.012)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.50	0.50	0.50	0.47	0.47	0.47
Control Var	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
p-value(4-1)	0.00	0.00	0.00	0.00	0.00	0.00

Panel D. Dependent variable: Industry-adjusted NI to sales ratio

	SIC			FIC		
	(1)	(2)	(3)	(4)	(5)	(6)
ComOwn Similarity Quartile 1	-0.016***			-0.007		
	(0.003)			(0.194)		
ComOwn Similarity Quartile 2	-0.017***			-0.018***		
	(0.003)			(0.002)		
ComOwn Similarity Quartile 3	0.029***			0.004		
	(0.000)			(0.558)		
ComOwn Similarity Quartile 4	0.050***			0.028***		
	(0.000)			(0.005)		
PropPeer Similarity Quartile 1		-0.022***			-0.006	
		(0.000)			(0.234)	
PropPeer Similarity Quartile 2		-0.020***			-0.011**	
		(0.000)			(0.020)	
PropPeer Similarity Quartile 3		0.013**			0.009	
		(0.019)			(0.110)	
PropPeer Similarity Quartile 4		0.037***			0.041***	
		(0.000)			(0.000)	
NumMgnr Similarity Quartile 1			-0.012*			-0.010
			(0.063)			(0.162)
NumMgnr Similarity Quartile 2			-0.021***			-0.014**
			(0.000)			(0.024)
NumMgnr Similarity Quartile 3			0.016**			0.003
			(0.030)			(0.623)
NumMgnr Similarity Quartile 4			0.026***			0.028***
			(0.002)			(0.000)
N	59987	59987	59987	59987	59987	59987
Adjusted R^2	0.62	0.62	0.62	0.57	0.57	0.57
Control Var	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
p-value(4-1)	0.00	0.00	0.00	0.00	0.00	0.00

Table C.9: Industry Quartile Analysis – M&A of Financial Institutions

This table reports the results for the difference-in-differences estimation using the M&A of financial institutions as an exogenous shock to a firm's common ownership level. The dependent variable is Gross Margin in column 1, R&D to asset ratio in column 2, EBITDA to sales ratio in column 3, and net income to sales ratio in column 4. Treated firm is a firm in the portfolio of target or acquirer that experienced an increase in common ownership post M&A. Control firm is a firm in the portfolio of either target or acquirer that did not experience a change in its common ownership levels post acquisition. Similarity quartile j is 1 if the firm belongs to an industry in the jth quartile of similarity, 0 otherwise. All continuous variables are winsorized at 1st and 99th percentile. Standard errors are clustered by firm. p-values are in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

Panel A. Industry Quartile Analysis using 4-digit SIC code

	GrossMargin	R&D/SALE	EBITDA/SALE	NI/SALE
	(1)	(2)	(3)	(4)
Treated	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
Post	-0.008	-0.000	0.047	0.065*
	(0.582)	(0.984)	(0.147)	(0.067)
Treated x Post	-0.023	0.062**	-0.281***	-0.326***
	(0.320)	(0.049)	(0.002)	(0.001)
Sim. Quartile 2 Dummy	0.044*	-0.030***	0.214***	0.240***
	(0.070)	(0.004)	(0.000)	(0.000)
Treated x Sim. Quartile 2 Dummy	-0.045	0.017	-0.048	-0.130
	(0.497)	(0.655)	(0.697)	(0.424)
Post x Sim. Quartile 2 Dummy	-0.035*	0.022*	-0.136***	-0.154***
	(0.094)	(0.057)	(0.001)	(0.001)
Treated x Post x Sim. Quartile 2 Dummy	0.035	-0.042	0.342**	0.307**
	(0.335)	(0.270)	(0.010)	(0.045)
Sim. Quartile 3 Dummy	0.071*	-0.071***	0.321***	0.374***
	(0.086)	(0.000)	(0.000)	(0.000)
Treated x Sim. Quartile 3 Dummy	0.001	0.030	0.086	0.308
	(0.995)	(0.468)	(0.596)	(0.171)
Post x Sim. Quartile 3 Dummy	0.049**	0.011	-0.083**	-0.129***
	(0.023)	(0.234)	(0.028)	(0.002)
Treated x Post x Sim. Quartile 3 Dummy	0.132*	-0.146***	0.497***	0.553***
	(0.056)	(0.000)	(0.000)	(0.000)
Sim. Quartile 4 Dummy	0.027	-0.011	0.094	0.087
	(0.621)	(0.613)	(0.224)	(0.343)
Treated x Sim. Quartile 4 Dummy	0.267*	-0.084*	0.368**	0.615**
	(0.065)	(0.056)	(0.040)	(0.014)
Post x Sim. Quartile 4 Dummy	-0.054*	0.018*	-0.087**	-0.123***
	(0.074)	(0.064)	(0.040)	(0.009)
Treated x Post x Sim. Quartile 4 Dummy	0.148**	-0.042	0.287***	0.259**
	(0.027)	(0.223)	(0.007)	(0.039)
N	15337	15337	15337	15337
Adjusted R^2	0.89	0.76	0.82	0.81
Yes	Yes	Yes	Yes	Yes
Deal x Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Panel B. Industry Quartile Analysis using FIC400 code

