Essays on Empirical Corporate Finance

By Varun Verma

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Acknowledgements

I am highly grateful to my supervisor Prof. Carsten Bienz for his continuous guidance and support during my Ph.D. studies. His feedback, continuous encouragement and enthusiasm have helped me immensely in becoming a better researcher. I highly appreciate the amount of time and effort he has devoted in making my Ph.D. experience more productive. I am also grateful to Prof. Tyler Hull, Prof. Tommy Stamland and Prof. Svein-Arne Persson for their support during the initial years of my Ph.D. studies.

I am thankful to my co-author Chunbo Liu for his contributions in our joint work and also to the faculty members at NHH Department of Finance for providing me guidance during my work. I have gained a lot from my interactions with Karin Thorburn, Francisco Santos, Xunhua Su, Jørgen Haug, B. Espen Eckbo, Tore Leite, Jøril Mæland, Konrad Raff, Aksel Mjøs and Michael Kisser.

I am grateful to my Ph.D. colleagues Johan Mellberg, Raffaele Giuliana, Yun Tang, Xiaoyu Zhang, Loreta Rapushi, Negar Ghanbari, Giovanni Bruno, Debashis Senapati and Stig Lundeby for providing me great atmosphere at work. I would also thank the administrative staff at Department of Finance for their efforts at improving our Ph.D. experience.

I am highly indebted to family, especially my parents, Pradip Kumar Verma and Geeta Verma, who have patiently and firmly stood by me during the ups and downs of my life. It is their support that has made this dissertation possible.

Finally, I am thankful to all my friends in Bergen who have made my past five years enjoyable.

Sincerely,

Varun Verma

Summary

This dissertation consists of three essays and is submitted to the Department of Finance at Norwegian School of Economics in partial fulfillment of requirements for the completion of Doctor of Philosophy degree in Finance.

The three essays explore important subject areas in Empirical Corporate Finance. The first essay questions the underpinnings of the instrumental variable approach with regards to one of its common applications. The next two essays use instrumental variable approaches to explore topics related to capital structure and CEO compensation.

Essay 1: Industry-level Import Tariffs and Competition: A study with US data from 1974 to 2015

In this essay, I look at the relationship between import tariffs and industry competition, and examine whether former can be used to study the latter, specifically using the data for US manufacturing industries.

Competition is an important aspect of industry that affects policies and performance of firms within the industry. However, due to lack of direct measures for competition, it has been a bit difficult to study empirically. As a result, a commonly used alternative approach involves the use of import tariffs and large import tariff reduction events. The basis of this approach lies primarily in following two characteristics: firstly, import tariffs are a form of trade barrier that are negatively associated with international trade (Sachs and Warner 1995), and thus have a negative impact on the competition encountered by the domestic firms. Secondly, considering the changes in US import tariffs over the past several years, these tariffs provide sufficient time-series variations for performing empirical analysis (Fresard 2010).

Looking at the time-series variations in the industry-level import tariffs in US manufacturing sector, I find that, although there were substantial variations in the years prior to 2001, the size of variations is pretty small in the post 2001 years. Consequently, it raises questions about whether these variations in import tariff are sufficiently large to study competition and its effects on firms, especially in the years beyond 2001. Therefore, in this essay, I study whether import tariffs (and large changes in import tariffs) bring about significant changes in the variables associated with competition such as import penetration, industry profitability and firm profitability.

The results of the analysis show that, in the years 1974 to 2001, import tariffs have a significant negative impact on import penetration and a significant positive impact on firm profitability. On the other hand, in the post-2001 period, there is no significant impact on import penetration, industry profitability or firm profitability. These results raise an important concern about the economic foundation behind the framework that supports the use of import tariffs to study effects of competition in the post-2001 years.

In order to demonstrate the problem that may arise due to improper application of the aforementioned approach, I supplement the above analysis with a replication work on Fresard (2010) for the period beyond the year 2001. Originally, Fresard used large import tariff reduction events (or tariff cuts) in the pre-2001 period to study the effect of corporate cash holdings on the product market performance of a firm. Considering the significant relationship between import tariffs and import penetration for the pre-2001 period, this was an appropriate application. However, when the same methodology is applied in the years beyond 2001, then the results are insignificant. The results presented in the paper are not a criticism to Fresard (2010) (since Fresard appropriately uses the import tariff data in the pre-2001 period), but rather point to the limitations that may arise if the same methodology is used in the post-2001 years.

Essay 2: Debt Covenants and CEO Compensation

This essay is a joint work with Chunbo Liu. In this essay, we explore the influence of debt covenants on compensation paid to the CEO of a firm.

In the paper, we contend that covenants should have an effect on CEO compensation for two primary reasons: increase in CEO's effort level (effort channel) and increase in CEO turnover risk (risk channel). Looking at the effort channel, we contend that presence of covenants in the debt contracts increases monitoring, thereby increasing the effort level for the CEO (Hermalin 2005). From the point of view of the risk channel, strict covenant restrictions increase the likelihood of a covenant violation, thereby increasing the probability of CEO turnover (Nini, Smith and Sufi 2012). Therefore, both channels predict a positive relationship between covenant restrictions and CEO compensation.

In our analysis, we use two measures of covenant restrictions. The first measure is the number of non-duplicative covenants that are active on a firm in any given year. The second measure is the *distance-to-violation*, which represents the gap between the reported value on an underlying accounting variable and the threshold imposed via the covenant. Our findings show a positive relationship between the *number of covenants* and CEO compensation, and a negative relationship between *distance-to-violation* and CEO compensation. These results are consistent with the predictions made by effort channel as well as the risk channel. In order to overcome the endogeneity concerns, we supplement the analysis using a difference-in-difference analysis. We use the implementation of Statement of Financial Accounting Standards No. 160 (SFAS 160) in the year 2007-08 as an exogenous shock to the *distance-to-violation* measure of covenant restrictions. The results of the difference-in-difference indicate support for our initial findings.

Based on the observed results, we conclude that covenant restrictions have a positive impact on CEO compensation. We attribute this relationship to both the factors: effort and risk. We contend that covenants increase the monitoring of CEO and reduce the flexibility available, thereby increasing the CEO's effort level. Also, increase in number of covenants and

decrease in *distance-to-violation* results in higher likelihood of covenant violation thereby increasing the CEO turnover risk.

Essay 3: Does Customer Industry affect the Financial Policy of a firm?

In this essay, I explore customer industry as a determinant of leverage of a supplier firm. With regards to this, there are two prominent theoretical frameworks that propose opposing effects. The first framework is based on the stakeholder theory that regards customers and suppliers as non-financial stakeholders of a firm. It predicts that supplier firms in major bilateral relationships should maintain low leverage in order to reduce the likelihood of a spillover distress to or from their major customers (Titman 1984) (Titman and Wessels 1988) (Banerjee, Dasgupta and Kim 2008). The second framework, the bargaining theory advocates that debt has a positive effect on the bargaining position of a firm with respect to its customers and suppliers (Bronars and Deere 1991) (Dasgupta and Sengupta 1993) (Sarig 1998) (Hennessy and Livdan 2009). This incentivizes suppliers to increase their debt to improve their bargaining position. Considering these opposing predictions of stakeholder theory and bargaining theory, it is an interesting empirical question to see which of the two is more dominant.

The major challenges in conducting this analysis are the endogeneity concerns arising due to close association of a firm's financial policy with other policies such as operations, investment policy, etc. To address these concerns, I use an instrumental variable approach based on the following two steps: First, for each supplier firm, I remove the major *customer firm* from the customer industry and use the *remainder of the customer industry* (or customer peers) for the analysis. Second, similar to the methodology in Leary and Roberts (2014), I instrument the leverage of customer peers using the idiosyncratic returns of these customer peers.

Looking at the period from 1992 to 2009, the baseline results of the analysis show that the customer peers leverage has a significant positive impact on the supplier firm leverage. Since, customer peers leverage represents customer industry leverage, the obtained results indicate that the leverage in the customer industry has a strong positive impact on the leverage of the supplier firm. The observed impact is consistent with the bargaining theory and is economically significant (one standard deviation increase in customer industry leverage leads to a 6.5% increase in supplier firm leverage). I find that these results are robust to different specifications for supplier firm leverage (long-term leverage, total leverage, book leverage, market leverage) and are not driven by either the customer firm or the supplier firm's own industry. In addition, I find that the results are stronger and more significant for the supplier firms that belong to the durable goods industries.

Bibliography

Banerjee, Shantanu, Sudipto Dasgupta, and Yungsan Kim. "Buyer–Supplier Relationships and the Stakeholder Theory of Capital Structure." Journal of Finance 63, no. 5 (2008): 2507–2552.

Bronars, Stephen G., and Donald R. Deere. "The Threat of Unionization, the Use of Debt, and the Preservation of Shareholder Wealth." Quarterly Journal of Economics 106, no. 1 (1991): 231–254.

Dasgupta, Sudipto, and Kunal Sengupta. "Sunk investment, bargaining and choice of capital structure." International Economics REview, 1993: 203-220.

Fresard, Laurent. "Financial Strength and Product Market Behavior The Real Effects of Corporate Cash Holdings." The Journal of Finance 65, no. 3 (June 2010): 1097-1122.

Hennessy, Christopher A., and Dmitry Livdan. "Debt, bargaining, and credibility in firm–supplier relationships." Journal of Financial Economics 93 (2009): 382–399.

Hermalin, Benjamin E. "Trends in Corporate Governance." The Journal of Finance 60, no. 5 (October 2005): 2351-2384.

Nini, Greg, David C. Smith, and Amir Sufi. "Creditor Control Rights, Corporate Governance, and Firm Value." The Review of Financial Studies (Oxford University Press) 25, no. 6 (June 2012): 1713–1761.

Sachs, Jeffrey D., and Andrew Warner. "Economic Reform and the Process of Global Integration." Brookings Papers on Economic Activity 26 (1995): 1-118.

Sarig, Oded H. "The effect of leverage on bargaining with a corporation." Financial Review 33 (1998).

Titman, Sheridan. "The effect of capital structure on a firm's liquidation decision." Journal of Financial Economics 13, no. 1 (1984): 137-151.

Titman, Sheridan, and Roberto Wessels. "The determinants of capital structure." Journal of Finance 43, no. 1 (1988): 1-19.

Industry-level Import Tariffs and Competition: A study with US data from 1974 to 2015

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Abstract

This paper tests the application of US industry-level Import tariff data in studying the effects of industry competition. Specifically, I explore the underlying economic rationale and justifications that are based on the causal relationship between import tariffs and industry competition. The findings show that, while the relationship between import tariffs and industry competition was significant in the years 1974-2001, it is no longer significant in the subsequent years. In the post-2001 period, Import tariffs have no significant effect on variables related to industry-level competition such as import penetration and profitability. The results in the paper are supported by a replication work on Fresard (2010) using import tariff data from year 1974 to 2015. The findings of this study raise important concerns regarding application of import tariffs for studying competition in the years beyond 2001.

Keywords: Import tariffs, competition, Import penetration index, profitability

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* I am grateful to Prof. Carsten Bienz for his invaluable guidance and support. I am also thankful to Francisco Santos, Xunhua Su, other faculty members at Norwegian School of Economics and Chunbo Liu for their comments and suggestions.

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1. Introduction

"Given the competition for top journal space, there is an incentive to produce 'significant' results. With the combination of unreported tests, lack of adjustment for multiple tests, and direct and indirect p-hacking, many of the results being published will fail to hold up in the future."

"In this address, I take a step back and examine how we conduct our research. Unfortunately, our standard testing methods are often ill equipped to answer the questions that we pose."

Campbell R. Harvey
President, American Finance Association 2016

In the process of research, we as researchers regularly turn to existing literature as a guiding tool to resolve the problems we face. The literature guides us about the available techniques, practices and procedures that can help us answer the questions we pose. Often academics use previous established results for motivating the techniques used in their work. As a result, the use of many of the techniques and approaches is so widespread that sometimes researchers overlook the basic principles and tests that establish the validity of these techniques. Highlighting such problems in his presidential address, Campbell Harvey calls for a relook at the process that we as researchers use for conducting research. In this paper, I am testing the application of a methodology that is based on an important old insight drawn from the previous literature. I look into the relationship between import tariffs and industry competition and examine whether former can be used to study the latter, specifically using the data for US manufacturing industries.

Relationship between competition and firm policies is a well-studied topic in finance literature. Competition is an important aspect of industry that affects the policies and

performance of all the firms operating in the market[1]. Due to the importance of this relationship, there is a big theoretical literature that studies the effects of industry competition on firm policies and performance (Spence 1986) (Nickell 1996) (Zott and Amit 2008). However, the empirical work in this area has been difficult primarily due to lack of direct measures for industry competition. The common variables used to measure competition are either too static, like the Hirschman Herfindahl Index, or are difficult to measure like the price–cost margin. As a consequence, many researchers have resorted to using alternative approaches to study this relationship. Among these alternatives, one of the popularly used methods involves the use of import tariffs and large import tariff reduction events, which are assumed to be one of the factors affecting the competitive environment of an industry.

The economic foundation of this methodology lies in the relationship between international trade and industry competition, which is another well-studied subject in the literature[2]. Several papers have offered strong evidences in support of the argument that when a country increases its international trade and imports, it witnesses an increase in the industry competition. This increase in industry competition has a negative effect on the market power of its domestic firms. Import tariffs are considered an important form of trade barriers that affect the inflow/outflow of goods into a country. Therefore, import tariffs have an effect on the international trade, and consequently the industry competition. Based on this relationship between import tariffs and industry competition, there is a long string of recent papers that use import tariffs as a proxy to study the effects of competition.

Import tariffs are a form of trade barriers that affect the openness of a country's domestic markets to foreign goods (Sachs and Warner 1995). There are several reasons cited for using import tariffs to study the effect of competition. Firstly, import competition is an

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1 Competition affects various firm policies such as capital structure (Bolton and Scharfstein 1990) (Maksimovic 1988), investment (Schmutzler 2013), payout policy (Gustavo and Michaely 2007) etc. It also affects various aspects of firm performance such as productivity (Januszewwski, Koke and Winter 2002), profits (Esposito and Esposito 1971) (Levinsohn 1993), etc.

2 (Levinsohn 1993)(Chen, Imbs and Scott 2009)(Pugel 1980)(Katics and Petersen 1994)(DeRosa and Goldstein 1981) and many more.

important component of overall competition that the firms face in an industry. Import tariffs form a substantial portion for overall trade costs (Anderson and Wincoop 2004), and thus affect competitiveness of foreign goods in domestic markets. Secondly, import tariffs are often based on bilateral trade treaties between countries, which limits the governmental control over them. Therefore, they are exogenous to the political influence and performance of the individual industries or firms (Lee and Swagel 1994). Thirdly, specifically in case of US, there has been a substantial change in import tariffs over past few decades. US government has gradually reduced the import tariffs over the years, which has led to a substantial reduction in the trading costs. Starting from a value of 8.23% in 1974, the average import tariff in the manufacturing industries has come down to about 2.28% in 2001, although beyond 2001 the changes have been small. Also, the levels of import tariffs vary across the industries and the variations for each industry are independent (or partly independent). Thus, unlike other measures of competition, import tariffs are not static and provide sufficient cross-industry and time-series variations to study the effects of competition (Fresard 2010).

Taking a note of these advantages, several papers have used import tariffs to study the effects of competition. Xu (2012) used import tariffs as an instrument to study the effect of import penetration and profitability on the capital structure of a firm. Fresard (2010) used large import tariff reductions to study the effect of corporate cash holdings on the product market performance of a firm. Fresard followed a difference-in-difference methodology where large tariff reductions were assumed to be events that trigger changes in industry competition. Valta (2012) uses methodology similar to Fresard (2010), to study the effect of competition on the cost of debt and finds that higher competition leads to higher cost of debt for the firms. Lin, Officer and Zhan (2015) finds that intensification of competition, caused by a rise in imports in an industry, leads to an increase in earnings management and financial restatements by firms in the industry.

One of the common features among the papers mentioned above is that they utilize the industry-level imports data on US manufacturing sector for years until early 2000s. This

commonality is primarily due the large time-series and cross-industry variation that has been observed in the industry-level import tariff data for US manufacturing sector in this time period. Looking at a graph for evolution of average import tariff in the years 1974 to 2015, I find that average tariff in US manufacturing industries showed a substantial and almost monotonic decline in the period from 1974 until 2001[3]. However, this decline bottoms out in 2001 after which the average tariff has remained strikingly stable[4]. This raises the question of how relevant these *small* reductions in import tariff are for studying competition in the years beyond 2001.

As already mentioned, an important characteristic of import tariff data, which had motivated their usage for studying competition, is the time-series variation in the data. Due to the stability in import tariffs in subsequent years, this property seems to be absent in the period beyond 2001. However, some recent papers have continued to use this dataset with extensions until years 2011-12 without re-analyzing the economic foundation that had motivated this approach in the first place. This re-analysis is important to ascertain whether the import tariffs in the years after 2001 bring about any real changes in the competitive environment of the industries. Thus, in this paper, I am exploring this economic foundation in the years beyond 2001 that would support such a research framework. Specifically I look at whether, in the years subsequent to 2001, import tariffs bring about significant changes in competition that would justify their utility in studying competition.

Considering that import tariffs affect the inflows of imports into a country, they should have a direct effect on the import penetration. Thus, I begin the analysis by looking at relationship between import tariffs and import penetration. I use the panel data provided by Feenstra (1996), Feenstra, Romalis, and Schott (2002) and Schott (2010), which includes 312 manufacturing industries for years 1974 to 2015. The results show that, in the period

[3] I look at the period beyond 1974, since the data on import tariffs starts from this year. Some papers, which use imports data, utilize the data from 1989 because there was a change in the industry coding system in 1987.

[4] Although the literature does not cite any specific reason for this observation, it is partly expected because in 2001 the level of import tariffs was quite low for any further reductions.

1974 – 2001, Import tariffs have a significant negative impact on import penetration, which is consistent with the results in Xu (2012). However, in the period subsequent to 2001, this impact is insignificant. I supplement this analysis using a difference-in-difference approach around large import tariff reduction events. Following methodology similar to Fresard (2010), I investigate whether large tariff reduction events lead to increases in import penetration[5]. Again, I find that while in the years before 2001, large tariff reductions are followed by a larger increase in import penetration; this effect is absent in the years after 2001.