	GrossMargin	R&D/SALE	EBITDA/SALE	NI/SALE
	(1)	(2)	(3)	(4)
Treated	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
Post	0.015	-0.012*	0.072**	0.106*
	(0.142)	(0.077)	(0.042)	(0.066)
Treated x Post	-0.048**	0.020	-0.087*	-0.099
	(0.041)	(0.128)	(0.095)	(0.168)
Sim. Quartile 2 Dummy	0.015	-0.001	0.079*	0.083
	(0.194)	(0.850)	(0.054)	(0.109)
Treated x Sim. Quartile 2 Dummy	-0.004	0.019	-0.084	-0.059
	(0.948)	(0.543)	(0.471)	(0.713)
Post x Sim. Quartile 2 Dummy	-0.025*	0.013	-0.086**	-0.098*
	(0.086)	(0.114)	(0.027)	(0.081)
Treated x Post x Sim. Quartile 2 Dummy	0.023	-0.015	0.062	0.049
	(0.539)	(0.510)	(0.445)	(0.656)
Sim. Quartile 3 Dummy	0.033	-0.041***	0.167***	0.177**
	(0.229)	(0.001)	(0.003)	(0.012)
Treated x Sim. Quartile 3 Dummy	0.087	0.008	0.152	0.261
	(0.318)	(0.849)	(0.366)	(0.194)
Post x Sim. Quartile 3 Dummy	0.000	0.006	-0.051	-0.062
	(0.996)	(0.499)	(0.174)	(0.248)
Treated x Post x Sim. Quartile 3 Dummy	0.039	-0.034	0.085	0.077
	(0.278)	(0.159)	(0.283)	(0.465)
Sim. Quartile 4 Dummy	0.062*	-0.056***	0.216***	0.204**
	(0.065)	(0.000)	(0.001)	(0.025)
Treated x Sim. Quartile 4 Dummy	0.014	0.002	0.108	0.213
	(0.877)	(0.968)	(0.533)	(0.317)
Post x Sim. Quartile 4 Dummy	-0.034*	0.029**	-0.140***	-0.172**
	(0.058)	(0.031)	(0.007)	(0.034)
Treated x Post x Sim. Quartile 4 Dummy	0.114***	-0.044**	0.235***	0.248**
	(0.001)	(0.034)	(0.003)	(0.030)
N	15337	15337	15337	15337
Adjusted R^2	0.67	0.61	0.71	0.75
Yes	Yes	Yes	Yes	Yes
Deal x Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table C.10: GDP Price Index

This table reports the results for the difference-in-differences estimation using the M&A of financial institutions as an exogenous shock to a firm's common ownership level. The dependent variable is Log of Price Index. Treated (control) firm is a firm in the portfolio of target or acquirer that experienced (did not experience) an increase in common ownership post M&A. Industry is defined using 4-digit SIC code in columns 1 and 2 and FIC400 code in columns 3 and 4. Similarity quartile j is 1 if the firm belongs to an industry in the jth quartile of similarity, 0 otherwise. All continuous variables are winsorized at 1st and 99th percentile. Standard errors are clustered by industry. p-values are in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

	SIC		FIC	
	(1)	(2)	(3)	(4)
Treated	0.000	0.007	0.000	0.010
	(.)	(0.609)	(.)	(0.350)
Post	0.047***	0.041***	0.046***	0.040***
	(0.003)	(0.003)	(0.001)	(0.001)
Treated x Post	-0.044*	-0.037*	-0.043**	-0.037***
	(0.060)	(0.050)	(0.015)	(0.010)
Sim. Quartile 2 Dummy	0.010	0.005	0.014	0.009
	(0.523)	(0.620)	(0.196)	(0.233)
Treated x Sim. Quartile 2 Dummy	0.006	0.032*	-0.004	0.027**
	(0.806)	(0.051)	(0.879)	(0.048)
Post x Sim. Quartile 2 Dummy	-0.011	-0.002	-0.009	-0.001
	(0.513)	(0.850)	(0.450)	(0.901)
Treated x Post x Sim. Quartile 2 Dummy	-0.019	-0.019	-0.018	-0.017
	(0.567)	(0.410)	(0.447)	(0.340)
Sim. Quartile 3 Dummy	0.063**	0.061***	0.075***	0.069***
	(0.036)	(0.006)	(0.002)	(0.000)
Treated x Sim. Quartile 3 Dummy	-0.004	0.022	-0.020	0.019
	(0.936)	(0.258)	(0.597)	(0.219)
Post x Sim. Quartile 3 Dummy	-0.064***	-0.062***	-0.065***	-0.062***
	(0.002)	(0.000)	(0.000)	(0.000)
Treated x Post x Sim. Quartile 3 Dummy	0.017	0.019	0.018	0.020
	(0.530)	(0.421)	(0.383)	(0.237)
Sim. Quartile 4 Dummy	0.109**	0.112***	0.121***	0.122***
	(0.023)	(0.005)	(0.002)	(0.000)
Treated x Sim. Quartile 4 Dummy	-0.048	-0.016	-0.066	-0.021
	(0.408)	(0.556)	(0.186)	(0.365)
Post x Sim. Quartile 4 Dummy	-0.115	-0.107*	-0.114*	-0.106**
	(0.116)	(0.098)	(0.057)	(0.045)
Treated x Post x Sim. Quartile 4 Dummy	0.084*	0.072*	0.085**	0.074**
	(0.050)	(0.050)	(0.016)	(0.012)
TSIM	0.088	0.139	-0.161	-0.127
	(0.771)	(0.580)	(0.487)	(0.489)
N	12286	12295	12286	12295
Adjusted R^2	0.68	0.66	0.68	0.66
Controls	Yes	Yes	Yes	Yes
Deal x Firm FE	Yes	No	Yes	No
Deal FE	No	Yes	No	Yes
Firm FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes

Table C.11: Long-term Investors

This table presents the results for the hypothesis that the effects of common ownership are concentrated in firms belonging to industries with high product similarity. The dependent variables are gross margin (column 1), R&D to sales ratio (column 2), EBITDA to sales ratio (column 3), and NI to sales ratio (column 4). The dependent variables are industry adjusted where industry is defined using 4-digit SIC code in Panel A and FIC400 code in Panel B. Common ownership is measured using dedicated and quasi-indexer investors and is measured as the total numbers of shares owned by institutional investors that holds at least one other industry peer (*ComOwn*). The regression includes all firm level control variables used in panel regressions.Variable definitions are in Appendix A.1. All continuous variables are winsorized at 1st and 99th percentile. Standard errors are clustered by firm. p-values are in parentheses.