Next, I look at the relationship between import tariffs and profitability, at both industry and firm level. I find that import tariffs do not have any significant effect on industry profitability, which has been proxied using the price-cost margin in the industry. In case of firm profitability, I look at the relationship between import tariffs and contemporary as well as future profitability in the leading year. I find that in the years before 2001 import tariffs do have a positive impact on both contemporary and one-year-leading profitability. However, in the years after 2001, this effect is not significant.

The aforementioned results raise an important concern about the economic foundation behind the framework that supports the use of import tariffs to study effects of competition in the years post 2001. Consistent with the previous literature, the results in the years before 2001 show a significant relationship between import tariffs and industry competition, however this relationship is insignificant in the years afterwards. Although, this analysis may not conclusively demonstrate that import tariffs do not have an impact on competition, it does however show that the variations in import tariffs during this period are too small to bring about sufficient changes in competition.

In the next part of the paper, I replicate the analysis performed in Fresard (2010) using industry-level import data from 1974 to 2001, and then redo the analysis in the period beyond 2001. Fresard (2010) uses large import tariff reduction events (or tariff cuts) to study

[5] I generate a set of large tariff reduction events in the same manner as given in Fresard (2010), and then look at the changes in import penetration around these events.

the effect of corporate cash holdings on the product market performance of a firm. Fresard argues that if cash holdings have an effect on the product market performance of a firm, then a cash–rich firm should have superior product market performance as compared to its competitors[6]. Thus, Fresard examines whether an increase in domestic market competition due a tariff cut, results in a cash–rich firm gaining market share at the expense of its competitors. Replicating the analysis from Fresard (2010), I show that in the years before 2001, subsequent to a tariff cut, cash–rich firms do experience an increase in the market share. The magnitude and sign of the coefficient are consistent with the original paper.

Next, I carry out the same analysis for the years after 2001. For the period 2002 – 2015, I look at whether, subsequent to tariff cuts, a cash–rich firm gains market share at the expense of its competitors in the domestic market. The findings show that cash holdings do not have any significant impact on the firm performance. Taking a closer look at the data, I find that the insignificant results in the period 2002 – 2015 can be partly explained by the smaller size of tariff reductions during the tariff cuts in this time periods. In 1974 – 2001 period, the average size of tariff reduction during a tariff cut is about 1.94%, while in 2002 – 2015 period this size shrinks to 0.63%. Due to a smaller size of reduction, the increase in import competition is insufficient to study the desired effect of competition.

Also, I conduct the analysis over the combined period from 1974 – 2015. Although, the coefficients obtained from this analysis are significant, a closer look at the data reveals that when we consider the period 1974 – 2015, all the tariff cuts are concentrated in the years before 2001.

The results above give a strong indication that the utility of import tariffs, specifically the import data for US manufacturing industries, at studying the effects of competition is quite limited. In the years prior to 2001, the import tariffs do seem to have an

[6] The product market performance is given by the market share growth of a firm (calculated using industry-adjusted sales growth of the firm in the given year). So, an increase in the market share growth of a firm as a consequence of larger cash holdings would suggest a superior product market performance by the firm.

impact on import penetration and import competition in the manufacturing industries. But, in the time period after 2001, the variations in import tariff are too small and thus do not bring about any sufficient change in import competition. Thus, extension of this approach in the years beyond 2001 can be erroneous and calls for a relook at the analysis.

This paper broadly relates to the literature that investigates the relationship between imports and industry competition. Several papers have studied the effects of imports on industry competition using various variables like import tariffs, import penetration, non–tariff barriers etc. The general insight among these papers is that an increase in imports leads to an increase in the competition. In this paper, I explore whether these results, specifically in case of import tariffs, continue to hold in the recent years. The results in this paper, which are contrary to the previous literature, point to a changing dynamics within the international trade. The results presented here are particularly important for the recent subset of papers that use import tariffs data to study the effects of competition. This paper provides an important cautionary note at the utility of import tariff data to conduct such a work, especially when using data for years beyond 2001.

The remainder of the work is organized as follows. Section 2 provides the literature review where I present various papers that have studied effects of imports and import tariffs on the competition in the industries. I also present several of the recent papers that have used import data to study the effects of competition. Section 3 provides information about the empirical strategy, data sources and important variables. Sections 4 & 5 presents the main results for the analysis, along with the replication of Fresard (2010) paper. Sections 6 & 7 discuss the results and provide the conclusion.

2. Literature Review

There is a considerable theoretical literature that looks into the relationship between industry competition and firm performance (Djankov and Hoekman 2000). However, the empirical work in this area has been difficult. One of the primary reasons for this is the lack of a measure for competition that is quantifiable and dynamic (Katics and Petersen 1994).

The most commonly used measures for competition, HHI and Lerner Index, are static and ex-post measures that relate to the average competition in an industry (Duchin, Su and Xu 2018). Considering this issue, many researchers have used other variables and techniques to ascertain the effects of competition. These alternative approaches include usage of variables associated with international trade, product market fluidity (Hoberg, Phillips and Prabhala 2014), entropy (Pagoulatos and Sorensen 1976) etc., where each of these variables relate to different dimensions of competition.

In an open economy, an important component of industry competition for the domestic firms is the competition arising from international trade (Pagoulatos and Sorensen 1976). One of the oldest and robust insights regarding international competition is its ability to curtail the market power of domestic firms (Levinsohn 1993) (DeRosa and Goldstein 1981) (Katics and Petersen 1994) (Pugel 1980) (Chen, Imbs and Scott 2009). The effect of import competition on industry markups is a well-studied topic (Levinsohn 1993), (Harrison 1994), (Djankov and Hoekman 2000). In order to study the effects of international trade, some of these papers utilize large trade events, such as liberalization of economy (Levinsohn 1993) (Harrison 1994), bi-lateral agreements between countries like NAFTA, while others use trade-associated variables like import penetration (Xu 2012), import tariffs (Valta 2012) and import ratio (Esposito and Esposito 1971). Levinsohn (1993), using the 1984 trade liberalization in Turkey, showed that trade liberalization in imperfectly competitive industries leads to a decline in industry markups[7]. Harrison (1994), using a panel of manufacturing firms from Cote d'Ivoire, showed that market power of domestic firms is significantly higher in industries that have lower import penetration and higher import tariffs. Pagoulatos and Sorensen (1976) looked into the effects of import competition on market structure–profitability relationships and the price–cost margins in different industries. Using various proxies[8] for import competition, Pagoulatos et al. find that, while non-tariff

[7] The perfectly competitive industries showed mixed results, where some witnessed increase in markups, while others showed a decrease or no change.

[8] Used three measures for import competition: nominal import tariffs, imports-to-domestic value of shipments (Import Ratio) and Import growth rate

barriers have an effect on the industrial price–cost margin, nominal import tariffs do not have any impact. In a similar work, Esposito and Esposito (1971) used the import ratio to show a negative relationship between foreign entry threat and industrial profits.

The papers above, along with several others, provide strong evidence for the effects of imports on the competition in an industry. Thus, several recent papers have used data on import tariffs to study the effects of competition on the corporate performance of firms. Import tariffs, unlike non-tariff barriers, are assumed to be exogenous to the political influences of any industry (Lee and Swagel 1994)[9]. This seems like a reasonable assumption since tariffs are often based on bi–lateral agreements like GATT (Sachs and Warner 1995). Among these recent papers, some use import tariffs as proxy for import competition (Bernard, Jensen and Schott 2006) (Xu 2012), while others use large reductions in import tariffs to conduct event studies (Fresard 2010) (Valta 2012) (Fresard and Valta 2016)

Using import tariffs as an instrument for import penetration and profitability in an industry, Xu (2012) finds a positive relationship between book leverage and expected future profitability. While studying the impact of international trade on industry productivity, Bernard, Jensen and Schott (2006) finds that large declines in international trade costs lead to strong productivity growth in related industries. Looking beyond imports, Bernard et al. also finds that domestic firms that have been exporting in the past witness an increase in their shipments when the trade costs decline.

Following a difference-in-difference approach, Fresard (2010) studied the effect of corporate cash holdings on the product market performance of firms in the domestic market of a country. Fresard classifies changes in tariffs that are larger than a specified threshold as Tariff reduction events or Tariff cuts. Fresard assumes that tariff cuts are events that trigger changes in the competition in an industry, and shows that cash–rich firms have a superior

[9] It is important to take into account the lobbying and political influence of industry with regards to the Trade policy. These have an influence on the non-tariff barriers since they are set by the countries individually.

performance in the product market[10]. Valta (2012) uses a similar methodology to show that the cost of debt is systematically larger for the firms that face higher competition due to import tariff reductions. Fresard and Valta (2016) uses large tariff reductions to study the response of incumbent firms on their investments when there is a higher entry threat due to foreign goods. Fresard et al. find that the incumbent firms usually reduce their investments after the tariff cuts, especially when deterring entry is costly and the investments make the incumbents look weak.

A similar difference-in-difference approach of using large import tariff reductions has been taken further in many recent working papers. Chen and Lin (2014), using large import tariff reductions, finds an increase in tax avoidance by firms in the industries that witness increased openness to foreign trade. The effect is more pronounced for firms that have less financial flexibility prior to the tariff cuts. Lin, Officer and Zhan (2015) finds that intensification of competition, caused by a rise in imports in an industry, leads to an increase in earnings management and financial restatements by firms in the industry.

Thus, there is a considerable literature that uses import tariffs to study the effects of competition, entry threat and profitability. A common element among these papers has been the usage of import data for US manufacturing industries for the years until early 2000s. In the current paper, I am exploring the relationship between import tariffs and industry competition, particularly in the years beyond 2001. Such an analysis is important to ascertain whether such an approach can be used appropriately for studying competition in the years beyond 2001

3. Methodology / Empirical Strategy: the setting and the data

3.1. Setting

As described in the previous section, several papers have used import tariffs as a factor affecting competition, entry threat and future profitability in an industry. The basic

[10] In the paper, Fresard presents a graph between import tariffs and import penetration around tariff cuts to support the assumption that tariff cuts lead to real economic changes in the product market.

intuition for the use import tariffs is that import tariffs are a form of trade barrier that restrict the entry of foreign goods into the domestic markets of a country (Lee and Swagel 1994) (Trefler 1993). So, a decrease (increase) in the import tariffs in an industry would have a positive (negative) impact on the inflow of imports into the domestic market for that industry, thereby increasing the competition that domestic firms face.

Starting with Fresard (2010) and Valta (2012), a number of recent papers in the finance literature have used large reductions in import tariffs as settings for conducting quasi-natural experiments to study the effects of competition on the corporate performance of firms.

Most of these papers use a similar methodology where a large drop in import tariff in an industry is considered a tariff reduction event or Tariff Cut for that industry[11]. In order to be considered a valid quasi-natural experiment, it is essential that these tariff cuts bring about some real changes in product market competition (Fresard 2010)[12]. Therefore, in this paper, I test whether these tariff cuts bring about any real changes in the competition faced by the domestic firms in any industry in the years before and after 2001. This requirement is essential since it provides the economic foundation for the research framework followed.

3.2. Tariff Reduction events

Import tariffs are an important form of trade barrier that, along with other non-tariff policy barriers, control the amount of international trade in an economy. Over the past several years in US, there has been a large decline in import tariffs resulting in large

11 The terms tariff reduction events and Tariff cuts are used interchangeably through the paper and refer to the annual import tariff reductions where the decline in import tariff is larger than a chosen threshold.

12 Apart from this requirement, there are two more requirements mentioned by Fresard (2010): Firstly, Import tariffs should be exogenous to the industry performance and performance of firms within the industry, and secondly, the annual changes made in the import tariffs should be unanticipated, or at least partly unanticipated. In this paper, I do not look at the validity of these two requirements. However, if import tariffs are used for studying competition, then the researchers should also establish whether these requirements are met or not.

reductions in overall trading (import / export) costs. The changes in the import tariff have a direct impact on the competitiveness of the foreign goods in the domestic markets.

Over the past several years, US authorities have maintained records on the imports and exports of goods. In the years prior to 1989, they used the Tariff Schedule for The United States, Annotated (TSUSA) system which assigned 7–digit codes to the products imported into the country. In the year 1989, the coding system was changed from the TSUSA system to Harmonized System (HS), which is in use till the current date. Harmonized System assigns 10–digit codes to all imported and exported products. Feesnstra (1996) provides the concordance tables to match TSUSA codes to the US industry SIC codes, while Schott (2010) provides the concordance tables for the matching of HS codes. For the analysis in this paper, I use the product-level import data compiled by Feenstra (1996), Feenstra, Romalis and Schott (2002) and Schott (2010). This product-level data is then utilized to compile the 4-digit SIC industry-level data using the concordance tables from Feenstra (1996) and Schott (2010)[13]. Finally, using the data for all the years from 1974 to 2015, I compute the ad-valorem tariff for each individual 4-digit SIC industry for each year. Ad-valorem rate is defined as total duty collected on all the goods in an industry divided by total amount of general imports within that industry.

Out of 509 industries for which the import data is available, there are 312 industries for which we have the continuous data available from 1974 to 2015. In order to maintain consistency along the analysis, all the industries for which continuous data is not available have been dropped from the analysis. Graph 1 provides an insight into the development of average import tariff across all the manufacturing industries for years from 1974 to 2015. The graph shows a large and continuous decline in the average import tariff over the years, with most of the reduction happening in the years before 2001[14]. Beginning from about 8.23% in 1974, the average tariff drops to about 2.28% in 2001. Post 2001, there has been

[13] The product-level import data available on the websites of Robert Feenstra and Peter Schott has already been mapped to the relevant 4-digit SIC codes.

[14] Average import tariff is the simple average of ad-valorem rate all 4-digit SIC industries in any given year

only a small change in average tariff from 2.28% in 2001 to 2.22% in 2015. In the year 1989 we observe a kink in the graph because there was a change in the coding system for the industries in this year.

Graph 2 provides a more detailed look into the fluctuations in Import tariffs over the years. Graph 2.1 shows the average of annual tariff reductions across all the manufacturing industries in a year[15]. The graph shows a decline in the size of annual tariff reductions as we move from 1974 to 2015. A similar trend can be seen in case of median reductions, as shown in graph 2.2. In the case of medians, there is a very sharp change in the year 2001, after which the median reduction remains pretty small. These graphs seem to suggest that post 2001, not only does the level of import tariffs goes down, but also the size of tariff reductions shrinks substantially.

In order to capture the impact of import tariffs on imports, competition and other factors, I follow the process similar to Fresard (2010)[16]. I use the calculated ad–valorem rates to identify significant tariff reduction events or tariff cuts. For each industry, I calculate the Annual Tariff Reduction as yearly change in the industry import tariff. Since there is a change in the import codes that happened in 1989, the tariff changes observed in the year 1989 are set to zero. The Annual Tariff Reductions are then classified on the basis of the deviation of their size from their median level. To be more precise, an Annual Tariff Reduction is classified as a significant tariff reduction event or a tariff cut if the size of the tariff reduction is greater than 3 times the median value. Further, in order to ensure that these tariff cuts are indeed non-transitory and reflect a more permanent nature of the trade policy, I exclude the tariff cuts that are followed by equivalently large tariff increases in the following two years[17].

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[15] Annual tariff reduction is the first difference (only the negative values) of the import tariff level in a 4-digit SIC industry.

[16] There are several other papers that have used fluctuations import tariffs to measure variations in competition Trefler (2004), Trefler (2010), Guadalupe and Wulf (2010), Valta (2012), Xu (2012)

[17] The process followed is same as Fresard (2010) and is described in the internet appendix to Fresard (2010)

Graph 3 gives a closer look at the average levels of import tariffs around a tariff cut event. The Graph shows 3 lines, one for the whole dataset from 1974 to 2011 and the other two for pre-2001 and post-2001 periods. There is a substantial difference between the pre-2001 and post-2001 levels in the year *(t-2)*. The numerical value of import tariff levels around the Tariff cuts are given in table 1. While for the pre-2001 period, the import tariff in the year *(t-2)* is 11.10%, for post-2001 period this value drop down to 5.08%. During the tariff cut, the drop in the tariff from year *(t-1)* to *t* in pre-2001 period is 1.85%; this value shrinks to 0.64% in post-2001 period. Thus, there is a substantial difference between the sizes of tariff reductions in the pre-2001 and post-2001 periods.

Combining the import data with the Compustat data, finally leaves us with 136 industries. Graphs 4.1, 4.2 and 4.3 show the number of industries that undergo tariff cut in a given year during the three periods: 1974-2001, 2002-2011 and 1974-2011. In the pre-2001 period (Graph – 4.1), we can see that the events are not clustered in any specific years. The years with higher frequency for industries usually overlap with the years for significant trade deals, for example 1994-95 when North American Free Trade Agreement came into effect[18]. For post-2001 period (Graph 4.2), also the events are evenly distributed along the years. However, an important thing to note, although already mentioned above, is that for the tariff cuts in pre-2001 period the average reduction in the tariff is about 1.85%, which is about 3 times the reduction size for tariff cuts in post-2001 period.

To sum up, there are two important observations:

1. The levels of import tariff in the two time periods are quite different. The levels are considerably higher in pre-2001 than in post-2001 period.

[18] The high frequency in the years of significant trade deals suggests two things. On one hand, it lends credibility to the data and suggests that the available data represents the actual international trade enviroenement. However, on the other hand, it raises concerns about whether all or some of these events are unanticipated and exogenous. For the scope of this paper, I do not raise these question further, but it is important that these issues are addressed while using tariffs for studying competition.

2. The size of tariff reduction during a tariff cut is three times larger in pre-2001 period than in post-2001 period.

This distinction in the characteristics of import data in the two time periods is an important motivating factor for this current work.

3.3. Empirical Method

Major part of analysis in this paper looks at relationship between Import Tariffs and industry characteristics, such as Import Penetration, industry competition, and profitability. As explained earlier, there are some characteristic differences between the import tariff datasets in pre-2001 and post-2001 periods. Thus, this paper studies the pre-2001 and post-2001 periods separately. All of the analysis is done across the two time periods for comparison.

3.3.1 Relationship between Import Tariff and Import Penetration

The economic rationale behind the use of import tariffs to study competition is that import tariffs have an effect on import competition. Import tariffs form a substantial portion of trade costs associated with foreign goods (Anderson and Wincoop 2004). These costs have a direct effect on the competitiveness of these foreign products in the domestic market. Thus, import tariffs bring about real changes in the inflow of foreign goods into the domestic market.

Therefore, I begin the analysis by testing whether this rationale holds true across the two time periods i.e. whether import tariffs have an effect on import competition in the pre-2001 and post-2001 period. Following Bertrand (2004) and Xu (2012), I use import penetration index as a measure of the level of import competition that is encountered by the domestic firms in an industry. The import penetration index is given by (Xu 2012):

$$\text{Import Penetration Index} = \frac{\text{Imports}}{\text{Domestic Production} + \text{Imports}}$$

Similar to the model given in Xu (2012), I look at the impact of Import tariffs on import penetration[19]. I perform the analysis over industry level panel data.

$$IPI_{it} = \beta\, Tariff_{it-1} + \theta X_{it-1} + \mu_i + \vartheta_t + \varepsilon_{it} \qquad \text{(Eq. 1)}$$

where IPI_{it} is the Import Penetration Index in the year *t* for the industry *i*, $Tariff_{it-1}$ is the import tariff in the year *(t-1)* for industry *i*, X_{it-1} are the industry level control variables including the foreign exchange rate for the industry *i* in the year *(t-1)*. The industry fixed effects are given by μ_i and the time fixed effects are given by ϑ_t. The industry-level foreign exchange rate takes into account the distribution of imports coming from various origin-countries (the process is described in detail later).

3.3.2. Difference-in-Difference analysis for Import penetration and Import tariffs

In order to further gauge the impact of import tariffs on import competition, I look at whether large import tariff reductions or tariff cuts in an industry bring about a change in the import penetration within that industry. I divide the sample into two groups, treated and control, and perform a difference-in-difference analysis around the tariff cut events. The analysis is performed on industry-level panel data. The treated group comprises of the industries that undergo a tariff cut in the given year. The control group comprises of the remaining industries.

The dependent variable is the annual change in import penetration index. I look at the following specification:

$$\Delta IPI_{it} = \beta\, CUT_{it} + \theta X_{it} + \mu_i + \vartheta_t + \varepsilon_{it} \qquad \text{(Eq. 2)}$$

where *i* indexes the industry, and *t* indexes the year. ΔIPI_{it} is the change in the import penetration index for the industry *i* going from year *(t-1)* to *t*. X_{it} are the control variables. The variable CUT_{it} is the dummy variable that equals one for treated industries in the year of the treatment and is zero otherwise. Here, the coefficient of interest is β. Based on the

[19] Xu (2012) conducts the analysis using the Firm-level data. However, I use the 4-digit SIC industry-level data in this specification because this paper focuses on the impact on the industry.

documented effect of import tariffs on import penetration and import competition, the co-efficient β is expected to be positive, which means tariff cuts lead to increase in the import penetration in the treated industries.

3.3.3. Relationship between Import tariffs and Industry Price-Cost Margin

Import competition is one component of competition. Here, I look at whether import tariffs have an effect on the overall competitive environment in an industry.

An increase in the supply of foreign goods in an industry should push the prices down in the domestic market. Therefore, an increase in import competition would lead to a decline in the profit margins (Xu 2012). Following Xu (2012), I analyze the relationship between the import tariffs and profit margins at the industry level. The profit margin at the industry level is defined using the price-cost margin for the industry.

To study the relationship between the import tariffs and industry level profit margin, I estimate the following equation:

$$\mathrm{pcm}_{it} = \beta\, \mathrm{tariff}_{it} + \theta\, X_{it} + \mu_i + \vartheta_t + \varepsilon_{it} \qquad \text{(Eq. 3)}$$

where

$$\mathrm{pcm}_{it} = \frac{\mathrm{vadd}_{it} - \mathrm{payroll}_{it}}{\mathrm{vadd}_{it} + \mathrm{matcost}_{it}}$$

where pcm_{it} is the price-cost margin for the industry *i* in the year *t*, tariff_{it} is the import tariff, and X_{it} are the industry level control variables including measure of industry concentration. The industry-level fixed effects are given by μ_i and year fixed effects by ϑ_t. In the price-cost margin calculations, vadd is the value added by all the firms in the industry, payroll is the payrolls, and matcost is the total cost of material used in the industry.

Additionally, I perform the analysis using a firm-level panel data. I look at relationship between the import tariffs and firm profitability.

$$prty_{ijt} = \beta\, tariff_{jt} + \theta\, X_{jt} + \gamma\, Z_{it} + \mu_j + \vartheta_t + \varepsilon_{it} \qquad \text{(Eq. 4)}$$

where $prty_{ijt}$ is the profitability of firm *i* belonging to industry *j* in the year *t*, $tariff_{jt}$ is the import tariff for the industry *j*, X_{jt} are the industry-level control variables including measure of industry concentration, and Z_{it} are the firm-level control variables. μ_i and ϑ_t are the industry and year fixed effects.

3.4. Data

This study utilizes a number of sources to collect data on the requisite variables. Below I describe the sources and variables used.

3.4.1. Import Penetration Index

As described earlier, Import Penetration index for each 4-digit SIC code industry is defined as

$$\text{Import Penetration Index} = \frac{\text{Imports}}{\text{Domestic Production} + \text{Imports}}$$

The total amount of imports for the industry is sum of dollar amounts of all products imported for a 4-digit SIC industry. The data on imports is the product-level import data compiled by Feenstra (1996), Feenstra, Romalis, and Schott (2002) and Schott (2010). The data on domestic production for each 4-digit SIC industry is available from NBER-CES Manufacturing Industry Database[20]. The analysis involving the import penetration index has been between the years 1974 and 2011 due to the availability of data.

3.4.2. Price–Cost Margin

For the price–cost margin, I use the formula as described earlier (Xu 2012):

$$\text{Price} - \text{Cost Margin} = \frac{\text{vadd} - \text{payroll}}{\text{vadd} + \text{matcost}}$$

[20] This is a public database available at the following link: http://www.nber.org/data/nberces.html

where vadd is the value added by the industry, payroll is the sum of payrolls, and matcost is the cost of material used in the industry. For all 4-digit SIC industries, NBER-CES Manufacturing Industry Database provides the data on value added, cost of material and payroll. This data is also available only until 2011.

3.4.3. Industry-level Foreign Exchange Rate

The Industry-level foreign exchange rate is the source weighted average foreign exchange rate for an industry and it depends on the fraction of goods coming from different source countries. In order to construct the industry–level foreign exchange rate, I follow the process described by Xu (2012). The data on nominal currency exchange rates and consumer price indices is obtained from International Monetary Fund datasets. I begin by converting the nominal exchange rate (expressed as Foreign currency per USD) to real exchange rates using the consumer price indices of US and trading countries. Next, in order to calculate the source–weighted average foreign exchange rate for an industry, I need the weights for each currency. For each 4-digit SIC industry, I use the base year of 1995[21] and calculate the weights for each country's currency as share of industry imports coming from the country. I then use these weights with the real exchange rate for each currency to compute the source-weighted average exchange rate for each 4-digit SIC code industry. Lastly, this exchange rate is divided by 1000 to obtain the industry exchange rate index.

4. Results: Part 1

I start by looking at the relationship between import tariffs and import penetration. Graph 5 shows the movement of average import tariff and average import penetration over the period from 1974 to 2011[22]. Although the decline in the average import tariff is limited to the period 1974 to 2001, the average import penetration has continued to grow all the way till 2015. The trends in the import tariff and import penetration can also be seen in table 2. In

[21] The year 1995 is chosen for two reasons. Firstly, this is consistent with Xu (2012) and secondly, 1995 lies pretty close to the center of the time period 1974 to 2011

[22] The average import tariff is the simple average of the import tariffs for all 4-digit SIC industries in any year. Also, the average import penetration is calculated in a similar manner.

the pre-2001 period, the average import tariff drops by about 0.20% every year; while in the post-2001 period, there is a drop of only 0.03% every year. On the other hand, the growth in import penetration in both time periods, pre-2001 and post-2001, is approximately same[23]. These trends in import tariffs and import penetration, especially after 2001, raise concerns about whether we are looking at a spurious relationship between these two factors. Table 2 gives the average import tariffs and average import penetration over 5-year periods starting from 1974.

As mentioned earlier, the economic rationale behind the use of import tariffs to study competition is that import tariffs have an effect on import competition and import penetration. If this is true, then the industries which witness larger decline in their tariffs should also observe a higher increase in import penetration. To see if this effect is actually present in the data, I segregate the industries into four quartiles based on the size of tariff reduction they undergo during the period 1974-2011. More precisely, I compute the tariff difference for all industries between years 1974 and 2011, and divide the industries in four quartiles based on the size of this difference. Then, I look at the variations in import penetration between the top and bottom quartiles. These variations are shown in graphs 6.1 and 6.2. In the top quartile, the import tariff drop from 16.3% in 1974 to 3.69% in 2011, while in the bottom quartile the change is negligible from 1.86% to 1.13%. Again here, the majority of this reduction happens in the years 1974 to 2001. Graph 6.2 shows the import penetration for these top and bottom quartile, along with the average for whole sample. As observable in the graph, the import penetration for top quartile and bottom quartile was quite similar in the years 1974 to about 1990. There is some observable difference in the years 1990 to 2001, while the gap increases the most in years after 2001. Based on these graphical observations, these import tariff and import penetration trends seem inconsistent with the economic rationale.

[23] The values can be seen in the table accompanying with graph 5. The growth in import penetration in the post-2001 period is slightly greater.

Moving forward, table 3 presents the estimation results for equation 1. Columns (1), (2), (5) & (6) present the estimation results based on the period 1974 to 2011[24]. Columns (3) and (7) present the results for pre-2001 period, and columns (4) and (8) for post-2001 period. As we can see from columns (3) and (7), Import tariffs have a significant negative impact on import penetration when considering the period 1974 to 2001, while there is no significant impact in the period 2002 – 2011. The results remain similar when I add the industry level foreign exchange rate as a control variable. In the period 1974-2001, the sign and magnitude of the coefficient for tariff are consistent with the results presented in Xu (2012).

The results above suggest that although in pre-2001 period import tariffs had an effect on import penetration, this effect is absent in the post-2001 period. The difference-in-difference analysis using tariff cuts displays this distinction further. Graphs 7.1 and 7.2 show the evolution of average import tariff around a tariff cut for pre-2001 period and post-2001 period respectively. Both the graphs show a clear reduction in the import tariff from year *(t-1)* to *t*, and the reduction size in of pre-2001 period is noticeably larger than the reduction size in post-2001 period. In the pre-2001 period, the tariff shows a drop of 1.81%, while in the post-2001 period, the drop is 0.69%. Graphs 7.3 and 7.4 show the import penetration index around a tariff cut for the two periods. Graph 7.3 shows an increase in ΔIPI for the treated observations as we go from year *(t-1)* to *t*. On the contrary, graph 7.4 for the post-2001 period shows no change in ΔIPI between years *(t-1)* and *t*.

Table 4 presents the estimation results for equation 2. Columns (1) & (2) present the estimation results based on the period 1974 to 2011. Columns (3) & (4) present the results for pre-2001 period and columns (5) & (6) for post-2001 period. As we can see from columns (3) & (4), Treatment has a positive impact on ΔIPI in the treated industries (Industries that witness tariff cuts) in the pre-2001 period. However, this impact on ΔIPI is absent in the post-2001 period.

[24] I test for the unit root using the Im-Pesaran-Shin test with a trend minimization of AIC and reject the null hypothesis for the presence of unit root

Next, I test the relationship between import tariffs and industry profitability. The results are presented in table 5. In the columns (1) to (4), I use the Import tariffs as the independent variable. The additional controls mentioned in the table include capital–labor intensity and growth in demand (measured by growth in value added in the industry). Columns (1) to (4) show that there is no significant impact of import tariffs on the price–cost margin in any of the periods. These results are consistent with the findings of Pagoulatos, Sorensen (1976). Pagoulatos et al. show that nominal import tariffs do not have a significant impact on the price–cost margin within an industry.

In order to compare import tariffs with import penetration index as a factor affecting the industry price-cost margin, in columns (5) to (8) I use the import penetration index as the independent variable. Consistent with the findings of Xu (2012), Columns (7) shows that import penetration index has a significant negative impact on the price–cost margin in the years 1974 to 2001. However, the results are insignificant for the post-2001 period.

Based on the results in table 5, it is hard to conclude that import tariffs have any significant impact on the price-cost margin in an industry. Even the effect of import penetration is limited to the pre-2001 period.

Table 6 looks at the relationship between the Import tariffs and firm profitability in an industry. In the columns (1) to (3), I use contemporary import tariffs and foreign exchange rate, while in the columns (4) to (6) both the import tariffs and foreign exchange rate have been lagged by one year. Column (2) and (4) shows a significant and positive relationship between profitability of a firm and the import tariffs within the industry. Thus, in the pre-2001 period, if the import tariff in the industry decreases (increases), then there is a drop (rise) in the profitability of the firms. These results are consistent with the interpretation presented in Xu (2012), which presumes that profitability within an industry decreases when import tariffs decline[25]. However, columns (3) and (6) show that, in the

[25] Xu (2012) assumes that Import penetration has a negative impact on the profitability of firms in industry, and shows that import penetration in the industry declines when the import tariffs are reduced.

post-2001 period, import tariffs do not have any significant impact in the profitability of the firms.

The analysis presented above looks at the effect of import tariffs on import penetration, industry profitability and firm profitability. The results show that, while in the pre-2001 period, import tariffs may have had an effect on these dependent variables; in the post-2001 period, there is no significant effect. This shows that the economic rationale, which assumes that import tariffs affect industry competition, is not applicable in the post-2001 period. In the next part of the analysis, I investigate the application of this rationale using an example.

5. Results: Part 2 – Fresard (2010)

The results in the previous section suggest that there is a distinction between the Import tariff – Industry competition relationship in pre-2001 and post-2001 period. Due to this distinction, the tariff cuts in pre-2001 period had a significant effect on industry competition; however, tariff cuts in post-2001 period have no significant effect. These results raise important concerns regarding the economic foundation, especially in the years after 2001, that supports the use of import tariffs to study industry competition.

In his 2010 paper, Fresard used a difference-in-difference approach around tariff cuts to study whether cash-rich rich firms have a better performance in the product market as compared to the performance of their peers. He used the difference-in-difference approach in the pre-2001 period, which is appropriate as in this time period the tariff cuts had a significant effect on industry competition. In this section, I look at whether we would obtain similar results if the technique were used in the post-2001 period. Here, I would state that this study is not a criticism of Fresard (2010). The approach used in Fresard (2010) was appropriate considering the relationship between the import tariffs and industry competition in the pre-2001 period. Rather this study looks to explore if the approach used in that paper continues to be useful, and therefore, can be used for doing a similar work in the post-2001 period.

Therefore, in this paper, I replicate the analysis performed in Fresard (2010) over three time periods: pre-2001, post-2001 and combined time period (1974 – 2015). The time periods are chosen so as to allow a comparison between the pre-2001 and post-2001 periods, and to take a look at the issues that may arise if the entire time period is taken all together.

5.1. General outline of Fresard (2010)

In his 2010 paper, Fresard explores the strategic dimension of cash policy of a firm and its influence on the firm's product market performance. There are several papers that have looked in the advantages and disadvantages of cash holdings. A cash–rich firm can use its cash to benefit itself in a number of ways, for example aggressively pricing its products in the product market (Bolton and Scharfstein 1990), using cash reserves to fund competitive choices such as building an efficient distribution network or location of stores (Campello 2006), or using the cash to signal the possibility of an aggressive behavior towards its competitors thereby affecting the competitors actions (Benoit 1984). Largely, the theory predicts that the cash holdings may have an effect on the outcomes in the product market, both directly and indirectly. Based on this, Fresard argues that if cash holdings of a firm can influence the product market outcomes, then a cash–rich firm should gain market share at the expense of its competitors.

Thus, Fresard studies this relationship between the cash holding and the market share of a firm using two empirical strategies. The first empirical strategy is an instrumental variable approach where asset tangibility is used to instrument a portion of cash holdings. This is based on the assumption that asset tangibility of a firm cannot directly affect the firm's product market performance except through its association with the firm's financing ability. Using this approach on a firm-level panel data, Fresard shows a strong positive relationship between the cash holdings of a firm and its market share growth.

The second empirical strategy is a difference-in-difference approach that uses large import tariff reductions as a quasi-natural experiment. Fresard uses a few preliminary tests to

show that large reductions in industry-level import tariffs cause a change in the industry competition, and then uses these tariff reductions to study the performance of cash-rich firms in the product market. This difference-in-difference analysis reaffirms the positive relationship between the cash holdings and market share growth of the firm. Apart from these, the paper utilizes a number of cross sectional tests and robustness checks to support its results.

5.2. Replicating the Results for years 1974 – 2001

As mentioned above, Fresard used import tariff reductions as the quasi-natural experiment to study the effect of changes in competition. In this paper, the focus has been laid on this difference-in-difference analysis performed in Fresard (2010)[26].

I begin by replicating the analysis over the 1974-2001 period using the difference-in-difference approach. The following difference-in-difference regression is used for estimation (Fresard 2010):

$$\Delta\text{MarketShares}_{i,k,t} = \alpha_i + \eta_t + \vartheta(\text{zCash}_{i,k,t-2}) + \phi\text{CUT}_{k,t} + \psi(\text{zCash}_{i,k,t-2}) * \text{CUT}_{k,t} + B'X_{i,k} + \mathcal{E}_{i,k,t} \quad \text{(Eq. 5)}$$

where *i* denotes the firm, *k* denotes the industry and *t* denotes the year.

The dependent variable $\Delta\text{MarketShares}_{i,k,t}$ is the market share growth of firm *i* in the industry *k* in year *t*. The variable $\text{zCash}_{i,k,t-2}$ represents the cash position of the firm compared to its rivals in the industry and is calculated as difference between Cash-to-Asset Ratio of a firm and its industry-year average divided by the industry-year standard deviation (Mackay and Phillips 2005). $X_{i,k}$ is the set of control variables including size, past performance and past leverage.