Panel A. Defining industry using 4-digit SIC code

	GrossMargin	R&D/SALE	EBITDA/SALE	NI/SALE
	(1)	(2)	(3)	(4)
ComOwn Similarity Quartile 1	-0.003*	0.003***	-0.007	-0.009**
	(0.076)	(0.001)	(0.285)	(0.029)
ComOwn Similarity Quartile 2	-0.004**	0.003***	-0.007	-0.012***
	(0.013)	(0.000)	(0.350)	(0.001)
ComOwn Similarity Quartile 3	0.009***	-0.002*	0.006	0.012**
	(0.000)	(0.099)	(0.591)	(0.020)
ComOwn Similarity Quartile 4	0.023***	-0.007***	0.123***	0.027***
	(0.000)	(0.000)	(0.000)	(0.000)
N	59987	59987	59987	59987
Adjusted R^2	0.69	0.63	0.50	0.62
Control Var	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
p-value(4-1)	0.00	0.00	0.00	0.00

Panel B. Defining industry using FIC400 code

	GrossMargin	R&D/SALE	EBITDA/SALE	NI/SALE
	(1)	(2)	(3)	(4)
ComOwn Similarity Quartile 1	0.001	0.001	-0.003	-0.000
	(0.583)	(0.259)	(0.644)	(0.967)
ComOwn Similarity Quartile 2	-0.004***	0.002**	-0.013*	-0.013***
	(0.006)	(0.033)	(0.094)	(0.000)
ComOwn Similarity Quartile 3	0.007***	-0.002*	0.003	0.006
	(0.002)	(0.071)	(0.804)	(0.170)
ComOwn Similarity Quartile 4	0.017***	-0.008***	0.101***	0.034***
	(0.000)	(0.000)	(0.006)	(0.000)
N	59987	59987	59987	59987
Adjusted R^2	0.59	0.50	0.47	0.57
Control Var	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
p-value(4-1)	0.00	0.00	0.00	0.00

APPENDIX D

VARIABLE DEFINITIONS FOR SECTION 3

Table D.1: Variable Definitions

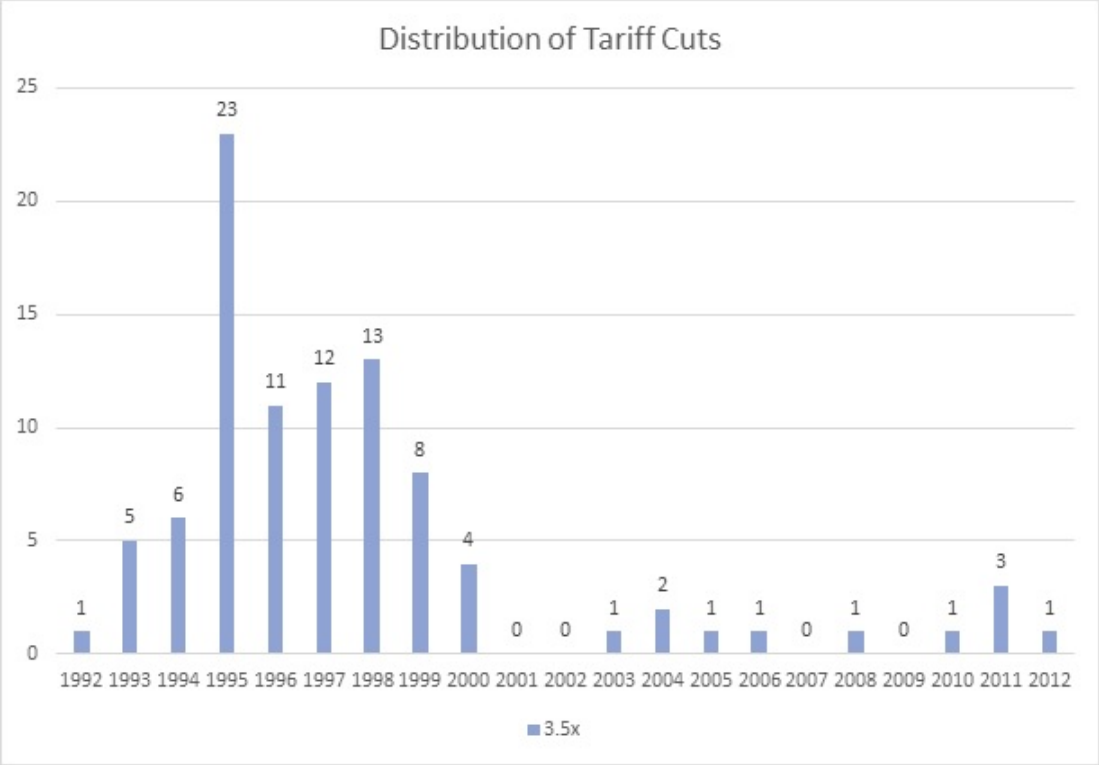
Explanatory Variables:	
Overconfident	An indicator variable for overconfident CEOs. Following Campbell et al. (2011), a CEO is identified as overconfident if they hold options that are at least 67% in the money, at least twice during their tenure. The classification begins from the first time they display such behavior.
Treated	An indicator variable for firms in industries that are face to tariffs cuts at least 3.5 times higher than the median tariff cut during the sample.
Post	An indicator variable for years after tariff cuts described above.
Outcome Variables:	
Gross Margin	Gross profit (SALE - COGS) divided by sales (SALE)
Operating Margin	Operating profit (SALE - COGS - XSGA) divided by sales (SALE)
R&D/Sales	The ratio of R&D expenses (XRD) to sales (SALE). Missing R&D expenses are replaced by 0.
Advertising/Sales	The ratio of advertising expenses (XAD) to sales (SALE). Missing advertising expenses are replaced by 0.
Ln(Market Share)	Natural log of ratio of sale (SALE) to total industry sales, where industry is defined using the 4-digit SIC code (SICH)
Q	Tobin's Q defined as the ratio of a firm's market value of assets (AT + MVE - CEQ - TXDITC) to book value of assets (AT)
Control Variables:	
Log Assets	Natural log of total assets (AT)
Leverage	Long term debt (DLTT) divided by total assets (AT)
Log MB	Natural log of Market to Book ratio, defined as market value of equity plus book value of debt divided by total assets. (CSHO x PRCCF + DLC + DLTT)/AT
Cash/Assets	Ratio of cash (CHE) holdings and total assets (AT)
Cash Flow/Assets	Ratio of income before extraordinary items cash flow (IBC) to total assets (AT)
Idiosyncratic Volatility	Mean squared error obtained from regressing daily firm stock returns on Fama-French three factors model for a year.
Log Delta	Natural log of (1+Delta), where Delta is the change in a manager's wealth for a 1% change in a firm's stock price.
Log Vega	Natural log of (1+Vega), where Vega is the change in a manager's wealth for a 0.01 change in standard deviation of a firm's stock returns.
CEO Duality	An indicator variable for firm years in which the CEO is also the chairman of the board
Turnover Dummy	An indicator variable for firm years in which the CEO in year t is different from CEO in year t-1