[26] In the unreported results, I also replicate the baseline results presented in Fresard (2010) and I find coefficients similar in value and significance.

The focus of the analysis lies in the co-efficient ψ that gives the difference between the cash-performance sensitivities of the firms that experience a shock to their competitive environment and the firms that don't experience any such shock. Fresard argues that if cash holdings provide an advantage in the product market, then subsequent to a tariff cut, the firms with higher cash holdings should experience a higher market share growth. Thus, the expected sign for the co-efficient is positive.

Panel A of Table 7 provides the summary statistics of the variables used in the analysis. All the firm–level variables have been winsorized at 1% level. The import tariff in an industry is calculated as the ad-valorem rate. Since the tariffs vary across the industries over the years, different industries witness tariff reduction events or tariff cuts in different years. The treated group is the set of firms that belong to the industries that undergo a tariff cut in a given year, while the firms in the rest of the industries comprise the control group.

The treatment is defined using the variable $CUT_{k,t}$, which is a dummy variable that equals 1 for the treated firms in the year of treatment and zero otherwise. I use three definitions of tariff cut each depending on a different level of threshold. Similar to Fresard (2010), I use three thresholds based on 3 times the median (baseline specification), 2.5 times the median and 2 times the median of all tariff reductions.

To provide economic foundation for the use of tariff cuts, Fresard used the graphs showing the variations in import tariff and import penetration around the tariff cut events. He indicates that there is a substantial rise in import penetration in the industries that experience a tariff cut. Graph 8.1 shows the level of average import tariff around the tariff cut events for the treated and control groups[27]. For the treated group, the average import tariff shows a drop of about 1.94% after the tariff cut. Graph 8.2 shows the changes in the import penetration around the tariff cut for the treated group. We can see that there is an increase in the import penetration over the years. These graphs show that tariff cuts lead to increases in the import

[27] These graphs are similar to the Graphs 7.1 and 7.3 mentioned in the Part 1. There are some differences between the two because in graphs 8.1 and 8.2, the data includes only those industries which are represented in Compustat database.

penetration and import competition in the domestic markets. Graph 8.3 shows the distribution of tariff cuts over the years. As can be seen, the tariff cuts are distributed almost through out the period.

Table 8 presents the estimation results for equation 5. Column (1), (2) and (3) use tariff cuts with 3 different specifications (threshold levels of 3, 2.5 and 2 median respectively). For all the specifications, the estimates of coefficient ψ are positive and significant lying in the range 0.067 to 0.032. Comparing columns (1) and (3), we see that as the size of the tariff cut reduces, the value of the coefficient ψ also goes down. The results here support the hypothesis that cash holdings have a positive effect on the product market performance of a firm.

5.3. Fresard (2010) Extension with 2002 to 2015 Data and 1974 to 2015 data

In this section, I replicate the analysis for two time periods: 2002 – 2015 and 1974 - 2015.

In order to keep the analysis comparable to the previous section, I use all the manufacturing industries (SIC 2000 to 3999) for which continuous import data is available over all the years (1974 to 2015). Table 7, panel–B provides the summary statistics for the variables based on years 2002 – 2015. Between panel–A and panel–B, there is a considerable difference in the average import tariff. The average import tariff in the years 1974 – 2001 is about 2.80%, while it is only 0.25% in the years 2002 – 2015. This substantial difference in the values of average import tariffs for the two periods is expected because the import tariffs dropped considerably in the years 1974 to 2001. The variables zCash and leverage have similar value as in Panel – A[28].

Graph 9.1 provides the evolution of average import tariff levels in the years surrounding the tariff cuts for period 2002 – 2015. The average import tariff shows a drop of 0.63% between the years *(t-1)* and *t*. The size of this drop is much smaller as compared to

[28] The total assets variable is larger in panel B. However, the value is similar when I take into account the inflation using the consumer price index.

the drop observed for years 1974 – 2001 (which was 1.94%). Graph 9.3 shows the changes in the import penetration for the treated firms. The graph shows an increase in the average import penetration around the tariff cut events, which is consistent with results presented in Fresard (2010). Graph 9.5 shows the distribution of tariff cuts across the years. There are couple of important observations to be made here: firstly, the number of tariff cuts in the 2002-2015 time period is considerably smaller than that in the period 1974-2001. Secondly, the tariff cuts are concentrated in a few years.

Table 9 column (1) presents the estimation results for equation 5 over the years 2002 – 2015. As we can see, the coefficient of interest ψ, although positive, is not significant. Thus, based on these results it is difficult to arrive to any conclusion with regards to the relationship between cash holdings and product market performance of a firm. These results are inconsistent with the findings presented in Fresard (2010).

Next, I conduct the analysis over the period 1974-2015. Graph 9.6 shows the frequency distribution of tariff cuts across the years. Here, the important observation is that almost all of the tariff cuts take place in the years before 2001. The average drop in import tariffs around the tariff cut is 1.45%. Many of the tariff reductions that qualified as tariff cuts in the years 2002–2015 period, no longer meet the baseline 3–median requirement to be qualify as a tariff cut[29].

Table 9 column (2) shows the estimation results for equation 5 over the period 1974-2015. The coefficient of interest ψ is positive and significant, which is consistent with the results of Fresard (2010).

The analysis presented in this section provides conflicting results. The coefficient ψ is not significant in the period 2002-2015, however it is significant when considering the

[29] The median tariff reduction is higher for the period 1974-2015 as compared to the median for period 2002-2015. Therefore, the threshold used for classifying a tariff reduction as a tariff cut is higher in the 1974-2015 period.

period 1974-2015. In order to reconcile these, I discuss the analysis of the three time periods in the next section.

6. Discussion

The basic question I am exploring in this paper is whether it is appropriate to use US import tariffs to study the effect of competition on corporate performance, especially in the years after 2001. The economic framework in this approach is based on the relationship between import tariffs, import penetration and industry competition. While studying the period before 2001, one of the primary reasons for using this approach was that the import tariff data provided sufficient time series and cross industry variation for conducting the analysis (Fresard 2010). In this section, I discuss the results obtained in part 1 and part 2 to answer the question about whether import tariffs continue to be relevant for conducting such an analysis in the years after 2001.

I began the analysis by looking at the variations in the import tariffs over the years from 1974 to 2015. A cursory look at these variations over the period suggests distinction between the trends in the pre-2001 and post-2001 periods. The graphs for average industry-level import tariffs (graph 1), average tariff reductions (graph 2.1) and median tariff reductions (graph 2.2) clearly depict these changing trends. Graph 5 illustrates relationship between the import tariffs and import penetration. As shown in graph 5, in the pre-2001 period, the import tariffs show almost a continuous drop, while the import penetration shows a continuous rise. As a result of this continuous drop, the average import tariff in the year 2001 is 2.28%, which leaves little room for any further reductions. Over the course of next 14 years, the drop in import tariffs is a negligible amount (about 0.06%). However, the import penetration in these years has continued to grow almost at the same rate as before 2001.

In the years before 2001, although a portion of the increase in the import penetration came from the easing of other non–tariff barriers, many studies have attributed a portion of the increased imports partly to the lowering of import tariffs (Bernard, Jensen and Schott

2006) (Xu 2012) (Fresard 2010). Confirming the results for these previous studies, I find a strong negative relationship between the import tariffs and import penetration (Table 1, column 3). The sign and value of the coefficient is consistent with the results in the previous studies. However, in the post-2001 period, when I look at the relationship between import tariffs and import penetration, the results are no longer significant (Table 1, column 4). Considering the low level of import tariff in the year 2001 and the subsequent small size of variations, it seems that the changes in import tariffs are too small to bring about a significant change in import penetration. Although, these results may not conclusively show that import tariffs do not have an impact on import penetration, they do show that at the least the changes in import penetration that may have been a consequence of import tariff variations are too small to distinguish them from noise or effects of other factors.

The aforementioned results are supported by the difference-in-difference analysis performed around the tariff cut events. Using an approach similar to Fresard (2010), I find that the tariff cuts in the pre-2001 period result in an increase in ΔIPI, while tariff cuts in the post-2001 period have no significant effect. Considering the developments in the imports tariffs in the two time periods, I attribute the difference in the results between the two time periods partly to the difference in the size of tariff cuts. In the pre-2001 period, the average size of tariff cut was much larger than size in the post-2001 period. The large size of tariff cuts in the pre-2001 period provided substantial changes in the import penetration, and thus the results for the pre-2001 period tariff cuts are consistent with the findings in the previous studies. However, in the post-2001 period, the size of the tariff cut is too small to bring about any significant change in import penetration.

Another way to ascertain the effect of import tariffs on industry competition is to view their effects on other variables associated with industry competition such as industry profitability. Following a model similar to Xu (2012), I look at whether import tariff and import penetration have an impact on the price–cost margin in an industry. In case of import tariffs, the relationship is insignificant in both the time periods. Import penetration, on the other hand, shows a significant negative effect on price-cost margins but only in the pre-

2001 period. The results for import penetration in the pre-2001 period are consistent with Xu (2012). Conducting the analysis at the firm level, the results show that in the pre–2001 years, higher import tariff is associated with higher firm profitability. However, as we go to the post-2001 period, the relationship is no longer significant (Table 6).

The results presented above indicate that there have been some changes in the relationship between import tariffs and import competition. While, in the pre–2001 period, import tariffs may have brought about significant changes in import competition, in the post–2001 period, this relationship no longer holds. Thus, the economic foundation that formed the basis for the use of import tariffs to study competition is no longer significant in the post-2001 years. And the justification that import tariff data provides sufficient time-series variation is not applicable.

The above results are further reinforced by part 2 of this paper that replicates the work of Fresard (2010) in the years beyond 2001. In his 2010 paper, Fresard looks into the strategic dimension of the cash holdings of a firm. Fresard employs a difference-in-difference empirical strategy where tariff cuts are used as events that trigger a change in the competitive environment of an industry. The initial analysis for the years 1974 to 2001 shows that cash-rich firms do perform better than their competitors when there is shock to the competition in their industry. The results are consistent with Fresard (2010) both in sign and magnitude. However, the results for the period 2002-2015 are not consistent with the results for the earlier time period. For the period 2002-2015, I find that there is no significant difference between the performance of cash-rich firms and their competitors. I attribute this discrepancy at least partly to the difference between the sizes of tariff cuts in the two time periods. Looking at the evolution of import tariffs around tariff cuts in the two time periods, I find that the average size of a tariff cut in the 1974-2001 period is considerably larger than the size of tariff cuts in 2002-2015. The insignificant effect of the tariff cuts is also visible when we take a glance at the evolution of import penetration around the tariff cuts in the 2002-2015 period. The changes in import penetration for the treated industries are not significantly different than changes for the control group (Graph 9).

Additionally, I perform the analysis for the 1974-2015 period. Interestingly, the results here are significant and consistent with findings in Fresard (2010). However, a closer look at the distribution of tariff cuts in the period reveals that almost all the tariff cuts take place in the years prior to 2001.

The results presented in part-2 of the analysis provide a good example of the problem in the application of import tariff data. It demonstrates the problem caused by improper use of import tariffs while studying competition. Using this framework for the period before 2001, as done by Fresard (2010), seems reasonable considering the significant effects of import tariffs on import penetration and profitability. However, in the post-2001 period the variations in import tariffs are too small. In the pre-2001 period, Fresard justified the use of import tariff data based on the time-series variations it provided for studying the effects of competition. However, in post-2001, Fresard's justification isn't applicable.

7. Conclusion and Further Work

The basic question I am exploring in this paper is whether it is appropriate to use US import tariffs to study the effect of competition on corporate performance, especially in the years after 2001. There are several justifications offered in the literature for using this approach. I primarily question two of these justifications: firstly, the economic foundation for the utility of import tariffs, and secondly, the sufficiency of time-series variation. I compare the applicability of this approach in two time periods: pre-2001 and post-2001, where the year 2001 is chosen based on a clear break that can be seen in the average import tariff evolution over the years. I find that in the pre-2001 period, the economic foundation for this approach is quite robust and the variations in import tariffs are sufficiently large to bring about real changes in the competitive environment of an industry. This is seen by testing the effect of industry-level import tariffs on the variables like import penetration, price-cost margins, profitability. However, in the post-2001 period, there is no significant evidence to support the economic foundation for this approach. The import tariffs in the post-2001 period do not have any significant relationship with competition associated variables like import penetration, profitability etc.

Thus, this paper brings to light an important consideration for the empirical studies that use the import tariff approach to study competition effects. It is important that these studies conduct proper preliminary analysis before using this approach, especially if they are using the import tariff data in the post-2001 period. Any work that does not conduct these tests is likely to generate erroneous results. Taking a cue from the presidential address of Campbell Harvey, we as researchers should aim at producing good research rather than limiting our work to a quest for 'significant' results.

8. Bibliography

Anderson, James E., and Eric Van Wincoop. "Trade Costs." Journal of Economic Literature (American Economic Association) 42, no. 3 (September 2004): 691-751.

Benoit, Jean-Pierre. "Financially Constrained Entry in a Game with Incomplete Information." The RAND Journal of Economics 15, no. 4 (Winter 1984): 490-499.

Bernard, Andrew B., J. Bradford Jensen, and Peter K. Schott. "Trade costs, firms and productivity." Journal of Monetary Economics 53 (2006): 917-937.

Bertrand, Marianne. "From the Invisible Handshake to the Invisible Hand? How Import Competition Changes the Employment Relationship." Journal of Labor Economics 22 (2004): 723-765.

Bolton, Patrick, and David S. Scharfstein. "A Theory of Predation Based on Agency Problems in Financial Contracting." The American Economic Review 80, no. 1 (March 1990): 93-106.

Boubaker, Sabri, Walid Saffar, and Syrine Sassi. "Product Market Competition and Debt Choice." Journal of Corporate Finance forthcoming, 2018.

Campello, Murillo. "Debt financing: Does it boost or hurt firm performance in product markets?" Journal of Financial Economics 82 (2006): 135-172.

Chen, Natalie, Jean Imbs, and Andrew Scott. "The dynamics of trade and competition." Journal of International Economics 77 (2009): 50-62.

Chen, Tao, and Chen Lin. "Trade Liberalization, Financial Flexibillty, and Corporate Tax Avoidance." Working Paper, 2014.

DeRosa, A., and Morris Goldstein. "Import Discipline in the U.S. Manufacturing Sector." Staff Paper (International Monetary Fund) (Palgrave Macmillan Journals on behalf of International Monetary Fund), September 1981: 600-634.

Djankov, Simeon, and Bernard Hoekman. "Market Discipline and Corporate Efficiency: Evidence from Bulgaria." Canadian Journal of Economics, February 2000.

Duchin, Ran, Xunhua Su, and Bin Xu. "Do firms respond to industry fast-growing stars?" Working Paper, 2018.

Esposito, Louis, and Frances Ferguson Esposito. "Foreign Competition and Domestic Industry Profitability." The Review of Economics and Statistics 53, no. 4 (November 1971): 343 - 353.

Feenstra, Robert C., John Romalis, and Peter K. Schott. "U.S. Imports, Exports and Tariff Data, 1989-2001." NBER Working Paper Series, December 2002.

Fresard, Laurent. "Financial Strength and Product Market Behavior The Real Effects of Corporate Cash Holdings." The Journal of Finance 65, no. 3 (June 2010): 1097-1122.

Fresard, Laurent, and Philip Valta. "How Does Corporate Investment Respond to Increased Entry Threat." Review of Corporate Finance Studies 5 (2016): 1-35.

Gustavo, Grullon, and Roni Michaely. "Corporate Payout Policy and Product Market Competition." working paper, March 2007.

Harrison, Ann E. "Productivity, imperfect competition and trade reform: Theory and evidence." Journal of International Economics 36 (1994): 53-73.

Harvey, Campbell R. "Presidential Address: The Scientific Outlook in Financial Economics." The Journal of Finance (The American Finance Association) 72, no. 4 (August 2017): 1399-1440.

Hoberg, Gerard, Gordon Phillips, and Nagpurnand Prabhala. "Product Market Threats, Payouts, and Financial Flexibility." Journal of Finance 69, no. 1 (2014): 293 - 324.

Januszewwski, Silke K., Jens Koke, and Joachim K. Winter. "Product market competition, corporate governance and firm performance: an empirical analysis for Germany." Resaerch in Economics 56 (2002): 299-332.

Katics, Michelle M., and Bruce C. Petersen. "The Effect of Rising Import Competition on Market Power: A Panel Data Study of US Manufacturing." The Journal of Industrial Economics 42, no. 3 (September 1994): 277-286.

Lee, Jong-Wha, and Phillip Swagel. "Trade Barriers and Trade Flows Across Countries and Industries." NBER Working Paper Series (National Bureau of Economic Research), July 1994.

Levinsohn, James. "Testing the imports-as-market-discipline hypothesis." Journal of International Economics 35 (1993): 1-22.

Lin, Chen, Micah S. Officer, and Xintong Zhan. "Does Competition Affect Earnings Management." Working Paper, September 2015.

Mackay, Peter, and Gordon M. Phillips. "How Does Industry Affect Firm Financial Structure?" The Review of Financial Studies (Oxford University Press) 18, no. 4 (2005): 1433-1466.

Maksimovic, Vojislav. " Capital structure in repeated oligopolies." RAND Journal of Economics 19, no. 3 (1988): 389-407.

Nickell, Stephen J. "Competition and Corporate Performance." Journal of Political Economy (The University of Chicago Press Journals) 104, no. 4 (August 1996): 724-746.

Pagoulatos, Emilio, and Robert Sorensen. "International Trade, International Investment and Industrial Profitability of U.S. Manufacturing." Southern Economic Journal (Southern Economic Association) 42, no. 3 (January 1976): 425 - 434.

Pugel, Thomas A. "Foreign Trade and US Market Performance." The Journal of Industrial Economics (Wiley) 29, no. 2 (December 1980): 119-129.

Roberts, Mark J., and James R. Tybout. Industrial Evolution in Developing Countries. Oxford University Press, 1996.

Sachs, Jeffrey D., and Andrew Warner. "Economic Reform and the Process of Global Integration." Brookings Papers on Economic Activity 26 (1995): 1-118.

Schmutzler, Armin. "Competition and investment - A unified approach." International Journal of Industrial Organization 31 (2013): 477-487.

Spence, M. Cost Reduction, Competition and Industry Performance. . Vols. International Economic Association Series, 77, in New Developments in the Analysis of Market Structure, by Mathewson G.F. Stiglitz J.E. Palgrave Macmillan, London, 1986.

Trefler, Daniel. "Trade Liberalization and the Theory of Endogenous Protection: An Econometric Study of US Import Policy." Journal of Political Economy (The University of Chicago Press) 101, no. 1 (February 1993): 138-160.

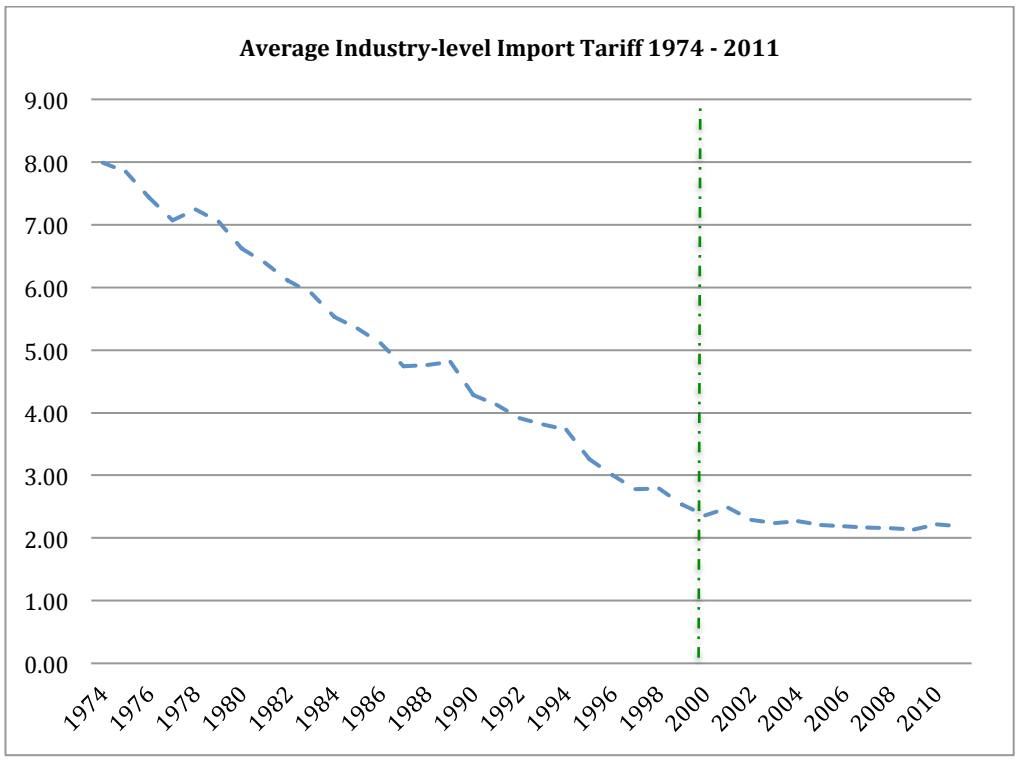
Valta, Philip. "Competition and the cost of debt." Journal of Financial Economics 105 (2012): 661-682.

Xu, Jin. "Profitability and Capital Structure: Evidence from import penetration." Journal of Financial Economics 106 (2012): 427-446.

Zott, Christoph, and Raphael Amit. "The fit between product market strategy and business model: implications for firm performance." Strategic Management Journal 29, no. 1 (January 2008): 1-26.

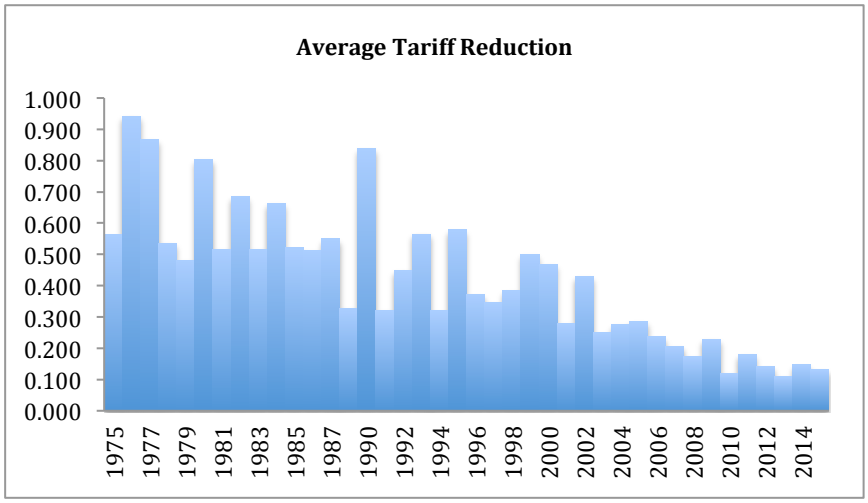
Graph 1: Import Tariff 1974 to 2015

The graph shows the average import tariffs over the years 1974 to 2015. Industry-level import tariff is an ad-valorem rate calculated as the total duty collected divided by the total general imports in the 4-digit SIC code industry and is expressed as a percentage. Average import tariff is the simple average of ad-valorem rate over all the 4-digit SIC code industries.

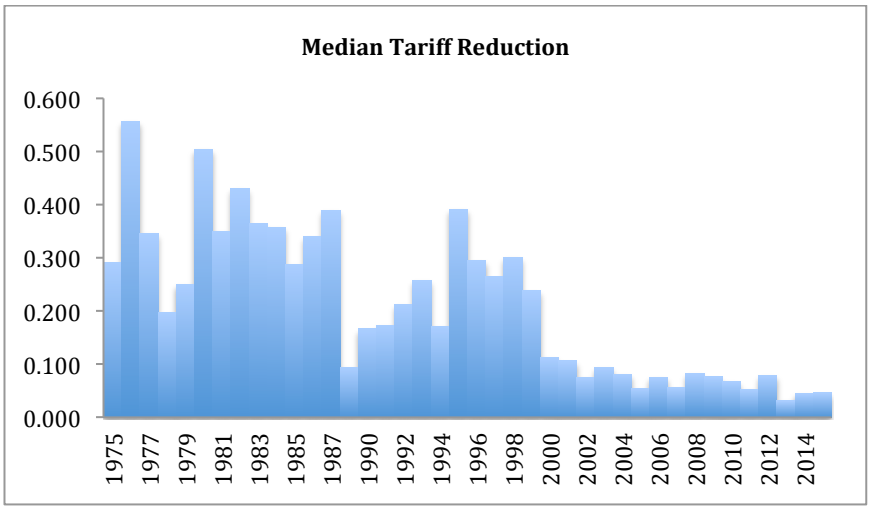


Graph 2: Average and Median Tariff Reductions over the years 1974 to 2015

The graphs 2.1 and 2.2 show the average tariff reduction and median tariff reduction over all industries in each year, respectively. Industry-level import tariff is calculated as the ad-valorem rate equal to total duty collected divided by total amount of general imports in a 4-digit SIC code industry and is expressed as a percentage. An industry-level tariff reduction is calculated as the first-difference of import tariffs for 4-digit sic code industry. This tariff reduction is then averaged over all the 4-digit SIC code industries in any given year to obtain the average tariff reduction for the given year. The median tariff reduction is also calculated in a similar manner. The Y-axis gives the size of the average tariff reduction in 2.1 and median tariff reduction in 2.2



Graph 2.1



Graph 2.2

Graph 3: Import Tariffs around Tariff Cuts

The graph shows the average level of import tariffs around a tariff cut. A tariff cut is defined based on baseline specification given in Fresard (2010). The three lines represent the tariff cuts in the three periods: 1974-2011, 1974-2001 and 2002-2011. Industry-level import tariff is calculated as the ad-valorem rate equal to total duty collected divided by total amount of general imports in a 4-digit SIC code industry and is expressed as a percentage. The Y-axis gives the level of average import tariff in the various years around the tariff cut. The Tariff cut takes place in the year *t*.

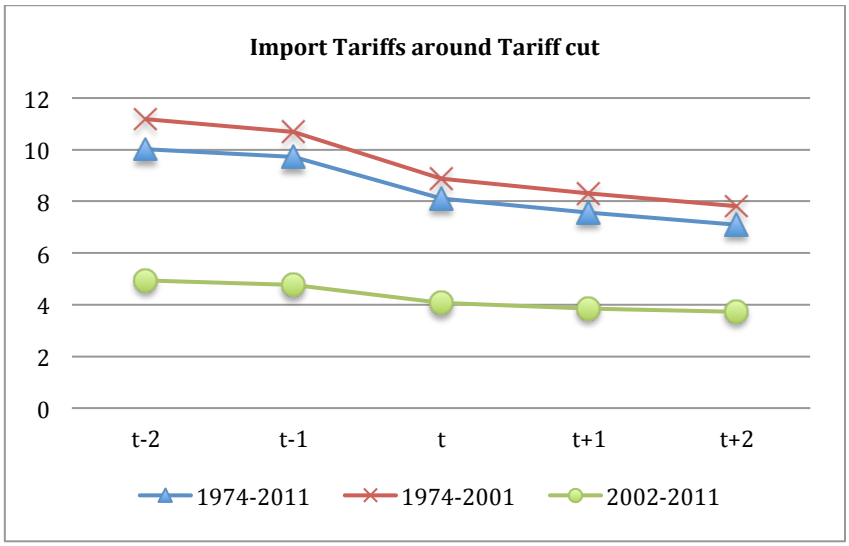


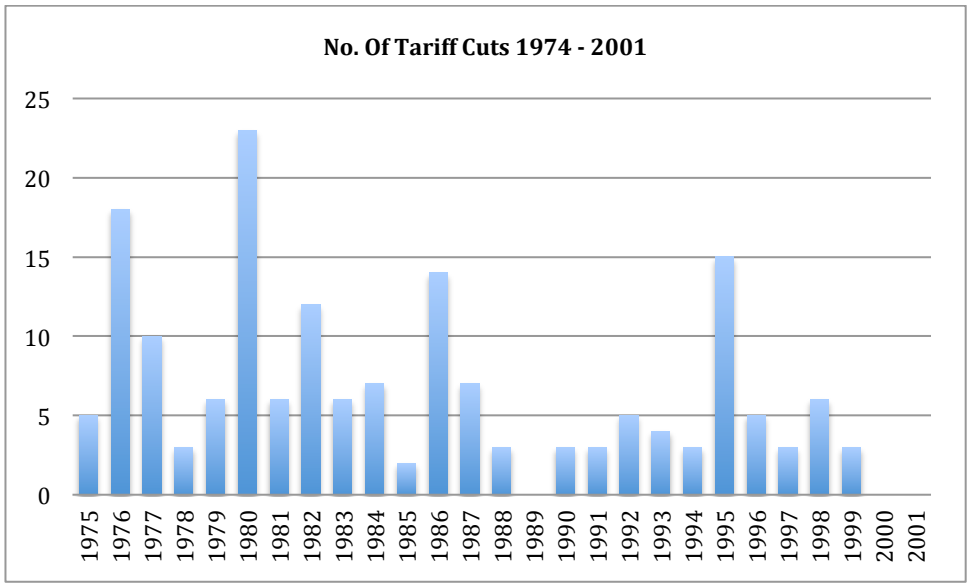
Table 1: Import Tariffs around Tariff Cuts

Panel A of the table provides the average import tariff in the years surrounding the tariff cuts. Panel B provides some relevant characteristics across the different time periods. The average is calculated as simple average of tariff over all the industries undergoing Tariff Cut. Year (t) is the year of Tariff Cut. This represents all the manufacturing industries for which the import data is available from 1974-2011 continuously.

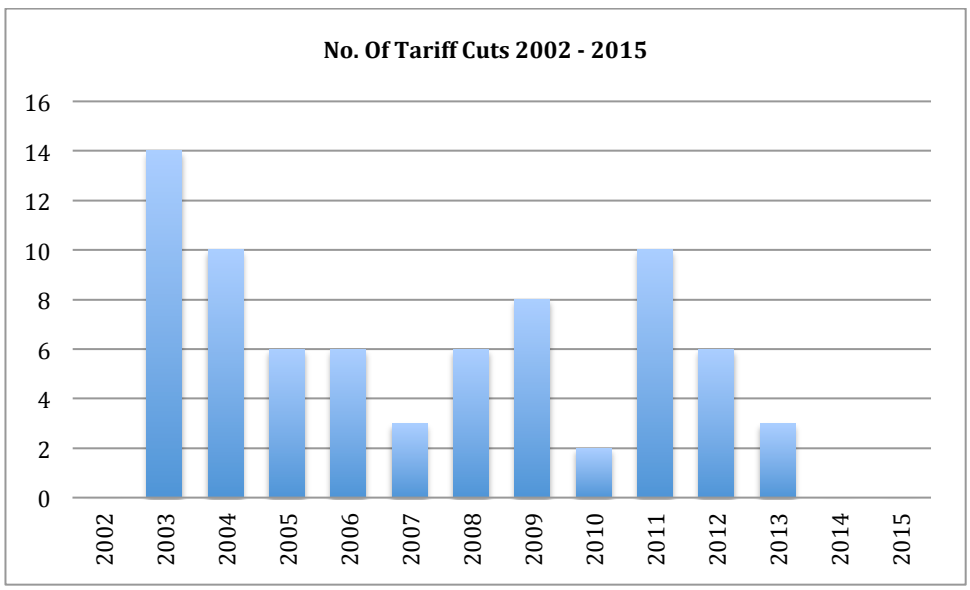
	1974-2011	1974-2001	2002-2011
Panel A: Import Tariffs (%)			
Tariff (t-2)	10.01	11.18	4.93
Tariff (t-1)	9.73	10.69	4.77
Tariff (t)	8.11	8.88	4.08
Tariff (t+1)	7.57	8.31	3.85
Tariff (t+2)	7.10	7.81	3.72
Panel B: Characteristics of Time periods			
No. Of Tariff Cuts	766	534	175
Average Size of Tariff Cut	1.62	1.81	0.70
No. Of industries witnessing the Cut	175	159	89

Graph 4: Distribution of Tariff reductions over Period – 1 (1974 – 2001)

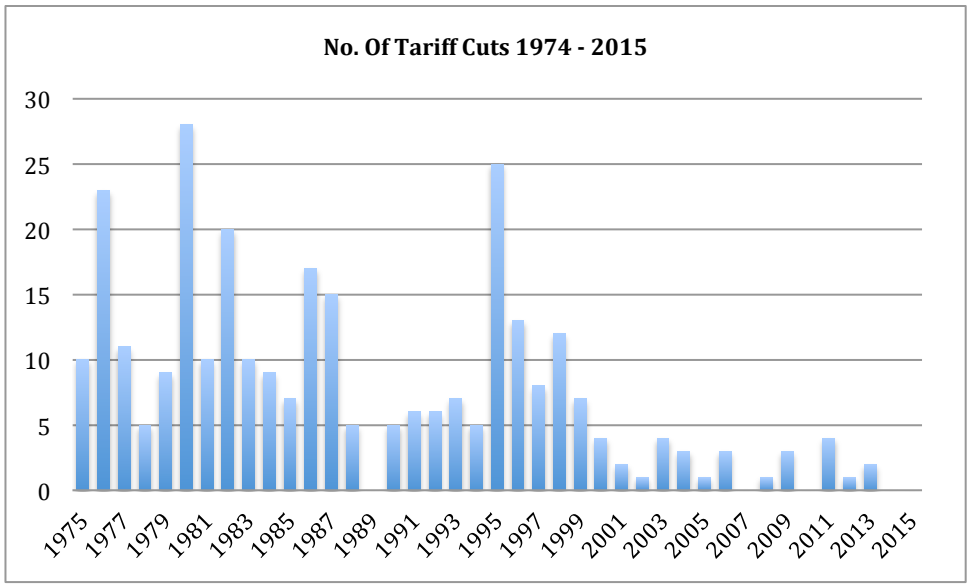
The Following Graphs give the number of Tariff cuts that take place in any given year across the three time periods: 1974-2001, 2002-2011, 1974-2015. A tariff cut is defined based on baseline specification given in Fresard (2010). An industry witnesses Tariff Reduction event when the reduction in tariff is larger than 3 times the median reduction. This graph is based on the industries for which the import data is available along with data on Compustat.
Note: Since the calculation of a tariff cut is based on the median level of tariff reduction in any given period. Therefore, the size of tariff reduction during a tariff cut in the three periods is different.



Graph 4.1



Graph 4.2


No. Of Tariff Cuts 1974 - 2015
30
25
20
15
10
5
0
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015

Graph 4.3

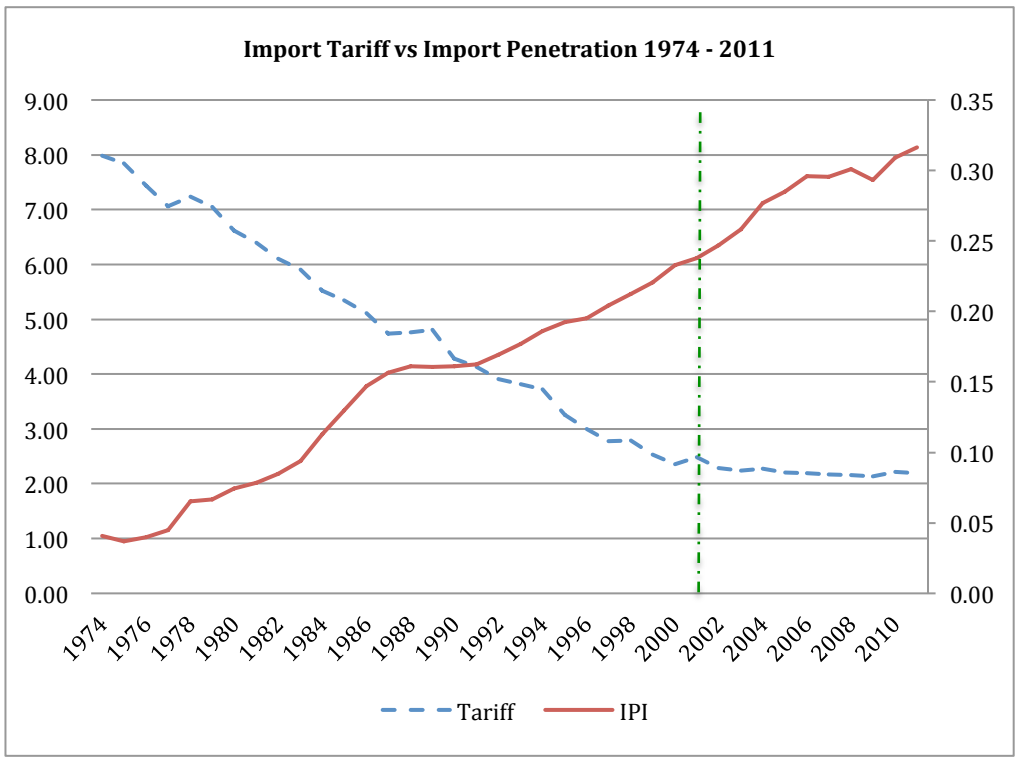
Graph 5: Import Tariff and Import Penetration 1974 - 2011

The graph shows the average import tariffs and average import penetration over the years 1974 to 2015. Industry-level import tariff is ad-valorem rate calculated as the total duty collected divided by the total amount general imports in the 4-digit SIC code industry and is expressed as a percentage. Average import tariff is the simple average of ad-valorem rate over all the 4-digit SIC code industries. Y-Axis (left): Import Tariffs; Y-Axis (Right): Import Penetration (IPI)

Import Penetration (IPI) for each industry is defined as:

$$Import\ Penetration = \frac{Imports}{Imports + Domestic\ Production}$$

Average import penetration is the simple average of import penetration of all 4-digit SIC code industries in any given year. The vertical dotted line represents the year 2001.