APPENDIX E

FIGURE FOR SECTION 3

Distribution of Tariff Cuts for manufacturing firms (SIC 2000-3999) from 1992-2012. Cut is defined as a dummy = 1 if the tariff reduction was at least 3.5 times the median reduction over the years and was not followed by an equivalent increase. Y-axis the number of unique industries that experienced a cut in the given year.

Figure E.1: Distribution of Tariff Cuts



APPENDIX F

TABLES FOR SECTION 3

Table F.1: Descriptive Statistics

Panel A presents the summary statistics of the complete sample. Panel B compares the treated firms and the matched control firms on the covariates used for matching. Treatment firms are defined as firms in industries that experience a tariff reduction of at least 3.5 times larger than the median tariff reduction. The sample begins with all firm-years from 1992 to 2012 with non-missing matching variables. For each treated firm, we find a control firm in the same year, with the same level of CEO optimism (Overconfident: 0 or 1) with the minimum Mahanalobis distance based on the variables presented in the table. The Mahanalobis distance between two firms j and k is given by $\sqrt{((x_j - x_k)' W_x^{-1} (x_j - x_k))}$ where, x is a vector of covariates and W is the variance-covariance matrix of the covariates. The matching process is described in detail in section 3.3.3 of the text. The last column gives the p-value of Satterthwaite's t-tests assuming unequal variances. Panel C reports the parallel trend tests for our dependent variables. The last column gives the p-values for the difference in means tests for the average growth rate from t-4 to t-1. For each outcome variable, we calculated year on year percentage growth from t-4 to t-1 and averaged out the three percentage changes. If data was missing for t-4, we averaged out two data points. If data was also missing for t-3, we used the previous year percentage growth. Panel C presents the year-over-year changes (Δ) in the outcome variables among the treatment and matched control samples between years -4 and -1 relative to the corresponding tariff shock year. All variables are defined in Appendix D.1.

Panel A: Descriptive statistics

	N	Mean	Std. Dev.	25th	Median	75th
Firm Characteristics						
Log Assets	1994	7.46	1.49	6.54	7.47	8.48
Log Market to Book	1994	0.44	0.65	-0.04	0.37	0.86
Leverage Ratio	1994	0.18	0.14	0.06	0.17	0.28
Cash to Assets	1994	0.14	0.18	0.02	0.06	0.17
Cash Flow to Assets	1994	0.04	0.12	0.02	0.06	0.1
Idiosyncratic Volatility	1994	0.02	0.01	0.02	0.02	0.03
Operating Margin	1994	0.09	0.45	0.09	0.14	0.21
Gross Margin	1994	0.33	0.44	0.22	0.37	0.56
R&D to Sale	1994	0.09	0.19	0	0.03	0.1
Ad to Sale	1994	0.01	0.03	0	0	0
Market Share	1994	0.21	0.26	0.03	0.1	0.32
Log Market Share	1994	-2.53	1.76	-3.54	-2.27	-1.13
Tobin's Q	1994	2.14	1.18	1.25	1.72	2.68
CEO related variables						
Overconfidence Dummy	1994	0.61	0.49	0	1	1
Log Delta	1994	5.58	1.32	4.68	5.49	6.48
Log Vega	1994	4	1.38	3.18	4.05	4.88
CEO Duality	1994	0.72	0.45	0	1	1
Male CEO	1994	0.99	0.09	1	1	1

Panel B: Differences in firm-characteristics post-match

		N	Mean	Std. Dev.	25th	Median	75th	p-value
Log Assets	Treated	168	7.15	1.6	5.92	7.01	8.38	0.39
	Control	168	7.29	1.42	6.57	7.31	8.09	
Log Market to Book	Treated	168	0.42	0.55	-0.02	0.44	0.81	0.7
	Control	168	0.4	0.54	0.06	0.32	0.73	
Leverage Ratio	Treated	168	0.16	0.14	0.04	0.14	0.27	0.97
	Control	168	0.16	0.12	0.05	0.15	0.24	
Cash/Assets	Treated	168	0.15	0.19	0.03	0.07	0.18	0.24
	Control	168	0.13	0.18	0.01	0.05	0.16	
Cash Flow/Assets	Treated	168	0.03	0.12	0.02	0.06	0.09	0.11
	Control	168	0.05	0.08	0.04	0.07	0.09	
Log Delta	Treated	168	5.33	1.34	4.38	5.19	6.26	0.86
	Control	168	5.36	1.03	4.59	5.23	6.01	
Log Vega	Treated	168	3.62	1.39	2.84	3.53	4.56	0.27
	Control	168	3.77	1.08	3.07	3.84	4.51	
Overconfidence Dummy	Treated	168	0.58	0.5	0	1	1	0.27
	Control	168	0.52	0.5	0	1	1	
Idiosyncratic Volatility	Treated	168	0.02	0.01	0.01	0.02	0.03	0.92
	Control	168	0.02	0.01	0.01	0.02	0.03	
CEO Duality	Treated	168	0.66	0.47	0	1	1	0.16
	Control	168	0.73	0.44	0	1	1	
Turnover Dummy	Treated	168	0.07	0.26	0	0	0	0.66
	Control	168	0.06	0.24	0	0	0	

Panel C: Parallel Trends Test

Difference in Variables	Untreated	Treated	p-value
Δ Operating Margin	0.016	0.025	0.57
Δ Gross Margin	0.010	0.009	0.90
Δ R&D/Sale	0.001	0.002	0.98
Δ AdExp/Sale	-0.004	-0.002	0.27
Δ Market Share	0.055	0.047	0.79
Δ Q	0.000	-0.006	0.89

Table F.2: Results of Triple Difference Regressions for Operating and Gross Margins

Panel A [Panel B] of this table shows the effect of overconfident CEOs on Operating Margin [Gross Margin] following tariff shocks using the sample of treated and matched control firms. The sample begins with all firm-years from 1992 to 2012 with non-missing matching variables. Treatment firms are defined as firms in industries that experience a tariff reduction of a magnitude which is at least 3.5 times larger than the median tariff reduction. For each treated firm, we find a control firm in the same year, with the same level of CEO optimism (Overconfident: 0 or 1) with the minimum Mahanalobis distance based on the variables presented in Table F.1, Panel A. The matching process is described in detail in section 3.3.3 of the text. Columns (1), (2), (3) and (4) use the sample within a one-year (-1, +1), two-year (-2, +2), three-year (-3, +3), and four-year (-4, +4) window around the tariff shock, respectively. All variables are defined in Appendix D.1. Standard errors are clustered within industry defined by four-digit SIC codes. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

Panel A: Operating Margin

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Post x Overconfident x Treated	-0.295***	-0.223***	-0.204**	-0.171**
	(0.004)	(0.010)	(0.012)	(0.012)
Post	-0.099	-0.094	-0.08	-0.059
	(0.141)	(0.129)	(0.119)	(0.170)
Overconfident	0.022	-0.013	-0.024	-0.025
	(0.776)	(0.736)	(0.416)	(0.372)
Post x Overconfident	0.142**	0.113*	0.099*	0.065
	(0.023)	(0.056)	(0.050)	(0.100)
Treated	-0.121**	-0.093**	-0.101**	-0.094**
	(0.025)	(0.032)	(0.021)	(0.027)
Post x Treated	0.112**	0.087*	0.088**	0.078**
	(0.046)	(0.052)	(0.035)	(0.036)
Overconfident x Treated	0.028	0.033	0.049	0.049
	(0.713)	(0.52)	(0.235)	(0.174)
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	670	1205	1639	1989
R^2	0.676	0.648	0.632	0.631

Panel B: Gross Margin

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Post x Overconfident x Treated	-0.173**	-0.146**	-0.141**	-0.119**
	(0.045)	(0.017)	(0.013)	(0.02)
Post	-0.006	-0.041	-0.04	-0.027
	(0.880)	(0.101)	(0.105)	(0.27)
Overconfident	-0.002	-0.033	-0.047*	-0.054**
	(0.975)	(0.208)	(0.069)	(0.039)
Post x Overconfident	0.04	0.054	0.063	0.044
	(0.412)	(0.116)	(0.106)	(0.215)
Treated	-0.134**	-0.113**	-0.109**	-0.093*
	(0.012)	(0.036)	(0.032)	(0.050)
Post x Treated	0.062	0.066	0.068*	0.054
	(0.444)	(0.211)	(0.093)	(0.167)
Overconfident x Treated	0.041	0.041	0.053	0.053
	(0.526)	(0.385)	(0.202)	(0.175)
Controls	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	670	1205	1639	1989
R^2	0.654	0.653	0.650	0.655

Table F.3: Results of Triple Difference Regressions for R&D Expense to Sales

This table shows the effect of overconfident CEOs on R&D expenditure following tariff shocks using the sample of treated and matched control firms. The sample begins with all firm-years from 1992 to 2012 with non-missing matching variables. Treatment firms are defined as firms in industries that experience a tariff reduction of a magnitude which is at least 3.5 times larger than the median tariff reduction. For each treated firm, we find a control firm in the same year, with the same level of CEO optimism (Overconfident: 0 or 1) with the minimum Mahanalobis distance based on the variables presented in F.1, Panel A. The matching process is described in detail in section 3.3.3 of the text. Columns (1), (2), (3) and (4) use the sample within a one-year (-1, +1), two-year (-2, +2), three-year (-3, +3), and four-year (-4, +4) window around the tariff shock, respectively. All variables are defined in Appendix D.1. Standard errors are clustered within industry defined by four-digit SIC codes. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Post x Overconfident x Treated	0.074***	0.042*	0.035	0.025
	(0.007)	(0.072)	(0.172)	(0.304)
Post	0.029**	0.019*	0.014	0.007
	(0.011)	(0.064)	(0.146)	(0.399)
Overconfident	0.003	0.01	0.015	0.017
	(0.865)	(0.247)	(0.119)	(0.116)
Post x Overconfident	-0.052**	-0.033*	-0.029	-0.018
	(0.014)	(0.064)	(0.104)	(0.287)
Treated	0.032**	0.022	0.021	0.016
	(0.025)	(0.182)	(0.167)	(0.246)
Post x Treated	-0.042**	-0.028**	-0.030**	-0.026*
	(0.013)	(0.047)	(0.044)	(0.057)
Overconfident x Treated	-0.006	-0.005	-0.011	-0.013
	(0.761)	(0.689)	(0.256)	(0.247)
Controls	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	670	1205	1639	1989
R^2	0.851	0.838	0.823	0.818