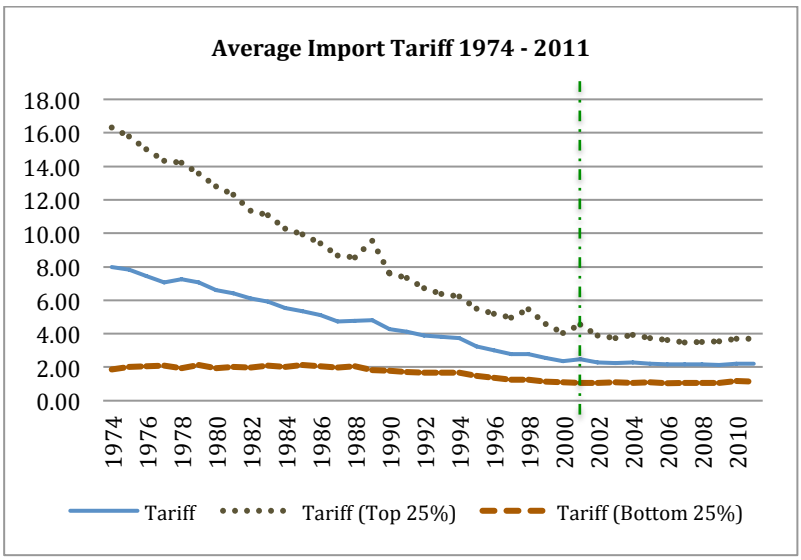


The Following table gives the slope of the Average Import Tariff and Average Import penetration Index in the pre-2001 and post-2001 periods

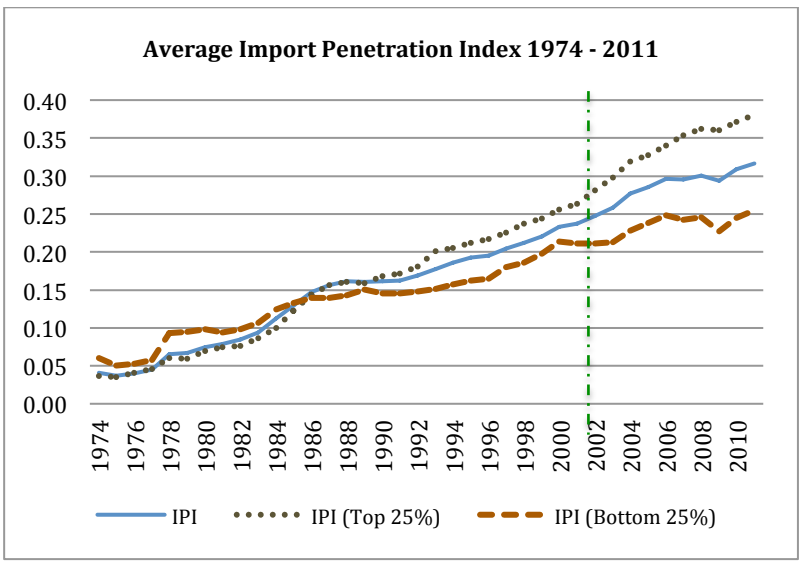
Slope	1974-2001	2001-2011
Import Tariffs	-0.204	-0.029
IPI	0.007	0.008

Graph 6: Average Import Tariffs and Import Penetration Index 1974 – 2011

This Graph segregates the Industries into categories based on the total reduction in import tariff from 1974 to 2011. The total reduction for an industry is calculated as the difference between the import tariff of the industry in the year 2011 and import tariff in year 1974.
Category1: Includes all industries between 1974 – 2011 that have data available for all the years
Category 2: Industries that witness largest reduction in import tariff (Top 25%)
Category 3: Industries that witness smallest reduction in import tariff (Bottom 25%)
Graph 6.1 gives the import tariffs for the three categories, while graph 6.2 gives the import penetration.



Graph 6.1



Graph 6.2

Table 2: Import tariff variations

This table provides the summary statistics for import tariffs, import penetration and Domestic production in various industries calculated over 5-year periods starting from 1974. Import penetration represents the market share of foreign goods, domestic production represents the market share of the domestic firms.

$$Import\ Penetration = \frac{Imports}{Imports + Domestic\ Production}$$

$$Domestic\ Production = \frac{Domestic\ Production}{Imports + Domestic\ Production}$$

Years		Mean	Std. Dev	p10	Median	p90
1974-1978	Import Tariff	7.62	6.56	1.15	5.99	15.49
	Import Penetration	0.05				
	Domestic Production	0.95				
1979-1983	Import Tariff	6.48	6.07	0.98	4.98	13.08
	Import Penetration	0.08				
	Domestic Production	0.92				
1984-1988	Import Tariff	5.13	5.39	0.73	3.79	10.40
	Import Penetration	0.14				
	Domestic Production	0.86				
1989-1993	Import Tariff	4.28	4.83	0.38	3.46	8.69
	Import Penetration	0.17				
	Domestic Production	0.83				
1994-1998	Import Tariff	3.19	3.78	0.21	2.23	7.26
	Import Penetration	0.20				
	Domestic Production	0.80				
1999-2003	Import Tariff	2.44	3.61	0.01	1.21	6.61
	Import Penetration	0.24				
	Domestic Production	0.76				
2004-2008	Import Tariff	2.25	3.02	0.00	1.22	6.27
	Import Penetration	0.29				
	Domestic Production	0.71				
2008-2011	Import Tariff	2.24	2.98	0.00	1.23	5.91
	Import Penetration	0.31				
	Domestic Production	0.69				

Table 3: Regression Analysis - Import Penetration vs Import Tariff

This table summarizes results from the OLS regression based on the following model:

$$IPI_{it} = \beta\, Tariff_{it-1} + \theta X_{it-1} + \mu_i + \vartheta_t + \varepsilon_{it}$$

where IPI_{it} is the Import Penetration Index in the year *t* for the industry *i*, $Tariff_{it-1}$ is the import tariff in the year *(t-1)* for industry *i*, X_{it-1} are the industry level control variables including the foreign exchange rate for the industry *i* in the year *(t-1)*. The industry fixed effects are given by μ_i and the time fixed effects are given by ϑ_t. The industry-level foreign exchange rate is calculated using the process described in Xu(2012). Robust standard errors with industry clusters are reported in the parentheses below the coefficients. ***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.
Columns (1), (2), (5) & (6): Years 1974 – 2011
Columns (3) & (7): Years 1974 – 2001
Columns (4) & (8): Years 2002 – 2011

	Import Penetration Index							
	1974-2011	1974-2011	1974-2001	2002-2011	1974-2011	1974-2011	1974-2001	2002-2011
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Import Tariff	-0.020***	-0.007***	-0.004**	0.005	-0.019***	-0.007***	-0.005**	0.005
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Foreign Exchange Rate					0.014	0.002	0.002	0.002
					(0.01)	(0.01)	(0.01)	(0.01)
Industry fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	8626	8626	6356	2270	8516	8516	6256	2260
Adjusted R-sq	0.694	0.790	0.788	0.963	0.721	0.806	0.811	0.963

Table 4: Difference in Difference Analysis – Import Penetration and Import Tariffs

This table summarizes results from the difference-in-difference analysis based on the following model:

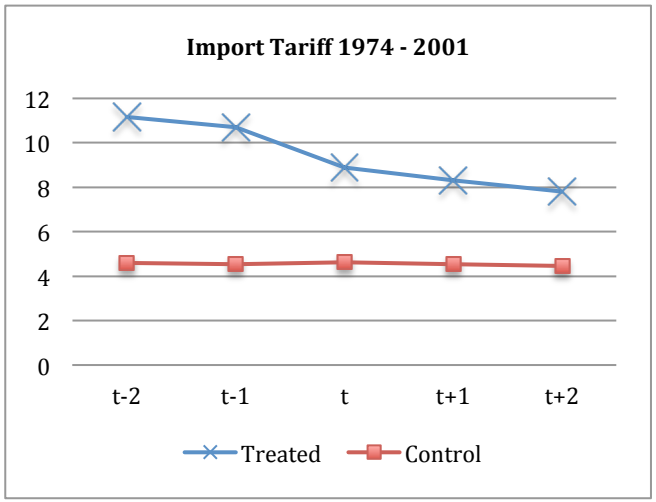
$$\Delta IPI_{it} = \beta\, CUT_{it} + \theta X_{it} + \mu_i + \vartheta_t + \varepsilon_{it}$$

where I indexes the industry, and t indexes the year. ΔIPI_{it} is the change in the import penetration index for the industry I going from year (t-1) to t. X_{it} are the control variables (foreign exchange rate). The variable CUT_{it} is the dummy variable that equals one for treated industries in the year of the treatment and is zero otherwise. Robust standard errors with industry clusters are reported in the parentheses below the coefficients. ***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.
Columns (1) & (2): Years 1974 – 2011
Columns (3) & (4): Years 1974 – 2001
Columns (5) & (6): Years 2002 – 2011

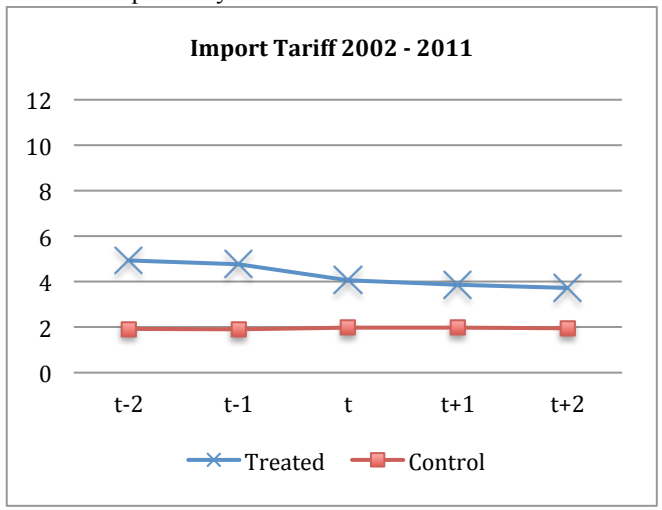
	ΔImport Penetration Index					
	1974-2011	1974-2011	1974-2001	1974-2001	2002-2011	2002-2011
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	0.005**	0.005**	0.006**	0.006**	0.003	0.004
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Foreign Exchange Rate		-0.002*		-0.001		-0.003
		(0.00)		(0.00)		(0.00)
Industry Fixed Effects	No	Yes	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8661	8661	6516	6391	2500	2490
R-sq	0.036	0.072	0.031	0.066	0.052	0.175

Graph 7: Import Tariffs and Import Penetration around the Tariff Reduction events

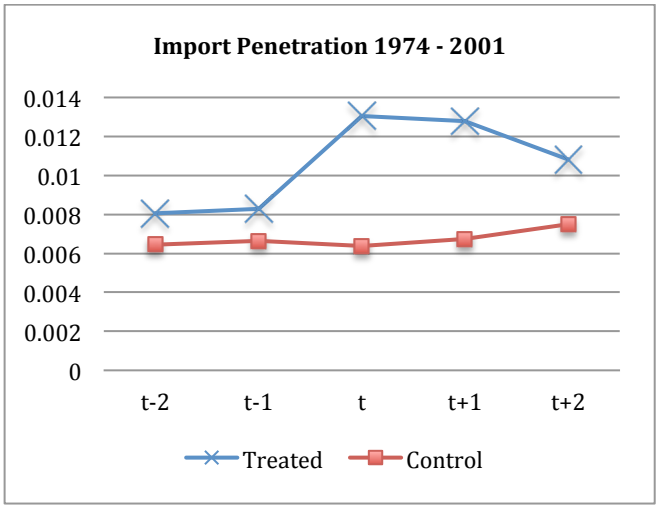
The graphs 7.1 and 7.2 show the average import tariff levels around a tariff cut in the two time periods 1974-2001 and 2002-2011 respectively. The graphs 7.3 and 7.4 show the average import penetration around a tariff cut in the two time periods 1974-2001 and 2002-2011 respectively.



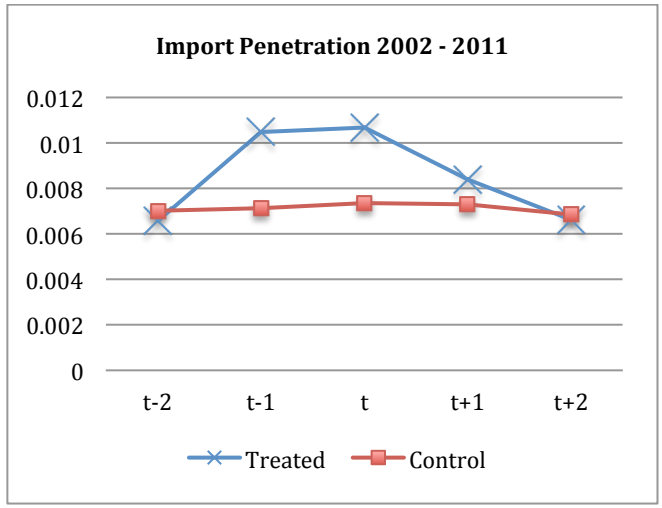
Graph 7.1



Graph 7.2



Graph 7.3



Graph 7.4

Table 5: Analyzing Price – Cost Margin, Import Tariffs and Import Penetration

This table summarizes results from the OLS regression based on the following model:

$$pcm_{it} = \beta\, tariff_{it} + \theta\, X_{it} + \mu_i + \vartheta_t + \varepsilon_{it}$$

where

$$pcm_{it} = \frac{vadd_{it} - payroll_{it}}{vadd_{it} + matcost_{it}}$$

pcm_{it} is the price-cost margin for the industry i in the year t, $tariff_{it}$ is the import tariff, and X_{it} are the industry level control variables including measure of industry concentration. The industry-level fixed effects are given by μ_i and year fixed effects by ϑ_t. In the price-cost margin calculations, vadd is the value added by all the firms in the industry, payroll is the payrolls, and matcost is the total cost of material used in the industry. Additional Controls include Capital-Labor Intensity, Growth in Demand (measured by growth in Value Added). Robust standard errors with industry clusters are reported in the parentheses below the coefficients. ***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.

	Price-cost Margin							
	1974-2011	1974-2011	1974-2001	2002-2011	1974-2011	1974-2011	1974-2001	2002-2011
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tariff	-0.002	-0.002	-0.001	0.003				
	(0.00)	(0.00)	(0.00)	(0.00)				
IPI					-0.066**	-0.070**	-0.064*	-0.132
					(0.03)	(0.03)	(0.04)	(0.08)
HHI	-0.009	-0.006	-0.002	-0.014	-0.007	-0.005	-0.002	-0.012
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Additional Controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3940	3940	2787	1153	3940	3940	2787	1153
Adjusted R-sq	0.8324	0.8451	0.8823	0.8929	0.8335	0.8465	0.8835	0.8963

Table 6: Profitability vs Import Tariffs

This table summarizes results from the OLS regression based on the following model:

$$prty_{ijt} = \beta\, tariff_{jt} + \theta\, X_{jt} + \gamma\, Z_{it} + \mu_j + \vartheta_t + \varepsilon_{it}$$

where $prty_{ijt}$ is the profitability of firm i belonging to industry j in the year t, $tariff_{jt}$ is the import tariff for the industry j, X_{jt} are the industry-level control variables including measure of industry concentration and industry-level foreign exchange rate, and Z_{it} are the firm-level control variables which include Market to Book, Asset Tangibility and logarithm of Sales. μ_i and ϑ_t are the industry and year fixed effects. Columns (1), (2) and (3) use contemporary variables. Columns (4), (5) and (6) use 1-year lagged variables (control variables are also lagged by 1 year). Robust standard errors with firm clusters are reported in the parentheses below the coefficients. ***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.