Table F.4: Results of Triple Difference Regressions for Ad Expense to Sales

This table shows the effect of overconfident CEOs on advertising expenditure following tariff shocks using the sample of treated and matched control firms. The sample begins with all firm-years from 1992 to 2012 with non-missing matching variables. Treatment firms are defined as firms in industries that experience a tariff reduction of a magnitude which is at least 3.5 times larger than the median tariff reduction. For each treated firm, we find a control firm in the same year, with the same level of CEO optimism (Overconfident: 0 or 1) with the minimum Mahanalobis distance based on the variables presented in F.1, Panel A. The matching process is described in detail in section 3.3.3 of the text. Columns (1), (2), (3) and (4) use the sample within a one-year (-1, +1), two-year (-2, +2), three-year (-3, +3), and four-year (-4, +4) window around the tariff shock, respectively. All variables are defined in Appendix D.1. Standard errors are clustered within industry defined by four-digit SIC codes. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Post x Overconfident x Treated	0.006	0.010	0.013**	0.015**
	(0.261)	(0.110)	(0.026)	(0.010)
Post	0.006	0.008	0.009	0.009*
	(0.269)	(0.189)	(0.119)	(0.096)
Overconfident	0.007	0.006	0.008*	0.008*
	(0.178)	(0.153)	(0.077)	(0.065)
Post x Overconfident	-0.008	-0.012**	-0.013**	-0.014**
	(0.103)	(0.045)	(0.016)	(0.011)
Treated	0.004	0.003	0.004	0.004
	(0.341)	(0.484)	(0.331)	(0.228)
Post x Treated	-0.005	-0.007	-0.009*	-0.010*
	(0.321)	(0.196)	(0.087)	(0.054)
Overconfident x Treated	-0.010*	-0.006	-0.008*	-0.009*
	(0.093)	(0.178)	(0.088)	(0.072)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	670	1205	1639	1989
R^2	0.741	0.735	0.734	0.739

Table F.5: Results of Triple Difference Regressions for Market Share

This table shows the effect of overconfident CEOs on market share following tariff shocks using the sample of treated and matched control firms. The sample begins with all firm-years from 1992 to 2012 with non-missing matching variables. Treatment firms are defined as firms in industries that experience a tariff reduction of a magnitude which is at least 3.5 times larger than the median tariff reduction. For each treated firm, we find a control firm in the same year, with the same level of CEO optimism (Overconfident: 0 or 1) with the minimum Mahanalobis distance based on the variables presented in F.1, Panel A. The matching process is described in detail in section 3.3.3 of the text. Columns (1), (2), (3) and (4) use the sample within a one-year (-1, +1), two-year (-2, +2), three-year (-3, +3), and four-year (-4, +4) window around the tariff shock, respectively. All variables are defined in Appendix D.1. Standard errors are clustered within industry defined by four-digit SIC codes. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Post x Overconfident x Treated	0.194*	0.294**	0.338**	0.342**
	(0.099)	(0.026)	(0.024)	(0.036)
Post	0.118	0.143**	0.169***	0.198***
	(0.142)	(0.017)	(0.006)	(0.003)
Overconfident	0.275**	0.328***	0.325***	0.330***
	(0.041)	(0.004)	(0.003)	(0.003)
Post x Overconfident	-0.196**	-0.288***	-0.333***	-0.366***
	(0.016)	(0.000)	(0.000)	(0.000)
Treated	0.174	0.201	0.191	0.199
	(0.339)	(0.254)	(0.247)	(0.203)
Post x Treated	-0.165**	-0.211**	-0.206*	-0.211*
	(0.050)	(0.016)	(0.050)	(0.064)
Overconfident x Treated	-0.210	-0.245*	-0.266*	-0.272*
	(0.172)	(0.070)	(0.055)	(0.063)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	670	1205	1639	1989
R^2	0.956	0.947	0.942	0.939

Table F.6: Results of Triple Difference Regressions for Firm Value

This table shows the effect of overconfident CEOs on firm value (Tobin's Q) following tariff shocks using the sample of treated and matched control firms. The sample begins with all firm-years from 1992 to 2012 with non-missing matching variables. Treatment firms are defined as firms in industries that experience a tariff reduction of a magnitude which is at least 3.5 times larger than the median tariff reduction. For each treated firm, we find a control firm in the same year, with the same level of CEO optimism (Overconfident: 0 or 1) with the minimum Mahanalobis distance based on the variables presented in F.1, Panel A. The matching process is described in detail in section 3.3.3 of the text. Columns (1), (2), (3) and (4) use the sample within a one-year (-1, +1), two-year (-2, +2), three-year (-3, +3), and four-year (-4, +4) window around the tariff shock, respectively. All variables are defined in Appendix D.1. Standard errors are clustered within industry defined by four-digit SIC codes. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Post x Overconfident x Treated	0.354*	0.371**	0.278*	0.225
	(0.066)	(0.022)	(0.062)	(0.106)
Post	-0.048	-0.006	0.068	0.089
	(0.658)	(0.924)	(0.336)	(0.257)
Overconfident	0.403***	0.399***	0.304***	0.275***
	(0.000)	(0.000)	(0.000)	(0.002)
Post x Overconfident	-0.125	-0.085	-0.060	-0.069
	(0.392)	(0.363)	(0.492)	(0.416)
Treated	-0.022	0.076	0.133	0.139*
	(0.859)	(0.397)	(0.126)	(0.082)
Post x Treated	0.060	0.009	-0.018	0.005
	(0.641)	(0.928)	(0.851)	(0.954)
Overconfident x Treated	-0.261**	-0.277***	-0.167	-0.157
	(0.048)	(0.008)	(0.117)	(0.135)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	670	1205	1639	1989
R^2	0.728	0.722	0.726	0.725

Table F.7: Placebo Test Using Treatment firms with Placebo "Treatment" in Non-tariff-cut years