	Firm Profitability					
	1974-2011	1974-2001	2002-2011	1974-2011	1974-2001	2002-2011
	(1)	(2)	(3)	(4)	(5)	(6)
Tariff	0.002	0.004***	-0.009			
	(0.00)	(0.00)	(0.01)			
L1.Tariff				0.003*	0.003*	-0.012
				(0.00)	(0.00)	(0.01)
Foreign Exchange Rate	0.006**	0.003	-0.008			
	(0.00)	(0.00)	(0.01)			
L1.Foreign Exchange Rate				0.009***	0.009**	-0.012
				(0.00)	(0.00)	(0.01)
Firm Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59633	41717	17916	55491	38143	17348
Adjusted R-sq	0.433	0.344	0.521	0.521	0.409	0.608

Part 2 - Fresard (2010) replication

Table 7: Summary Statistics

Panel A, B and C provide the summary statistics for the various firm-level variables in the three time periods: 1974-2001, 2002-2015 and 1974-2015

variable	N	Mean	Std. Dev	p10	Median	p90
			Panel A: Statistics for 1974 - 2001			
Total Assets	28432	1446	4524	5	93	2874
zcash	21324	0.00	0.97	-1.08	-0.18	1.37
Leverage	28372	0.16	0.15	0.00	0.13	0.37
Asset Tangibility	28294	0.42	0.13	0.22	0.45	0.55
Import Tariff	28432	2.80	2.72	0.00	2.30	6.21
			Panel B: Statistics for 2002 - 2015			
Total Assets	18839	4878	18287	10	158	8323
zcash	13616	0.00	0.98	-1.26	-0.02	1.26
Leverage	18770	0.11	0.15	0.00	0.03	0.33
Asset Tangibility	18707	0.25	0.15	0.04	0.24	0.46
Import Tariff	18839	0.25	0.50	0.00	0.00	1.07
			Panel C: Statistics for 1974 - 2015			
Total Assets	40585	2569	8415	6	124	4887
zcash	31203	0.00	0.97	-1.10	-0.16	1.36
Leverage	40472	0.15	0.15	0.00	0.11	0.36
Asset Tangibility	40394	0.37	0.15	0.14	0.41	0.54
Import Tariff	40585	2.05	2.57	0.00	0.95	5.63

Table 8: Fresard(2010) – Impact of Cash on Sales Growth rate

This table provides the difference-in-difference analysis based on the following specification:

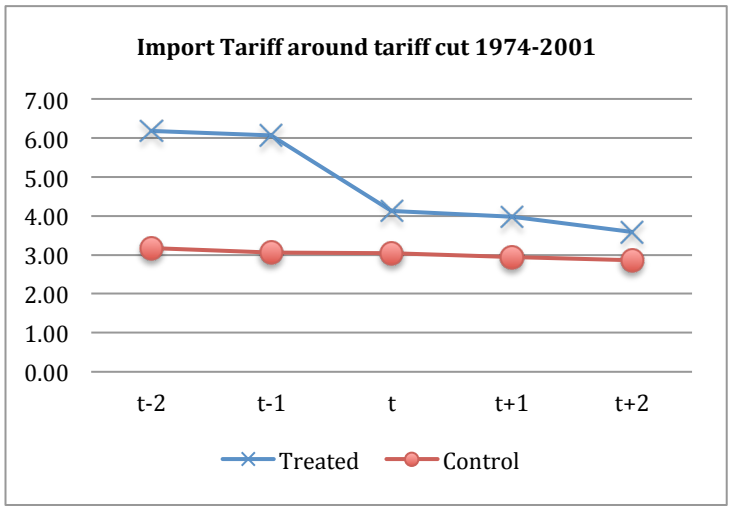
$$\Delta \text{MarketShares}_{i,k,t} = \alpha_i + \eta_t + \vartheta(\text{zCash}_{i,k,t-2}) + \phi \text{CUT}_{k,t} + \psi(\text{zCash}_{i,k,t-2}) * \text{CUT}_{k,t} + B'X_{i,k} + \mathcal{E}_{i,k,t}$$

The dependent variable $\Delta \text{MarketShares}_{i,k,t}$ is the market share growth of firm i in the industry k in year t. The variable $\text{zCash}_{i,k,t-2}$ represents the cash position of the firm compared to its rivals in the industry and is calculated as difference between Cash-to-Asset Ratio of a firm and its industry-year average divided by the industry-year standard deviation. $X_{i,k}$ is the set of control variables including size, past performance and past leverage. The treatment is defined using the variable $\text{CUT}_{k,t}$, which is a dummy variable that equals 1 for the treated firms in the year of treatment and zero otherwise. There are three specifications for treatment based on the size of threshold (3, 2.5 and 2 median). The baseline case is 3-Median. Robust standard errors with firm clusters are reported in the parentheses below the coefficients. ***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.

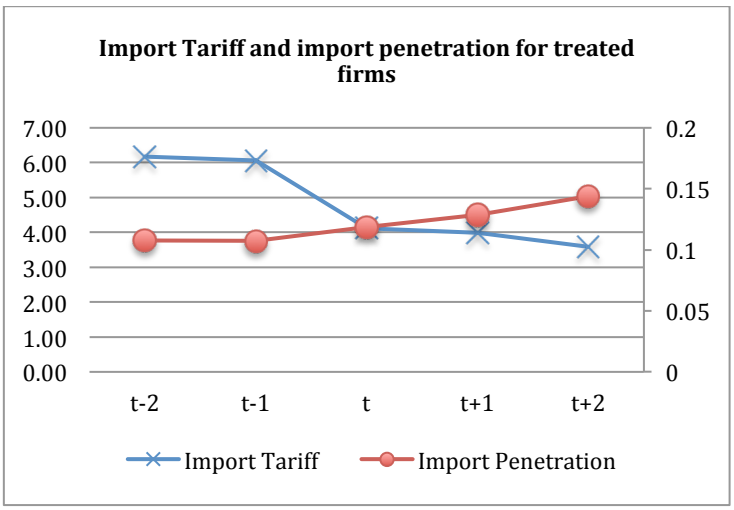
	Market Share Growth		
	3-Median	2.5-Median	2-Median
	(1)	(2)	(3)
zcash(t-2)	0.028***	0.026***	0.028***
	(0.01)	(0.01)	(0.01)
zCash(t-2) x CUT(t)	0.067***	0.067***	0.032*
	(0.02)	(0.02)	(0.02)
CUT(t)	0.000	-0.010	-0.010
	(0.02)	(0.01)	(0.01)
Size(t-1)	-0.056***	-0.056***	-0.056***
	(0.01)	(0.01)	(0.01)
Leverage(t-1)	0.090**	0.090**	0.090**
	(0.04)	(0.04)	(0.04)
Leverage(t-2)	-0.150***	-0.151***	-0.150***
	(0.05)	(0.04)	(0.04)
Sales Growth(t-1)	-0.083***	-0.083***	-0.084***
	(0.03)	(0.03)	(0.03)
Sales Growth(t-2)	-0.034**	-0.034**	-0.033**
	(0.01)	(0.01)	(0.01)
Firm Fixed Effects	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes
Observations	18742	18742	18742
R-Sq	0.257	0.258	0.256

Graph 8: Average import Tariff around the event year for Treated and Control group

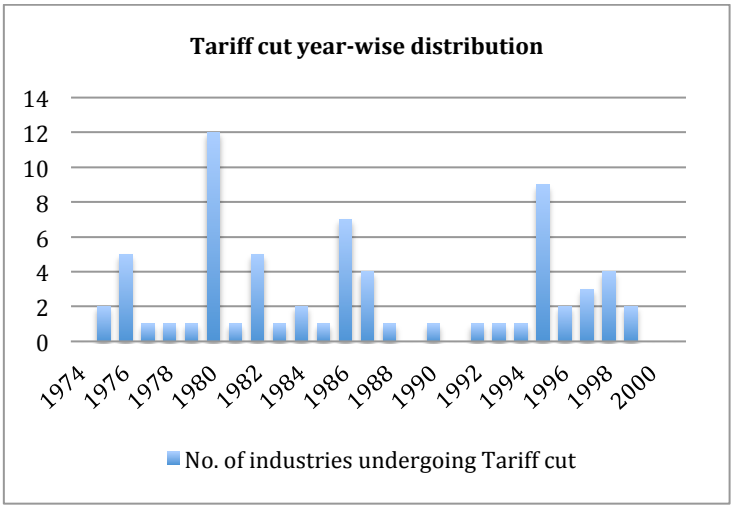
The graphs 8.1 shows the average level of import tariff around a tariff cut in the time periods 1974-2001, while graph 8.2 shows the fluctuation in import penetration along with import tariffs. The Tariff cut occurs in the year *t* and is calculated on the baseline specification of 3-median threshold. In the 8.2, Y-Axis(left) represents Import Tariffs for the Treated industries (%) and Y-Axis(Right) represents Import Penetration for the treated industries. Graph 8.3 gives the number of Tariff cuts that take place in any given year across the time period 1974-2001.



Graph 8.1



Graph 8.2


Tariff cut year-wise distribution
14
12
10
8
6
4
2
0
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
No. of industries undergoing Tariff cut

Graph 8.3

Table 9: Based on Table 4 of Fresard (2010) – Impact of Cash on Sales Growth rate

This table provides the difference-in-difference analysis based on the following specification for two time periods 2002-2015 and 1974-2015:

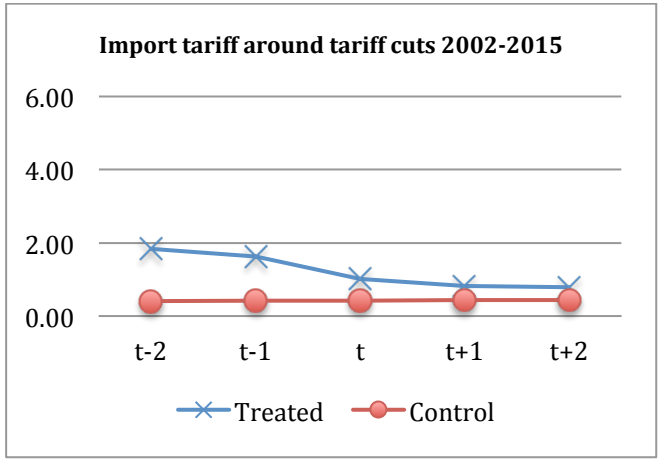
$$\Delta\text{MarketShares}_{i,k,t} = \alpha_i + \eta_t + \vartheta(\text{zCash}_{i,k,t-2}) + \phi\text{CUT}_{k,t} + \psi(\text{zCash}_{i,k,t-2}) * \text{CUT}_{k,t} + B'X_{i,k} + \mathcal{E}_{i,k,t}$$

The dependent variable $\Delta\text{MarketShares}_{i,k,t}$ is the market share growth of firm i in the industry k in year t. The variable $\text{zCash}_{i,k,t-2}$ represents the cash position of the firm compared to its rivals in the industry and is calculated as difference between Cash-to-Asset Ratio of a firm and its industry-year average divided by the industry-year standard deviation. $X_{i,k}$ is the set of control variables including size, past performance and past leverage. The treatment is defined using the variable $\text{CUT}_{k,t}$, which is a dummy variable that equals 1 for the treated firms in the year of treatment and zero otherwise. The estimation is for the baseline specification of treatment based on the 3-median threshold. Robust standard errors with firm clusters are reported in the parentheses below the coefficients. ***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.

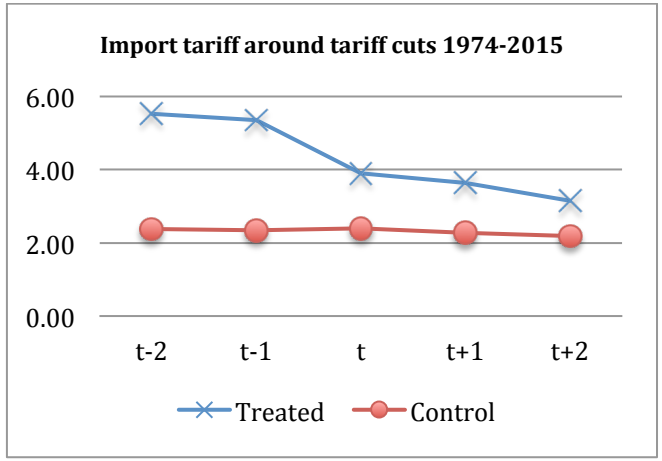
	Market Share Growth	
	2002-2015	1974-2015
	(1)	(2)
zcash(t-2)	0.075***	0.035***
	(0.02)	(0.01)
	0.000	0.000
zCash(t-2) x CUT(t)	0.003	0.063***
	(0.05)	(0.02)
	0.943	0.005
CUT(t)	0.029	-0.014
	(0.04)	(0.01)
	0.526	0.324
Size(t-1)	-0.081***	-0.046***
	(0.02)	(0.01)
	0.001	0.000
Leverage(t-1)	0.299**	0.132***
	(0.15)	(0.05)
	0.043	0.005
Leverage(t-2)	-0.077	-0.133***
	(0.13)	(0.04)
	0.548	0.002
Sales Growth(t-1)	-0.211***	-0.107***
	(0.03)	(0.02)
	0.000	0.000
Sales Growth(t-2)	-0.109***	-0.032**
	(0.02)	(0.01)
	0.000	0.021
Firm Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
Observations	11066	27758
R-Sq	0.316	0.236

Graph 9: Average import Tariff around the event year for Treated and Control group

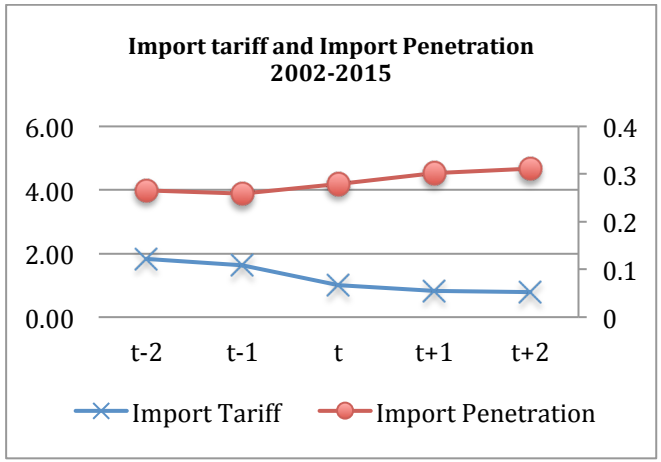
Graphs 9.1 and 9.2 show the average level of import tariffs around a tariff cut in the two time periods 2002-2015 and 1974-2015 respectively. Graphs 9.3 and 9.4, show the fluctuation of import penetration along with import tariffs for the two time periods 2002-2015 and 1974-2015 respectively. In graphs 9.3 and 9.4, Y-Axis (left) represents Import Tariffs for the Treated industries (%), while Y-Axis (Right) represents the Import Penetration for treated industries. Tariff cut occurs in year *t*.



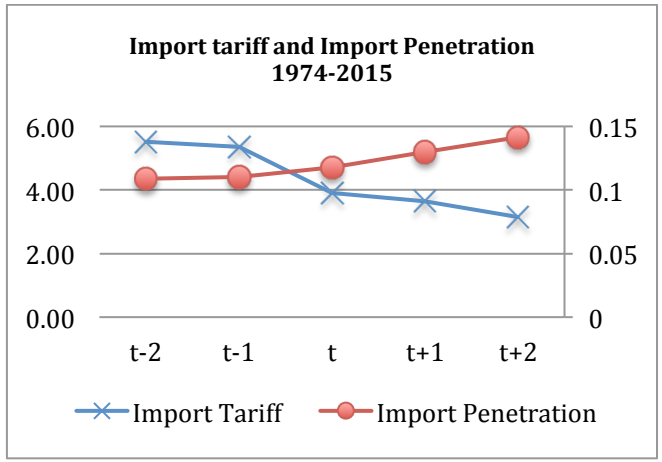
Graph 9.1



Graph 9.2

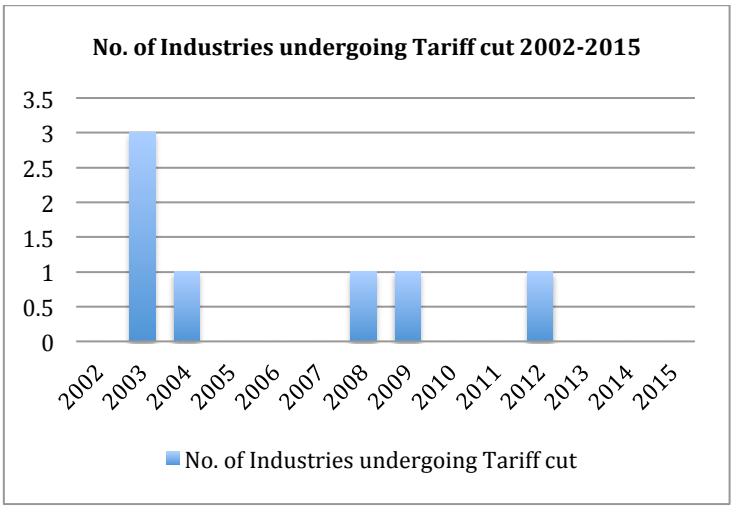


Graph 9.3

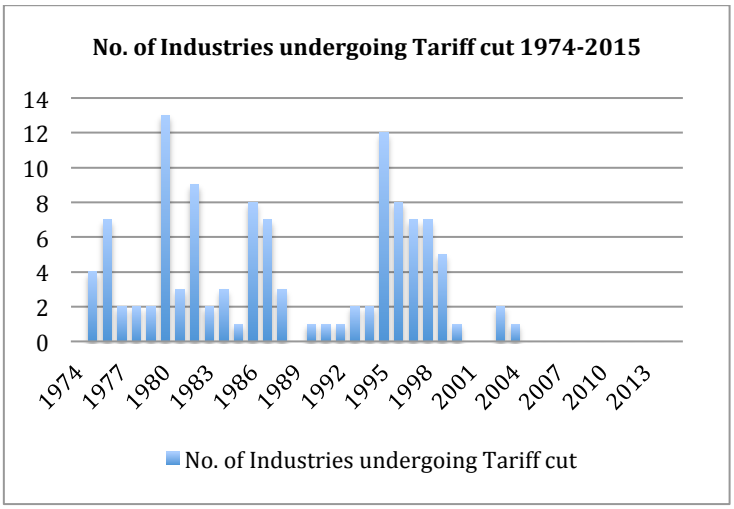


Graph 9.4

Graph 9.5 and 9.6 show the number of Tariff cuts that take place in any given year across the two time periods: 2002-2015 and 1974-2015 respectively. Tariff cuts are based on baseline specification of 3-median threshold.



Graph 9.5



Graph 9.6

Debt Covenants and CEO compensation

Chunbo Liu[†] Varun Verma[#]

Abstract

This paper empirically examines the relationship between debt covenants and CEO compensation. Or finding show that covenant restrictions, both bond covenants and loan covenants, have a positive effect on CEO compensation. We use two measures for covenant restrictions, namely number of covenants and distance-to-violation. Our findings suggest that debt covenants may have an impact on CEO effort level and CEO turnover risk. We supplement our analysis using a difference-in-difference approach around an exogenous accounting based shock to the variable distance-to-violation. The results of this analysis indicate support to our findings that strictness of covenants has positive effect on compensation.