This table presents placebo tests regarding the effect of overconfident CEOs on firm policies and value following tariff shocks using the sample of treated and matched control firms. The sample begins with all firm-years from 1992 to 2012 with non-missing matching variables. Treatment firms are defined as firms in industries that experience a tariff reduction of a magnitude which is at least 3.5 times larger than the median tariff reduction. We randomly assign "placebo" tariff reductions to treated firms, using only years in which the firm was not subject to a tariff reduction. We require that the placebo reduction year be at least four years from an actual tariff reduction. Columns (1), (2), (3) and (4) use the sample within a one-year (-1, +1), two-year (-2, +2), three-year (-3, +3), and four-year (-4, +4) window around the tariff shock, respectively. All regressions include industry and year fixed effects and controls as used in the main analysis. The variables are defined in Appendix D.1. Standard errors are clustered within industry defined by four-digit SIC codes. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Panel A: Operating Margin				
Post x Overconfident x Treated	0.006	-0.035	-0.013	0.029
	(0.902)	(0.326)	(0.780)	(0.636)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	996	1864	2628	3305
R^2	0.495	0.500	0.527	0.543
Panel B: Gross Margin				
Post x Overconfident x Treated	0.042	0.036	0.066	0.088
	(0.467)	(0.616)	(0.416)	(0.355)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	996	1864	2628	3305
R^2	0.434	0.442	0.450	0.453
Panel C: R&D/Sale				
Post x Overconfident x Treated	0.005	-0.000	0.000	-0.001
	(0.803)	(0.987)	(0.997)	(0.946)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	996	1860	2622	3297
R^2	0.727	0.723	0.734	0.741

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Panel C: Advertising/Sale				
Post x Overconfident x Treated	-0.003	-0.000	0.002	0.001
	(0.251)	(0.895)	(0.408)	(0.598)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	996	1860	2622	2297
R^2	0.631	0.640	0.650	0.655
Panel D: Ln(Market Share)				
Post x Overconfident x Treated	0.016	0.014	0.018	0.063
	(0.824)	(0.860)	(0.823)	(0.449)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	996	1864	2628	3305
R^2	0.961	0.960	0.960	0.959
Panel E: Tobin's Q				
Post x Overconfident x Treated	0.005	-0.009	0.004	0.051
	(0.978)	(0.961)	(0.970)	(0.662)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	996	1864	2628	3305
R^2	0.784	0.772	0.761	0.760

Table F.8: Placebo Test Using Non-Treated Manufacturing Firms with Placebo "Treatment" in Tariff-cut years

This table presents the results of a placebo test where firms in manufacturing industries that never experienced a tariff cut are randomly assigned a tariff cut in the same year as the actual tariff cut. These "pseudo-treated" firm-years are matched with a set of control firms following the same algorithm used in our main tests. Columns (1), (2), (3) and (4) use the sample within a one-year (-1, +1), two-year (-2, +2), three-year (-3, +3), and four-year (-4, +4) window around the tariff shock, respectively. All regressions include industry and year fixed effects and controls as used in the main analysis. The variables are defined in Appendix D.1. Standard errors are clustered within industry defined by four-digit SIC codes. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Panel A: Operating Margin				
Post x Overconfident x Treated	-0.067	-0.075	-0.055	-0.062
	(0.191)	(0.151)	(0.246)	(0.194)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	523	938	1277	1543
R^2	0.360	0.361	0.365	0.372
Panel B: Gross Margin				
Post x Overconfident x Treated	-0.032	-0.038	-0.040	-0.052
	(0.442)	(0.351)	(0.318)	(0.213)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	523	938	1277	1543
R^2	0.581	0.552	0.542	0.529
Panel C: R&D/Sale				
Post x Overconfident x Treated	0.013	0.000	-0.011	-0.015
	(0.568)	(0.990)	(0.631)	(0.473)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	523	938	1277 1	543
R^2	0.731	0.696	0.698	0.712

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Panel C: Advertising/Sale				
Post x Overconfident x Treated	-0.002	-0.002	0.003	0.004
	(0.726)	(0.649)	(0.631)	(0.550)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	523	938	1277	1543
R^2	0.757	0.760	0.743	0.733
Panel D: Ln(Market Share)				
Post x Overconfident x Treated	-0.195	-0.096	0.052	0.045
	(0.198)	(0.510)	(0.693)	(0.740)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	523	938	1277	1543
R^2	0.965	0.960	0.957	0.957
Panel E: Tobin's Q				
Post x Overconfident x Treated	0.060	0.282	0.101	0.103
	(0.834)	(0.140)	(0.557)	(0.479)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	523	938	1277	1543
R^2	0.739	0.725	0.726	0.730

Table F.9: Placebo Test using non-Manufacturing Firms with Placebo "Treatment" in tariff-cut years

This table presents the results of the placebo test where firms in non-manufacturing industries are randomly assigned a tariff cut in the same year as the actual tariff cut. These 168 "pseudo-treated" firm-years are matched with a set of control firms following the same algorithm used in our main tests. Columns (1), (2), (3) and (4) use the sample within a one-year (-1, +1), two-year (-2, +2), three-year (-3, +3), and four-year (-4, +4) window around the tariff shock, respectively. All regressions include industry and year fixed effects and controls as used in the main analysis. The variables are defined in Appendix D.1. Standard errors are clustered within industry defined by four-digit SIC codes. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Panel A: Operating Margin				
Post x Overconfident x Treated	0.004	-0.009	-0.008	0.001
	(0.741)	(0.645)	(0.660)	(0.969)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	659	1180	1598	1950
R^2	0.803	0.725	0.736	0.694
Panel B: Gross Margin				
Post x Overconfident x Treated	-0.011	-0.021	-0.019	-0.023
	(0.489)	(0.353)	(0.411)	(0.342)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	659	1180	1598	1950
R^2	0.754	0.725	0.725	0.716
Panel C: R&D/Sale				
Post x Overconfident x Treated	0.000	0.007	0.009	0.007
	(0.992)	(0.198)	(0.307)	(0.520)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	659	1180	1598	1950
R^2	0.860	0.845	0.831	0.827

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Panel C: Advertising/Sale				
Post x Overconfident x Treated	-0.003	-0.003*	-0.003	-0.002
	(0.137)	(0.096)	(0.150)	(0.333)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	659	1180	1598	1950
R^2	0.646	0.619	0.620	0.617
Panel D: Ln(Market Share)				
Post x Overconfident x Treated	0.103	0.008	-0.027	-0.097
	(0.313)	(0.947)	(0.818)	(0.404)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	659	1180	1598	1950
R^2	0.943	0.937	0.932	0.931
Panel E: Tobin's Q				
Post x Overconfident x Treated	0.108	-0.005	-0.056	-0.079
	(0.468)	(0.970)	(0.645)	(0.484)
Control variables	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	659	1180	1598	1950
R^2	0.744	0.726	0.708	0.693

Table F.10: Results of Triple Difference Regressions for Different Types of Investment

This table shows total investment scaled by sales (Panel A), R&D/Sales (Panel B), CAPEX/Sales (Panel C), and cash outflows for acquisitions scaled by sales (Panel D). Columns (1), (2), (3) and (4) use the sample within a one-year (-1, +1), two-year (-2, +2), three-year (-3, +3), and four-year (-4, +4) window around the tariff shock, respectively. All regressions include industry and year fixed effects and controls as used in the main analysis. The variables are defined in Appendix D.1. Standard errors are clustered within industry defined by four-digit SIC codes. p-values are in parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.

Panel A: Investment/Sales

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Post x Overconfident x Treated	0.089**	0.061*	0.063	0.046
	(0.029)	(0.095)	(0.104)	(0.230)
Post	0.037*	0.018	0.019	0.008
	(0.095)	(0.332)	(0.246)	(0.575)
Overconfident	-0.011	-0.012	0.001	0.008
	(0.657)	(0.541)	(0.972)	(0.681)
Post x Overconfident	-0.058**	-0.041	-0.044	-0.029
	(0.037)	(0.114)	(0.102)	(0.225)
Treated	0.041	0.012	0.022	0.016
	(0.115)	(0.691)	(0.323)	(0.400)
Post x Treated	-0.068**	-0.051*	-0.070**	-0.056**
	(0.026)	(0.054)	(0.011)	(0.019)
Overconfident x Treated	0.013	0.021	0.002	0.001
	(0.674)	(0.429)	(0.918)	(0.953)
Control variables	Yes	Yes	Yes	Yes
Industry and Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	670	1205	1639	1989
R^2	0.747	0.715	0.703	0.696

Panel B: R&D/Sales

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Post x Overconfident x Treated	0.074***	0.042*	0.035	0.025
	(0.007)	(0.072)	(0.172)	(0.304)
Post	0.029**	0.019*	0.014	0.007
	(0.011)	(0.064)	(0.146)	(0.399)
Overconfident	0.003	0.01	0.015	0.017
	(0.865)	(0.247)	(0.119)	(0.116)
Post x Overconfident	-0.052**	-0.033*	-0.029	-0.018
	(0.014)	(0.064)	(0.104)	(0.287)
Treated	0.032**	0.022	0.021	0.016
	(0.025)	(0.182)	(0.167)	(0.246)
Post x Treated	-0.042**	-0.028**	-0.030**	-0.026*
	(0.013)	(0.047)	(0.044)	(0.057)
Overconfident x Treated	-0.006	-0.005	-0.011	-0.013
	(0.761)	(0.689)	(0.256)	(0.247)
Control variables	Yes	Yes	Yes	Yes
Industry and Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	670	1205	1639	1989
R^2	0.851	0.838	0.823	0.818

Panel C: CAPEX/Sales

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Post x Overconfident x Treated	0.022*	0.015	0.009	0.004
	(0.098)	(0.291)	(0.539)	(0.795)
Post	0.020*	0.009	0.004	0
	(0.077)	(0.225)	(0.525)	(0.965)
Overconfident	-0.005	-0.009	-0.006	-0.001
	(0.714)	(0.264)	(0.407)	(0.853)
Post x Overconfident	-0.025**	-0.017	-0.013	-0.01
	(0.024)	(0.113)	(0.194)	(0.269)
Treated	-0.004	-0.004	0.002	0.002
	(0.628)	(0.564)	(0.743)	(0.752)
Post x Treated	-0.021*	-0.014	-0.014	-0.009
	(0.073)	(0.141)	(0.157)	(0.304)
Overconfident x Treated	0.019	0.020**	0.016*	0.013
	(0.171)	(0.019)	(0.070)	(0.129)
Control variables	Yes	Yes	Yes	Yes
Industry and Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	670	1205	1639	1989
R^2	0.51	0.494	0.466	0.443

Panel D: AQC/Sales

	(-1, +1)	(-2, +2)	(-3, +3)	(-4, +4)
Post x Overconfident x Treated	-0.002	0.004	0.019	0.018
	(0.931)	(0.812)	(0.267)	(0.274)
Post	-0.008	-0.008	0.004	0.004
	(0.530)	(0.435)	(0.641)	(0.587)
Overconfident	-0.001	-0.006	-0.003	-0.003
	(0.939)	(0.638)	(0.765)	(0.720)
Post x Overconfident	0.013	0.005	-0.006	-0.005
	(0.377)	(0.701)	(0.613)	(0.665)
Treated	0.019	-0.004	0	-0.002
	(0.182)	(0.820)	(0.964)	(0.869)
Post x Treated	-0.01	-0.012	-0.028*	-0.024*
	(0.526)	(0.381)	(0.062)	(0.072)
Overconfident x Treated	-0.004	0.002	-0.004	0
	(0.809)	(0.931)	(0.757)	(0.975)
Control variables	Yes	Yes	Yes	Yes
Industry and Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	670	1205	1639	1989
R^2	0.223	0.201	0.183	0.169