Keywords: Debt Covenants, Bond Covenants, Loan Covenants, CEO compensation

* We are grateful to Prof. Carsten Bienz for his invaluable guidance and support. We are also thankful to Francisco Santos, Xunhua Su and participants at NHH Brownbag seminar for their comments and suggestions.

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1. Introduction

For any firm that uses debt financing, debt covenants are an important component of the debt contracts that affect its investments, its capital structure, its cost of debt etc. (Roberts and Sufi 2009) (Chava and Roberts 2008) (Nini, Smith and Sufi 2012) Considering this widespread influence of covenants on firm policies, it is interesting to explore their impact on various stakeholders in the firm. Since the primary purpose of covenants is to reduce the conflicts of interest between the debt holders and shareholders, the literature around covenant has neglected their impact on other important stakeholders such as the firm's management, its customers and its suppliers. In this paper, we seek to partially fill this gap by focusing our attention on debt covenants and their influence on the firm's management. More specifically, we look at the relationship between covenant restrictions and CEO compensation.

CEOs are the top decision-makers in the firms who have authority over various policy decisions. Since covenants also have an influence on the firm policies, it is intuitive to say that they might have some influence on the CEOs as well. In this paper, we contend that covenants should have an effect on CEO compensation for two primary reasons: increase in CEO's effort level and increase in CEO turnover risk. For simplicity, we refer to these as the Effort channel and Risk channel respectively. Looking at the effort channel, we contend that presence of covenants in the debt contracts increases the effort level for the CEO. Covenants are a form of monitoring mechanism, which works on behalf of the debt holders (Nini, Smith and Sufi 2009), and like other monitoring mechanisms, they may increase the level of effort required of the CEO (Hermalin 2005)[1]. This additional effort is also required as a consequence of additional restrictions and reduced flexibility in policy decisions imposed via covenants. Therefore, we argue that a CEO would demand higher compensation for the disutility associated with this covenant-induced higher level of effort.

[1] Hermalin (2005) showed that, in case of board of directors, increase in the level of monitoring leads to an increase in CEO's effort level; thereby, leading to increase in the compensation paid to the CEO.

The second reason for the expected relationship between covenants and CEO compensation is an expected increase in CEO turnover risk. A higher number of covenants, along with stricter restrictions, increases the likelihood of a covenant violation[2]. Nini, Smith and Sufi (2012) showed that covenant violations increase the likelihood of CEO turnover, while Peters and Wagner (2014) showed that increase in likelihood of CEO turnover leads to an increase in CEO compensation. Based on these arguments, we contend that covenants increase the risk of CEO turnover, and therefore they should be associated with a higher compensation for the CEO.

Both of the aforementioned channels predict that the relationship between covenant restrictions and CEO compensation should be positive. Therefore, in this paper, we test this prediction empirically using data on S&P 1500 firms. For the scope of this paper, we do not differentiate between the two channels since they both predict the same relationship. However, we believe that this relationship can be further explored in the future to see which of the two effects is dominant.

In this paper, we look at the effects of bond covenants and loan covenants on the CEO compensation. We use the data on CEO compensation from Execucomp database for the years 1992 to 2014. We obtain the data on bond covenants from Mergent FISD database, and data on loan covenants from LPC DealScan database. In addition to these, we also use Compustat to obtain data on firm-level variables. After combining the available variables from Execucomp, Compustat, Mergent FISD and LPC DealScan, our final dataset consists of a total of 27,608 firm-year observations. For bond covenants, we have 15,151 firm-year observations, which represent a total of 1,690 firms. For loan covenants, we have 22,633 firm-year observations representing a total of 2,261 firms. In our sample, among the firms with non-zero covenants, majority of firms have about 3 to 5 bond covenants and 3 loan covenants. The most commonly used covenants in the sample are Maximum Debt-to-EBITDA, Minimum interest coverage and Minimum Fixed charge coverage covenants.

[2] For example, let us take case of a firm that has a covenant for minimum EBITDA. If such a firm currently has an EBITDA that is close to the threshold provided in covenants, then even fluctuations in the industry performance can cause the firm to violate the covenant.

In our analysis, we use two measures of covenant restrictions. The first measure is the number of non-duplicative covenants that are active on a firm in any given year[3]. The second measure is the *distance-to-violation*, which represents the gap between the reported value on an underlying accounting variable and the threshold imposed via the covenant. Both the effort channel and the risk channel predict that the *number of covenants* would have a positive effect on CEO compensation, while *distance-to-violation* would have a negative effect.

We begin our analysis by looking at the impact of bond covenants and loan covenants on CEO compensation. Our findings show a positive relationship between the *number of covenants* and CEO compensation. In addition, we find negative relationship between *distance-to-violation* and CEO compensation. These results are consistent with the predictions made by effort channel as well as the risk channel. The effort channel contends that the compensation paid to CEO depends on the effort level. Therefore, the observed relationships between the measures of covenant restriction and CEO compensation are consistent with the argument that covenants lead to an increase in monitoring activities, which further cause an increase in CEO effort level. On the other hand, the observed relationships are consistent also with the risk channel. From the risk channel perspective, a high number of covenants and a low *distance-to-violation* increase the risk of covenants violation, thereby increasing the risk of CEO turnover. In the analysis, we use a number of firm-level and CEO-level control variables, along with firm fixed effects and time fixed effects. Our results remain robust and consistent across the specifications.

While the relationship between the debt covenants and CEO compensation seems intuitive, the aforementioned empirical analysis may suffer from endogeneity bias. The main sources of this endogeneity are: the relationship between the CEO compensation and CEO decision-making authority, and omitted factors influencing both CEO compensation and debt covenants. For a CEO, compensation is an important factor that influences his decision

[3] Non-duplicative covenant means that if a firm has two debt contracts with the same covenant, then that covenant is counted only once.

within the firm (Aggarwal 2008). Thus, a CEO's decision to enter into a debt contract with or without covenant can be affected by his compensation, which gives rise to endogeneity concerns in our analysis.

The second source of endogeneity is any omitted factor that may influence both debt covenants and CEO compensation. The presence of debt covenants in a debt contract depends on a number of factors including leverage and type of debt (Malitz 1986) (Ismail 2014), debt maturity, growth opportunities (Billett, King and Mauer 2007) credit quality (Nini, Smith and Sufi 2009) managerial entrenchment (Chava, Kumar and Warga 2010) etc. Some of these factors also influence CEO compensation. Although in the analysis we control for large number of these factors, there may be other latent factors that influence both the covenant restrictions and CEO compensation. In presence of such a factor, our independent variables, *number of covenants* and *distance-to-violation*, may act as proxies for that factor. Therefore, in order to overcome these endogeneity concerns, we supplement our analysis using a difference-in-difference approach.

For the difference-in-difference analysis, we use the implementation of Statement of Financial Accounting Standards No. 160 (SFAS 160). The Financial Accounting Standards Board (FASB) brought into effect the SFAS 160 in the year 2007-08. This standard directed the reporting firms to include the minority interest within the equity section of the consolidated balance sheets. The implementation of SFAS 160 gave a mechanical shock to the size of equity section within the balance sheets of several firms. Although, the accounting modifications announced in SFAS 160 standards seem superficial in nature, they had important repercussions for the firms bound by equity-related covenants. Covenants usually follow a rolling-GAAP[4], and thus, SFAS 160 relaxed the constraints imposed by equity-related covenants for the firms that reported minority interests on their balance sheets.

We conduct the analysis using double differencing and triple differencing approaches around SFAS 160 shock in 2007-08. In the analysis, we use a sample of firms that are affected by

[4] (Leftwich 1983) (GopalaKrishnan and Parkash 1995) (Christensen, Lee and Walker 2009)

equity-related covenants such as maximum Debt-to-Equity, maximum leverage ratio etc. Our treatment group consists of firms that are affected by the relevant covenants and have minority interest on the balance sheet in the year prior to SFAS 160 implementation. On the other hand, the control group consists of firms with the relevant covenants but without any minority interest. Our results from the double differencing analysis indicate a negative relationship between treatment and CEO compensation. Since, the impact of SFAS 160 was to relax the constraints on the firm, the observed negative relationship is consistent with our expectation. Furthermore, we run a triple differencing analysis where we take into account the variations in the size of minority interest as well as whether a firm is constrained by the relevant covenants[5]. The results are again consistent with our expectation. The results obtained are robust to a large number of control variables, as well as different time windows around the event. Thus, the results of the difference-in-difference approach indicate support for our initial results that covenant restrictions have a positive effect on CEO compensation.

In the difference-in-difference analysis, we observe that firms in our treated group are considerably larger than the firms in the control group. This is expected because firms reporting minority interest are generally larger in size. In order to address this characteristic difference, we also perform the analysis using a propensity score matched sample of firms. The results here are also consistent with our expectation.

Based on the observed results, we conclude that covenant restrictions have a positive impact on CEO compensation. We attribute this relationship to both the factors: effort and risk. We contend that covenants increase the monitoring of CEO and reduce the flexibility available, thereby increasing the CEO's effort level. Also, increase in number of covenants and decrease in *distance-to-violation* results in higher likelihood of covenant violation thereby increasing the CEO turnover risk. Both these reasons predict a positive relationship between the debt covenant restrictions and CEO compensation. Thus, our results are consistent with both these channels.

[5] A firm is said to be constrained if it is close to violating the covenants. The precise definition is provided in the later section

Our paper contributes to the literature related to creditor control rights and the associated influence on the firm. Covenants are an important section of debt agreements that are inculcated in the contracts to reduce the conflict of interest between the debt holders and shareholders (Smith and Warner 1979) (Jensen and Meckling 1976). Covenants allow the creditors to exert substantial influence on the financial and investment policies of the firms, especially in the event of covenant violations. Covenant violations often lead to reduction in debt issuing activities by the firm (Roberts and Sufi 2009), reduction in capital expenditure and investment (Chava and Roberts 2008) and reduction in mergers and acquisitions (Nini, Smith and Sufi 2012). The influence of the covenants is not just limited to the events of violation. Looking at capital expenditure related covenants, Nini, Smith and Sufi (2009) find that firms bound by such covenants often maintain capital expenditure tightly below their contractual limits. Cohen, Katz and Sadka (2012) found that firms that are constrained by debt-related covenants increase their debt levels once the covenant restrictions are relaxed. While there are several papers that have looked at the influence of covenants on firms, there isn't much literature with regards to the influence of covenants on the firm's management. Our paper partly fills this gap by looking at the relationship between covenants and CEO compensation.

In addition, this paper also contributes to the literature studying factors that influence CEO compensation. There are several factors that influence the compensation paid to CEO such as firm size, firm risk, executive aversion to risk, ability, disutility of executive actions and effort, CEO turnover risk etc. (Aggarwal 2008) (Peters and Wagner 2014) (Holmstrom and Milgrom 1987). In this paper, we explore debt covenants as a factor influencing CEO compensation. We view covenants as a source of disutility for the CEO and as an additional risk factor that influences the compensation.

The remainder of the paper is structured in the following manner. Section 2 talks about the covenants, motivation and intuitive rationale for the expected relationship. Section 3 presents the empirical strategy along with the summary of the data. Section 4 provides the results of

the paper. Section 5 reconciles the results obtained with the intuitive rationale, followed by the conclusion in section 6.

2. Intuitive Framework

2.1. About Covenants

Debt financing is one of the most crucial policy decisions in a firm that has implications for its corporate strategy, investment policy and product market performance[6]. One of ways by which it influences the policy decisions of a firm is through debt covenants. Covenants are, basically, provisions within debt contracts that either restrict certain actions and policy decisions in a firm (Smith and Warner 1979) such as restriction on dividend payments and debt issuance, or require the firm to meet certain accounting and performance benchmarks, such as maximum debt to equity ratios and minimum EBITDA. The purpose of these provisions is to reduce the incentive conflicts between the shareholders and creditors, thereby reducing the cost of debt (Smith and Warner 1979) (Jensen and Meckling 1976). If these provisions are violated, the creditors obtain certain rights such as right to demand for immediate or accelerated payment and to reduce availability of further credit (Tirole 2006). Borrowers are usually required to inform the creditors in case these provisions are violated. Therefore, covenants serve as tripwires that allow the lenders to monitor the borrower's performance, and to re-evaluate the agreement in the event of a violation (Nini, Smith and Sufi 2009).

There is a large literature in this area that studies the factors that influence the use of covenants and their effects on the firm. The inclusion of these provisions in the debt contracts is often influenced by firm characteristics such as leverage, growth opportunities etc. Malitz (1986) and Ismail (2014) find that level and type of debt significantly influence

[6] The debt of a firm affects its investment ability and potential projects it undertakes (Jensen and Meckling 1976) (Myers 1977). It also affects the firm's relationship with its customers or suppliers (Titman 1984) (Bannerjee, Dasgupta and Kim 2008), its performance in the product market (Campello 2003), its interaction with the competitors (Phillips 1995) (Chevalier 1995) and its relationship with the workers (Bronars and Deere 1991) (Sharpe 1994).

the use of covenants. Billett, King and Mauer (2007) finds that covenants protection in public debt is positively associated with debt maturity, growth opportunities and leverage. Apart from general firm characteristics, the use of covenants is also influenced by the relationship between the firm management and shareholders. Studying the relationship between managerial agency and bond covenants, Chava, Kumar and Warga (2010) finds that managerial entrenchment, along with risk of managerial fraud, significantly influences the use of covenants in debt contracts.

While covenants and covenant violations impact the firm in a number of ways, they seldom cause bankruptcy or payment default (GopalaKrishnan and Parkash 1995). As a result, it is very common for a firm to be in violation of one or more covenants (Dichev and Skinner 2002). Even though, they are rarely associated with financial distress (Dichev and Skinner 2002), debt covenants still have an influence on several of the firm policies. Using a regression discontinuity design, Roberts and Sufi (2009) find that debt covenant violations lead to a sharp and persistent decline in the debt issuing activities of a firm. The impact is primarily driven by a reduction in credit facility, increase in interest spread or a demand for collateral. In addition, Roberts et al. (2009) shows that the observed impact is higher among the firms for whom the alternative sources of capital are more expensive. In a similar study, Chava and Roberts (2008) show that covenant violation lead to declines in capital investment, an effect that is primarily driven by creditor intervention. Nini, Smith and Sufi (2012) shows that covenant violations also lead to declines in acquisitions, capital expenditure, leverage, shareholder payouts and an increase in CEO turnover.

Although this influence of debt covenants is more pronounced in the events of violation, their influence is also observed on the firm policies prior to violations. Using a Sample of private credit agreements between banks and publicly traded US companies, Nini, Smith and Sufi (2009) showed that a large number of US firms, which use debt financing, are affected by capital expenditure restricting covenants. Such firms often observe declines in capital expenditure and generally maintain its level tightly below the contractual limit. Cohen, Katz and Sadka (2012) found similar results for debt-related covenants. Using a difference-in-

difference approach, Cohen et al. showed that, for the firms bound by debt-related covenants, a positive shock to the debt capacity due to relaxation in the covenants causes such firms to increase their debt. The effect was significant for firms that were either close to violating the covenants and were actually financially constrained[7].

2.2. Intuition

In order to study the influence of debt covenants on a firm, it is important to understand their relationship with different stakeholders. Considering that the primary purpose of debt covenants is to resolve conflict of interest between creditors and shareholders, the literature has mostly concentrated on the influence of covenants on these stakeholders. The other stakeholders, such as customers, suppliers and firm management, have received less attention. In this paper, we look to partly fill this gap by studying the relationship between debt covenants and the top management of the firm. More specifically, we look at whether the covenants, either bond covenants or loan covenants, have an influence on the CEO compensation.

A CEO's compensation in a firm is often influenced by his effort level, ability, aversion to risk, likes and dislikes for certain actions (Aggarwal 2008) etc. In order to study the relationship between debt covenants and CEO compensation, we contend that there are primarily two channels through which the debt covenants can influence CEO compensation. The first channel is based on the relationship between debt covenants and effort level that is required from the CEO as a consequence of these covenants. In this paper, we call this the effort channel. While, the second channel views covenants as an additional source of risk for the CEO, thereby adding a risk premium to his compensation. We refer to this channel as the risk channel.

The effort channel looks at the direct effects of covenants on the actions of the CEO and the associated disutility of these actions. As mentioned by Nini, Smith and Sufi (2009),

[7] The effect was also significant for firms that were already in violation of one or more covenants.

covenants are a form of monitoring mechanism that are used by the lenders as tripwires for monitoring the performance of the borrowers and ensuring that they get back their investments. In other words, for the management of a borrower firm, debt contracts with covenants increase the number of observers (i.e. the creditors) that monitor their performance and actions. In the absence, of debt contracts, the firm management is already under scrutiny of the board of directors who work on behalf of the shareholders. Therefore, overall the debt covenants increase the level of scrutiny into the actions of the CEO. With regards to the relationship between monitoring activities and CEO compensation, Hermalin (2005) shows that increased monitoring by board of directors leads to an increase in CEO effort. This increased effort is associated with an increased level of disutility that entails a higher compensation for the CEO. In the context of our paper, we extend this result on monitoring activities further to encompass also the monitoring activities of the lenders. We argue that the additional monitoring of the CEO, which is caused by the presence of debt covenants, should entail a higher disutility of effort and therefore a higher compensation for the CEO.

To get a brief idea about the aforementioned disutility, we look at the previous literature where we can find numerous examples of the restrictions that are imposed on the firms (and therefore on CEOs) by bank and loan covenants. Some of the most commonly used covenants in the debt contract limit the activities of the firm with regards to capital expenditure, mergers & acquisitions, further debt issuance etc. (Nini, Smith and Sufi 2009) (Chava and Roberts 2008). Although a large number of debt contracts undergo renegotiations, several papers find that the covenants do indeed reduce the set of actions available to the CEO, thereby affecting the flexibility of the firm with regards to future policy options (Nini, Smith and Sufi 2012) (Smith 1993). Further, in the event of a violation, the covenants result in transfer of control rights to the creditors, which often results in renegotiated contracts that contains even more stringent restrictions (Nini, Smith and Sufi 2012). An indirect way to see whether covenants affect CEO would be to look at whether some CEO characteristics affect the use of covenants in the first place. Looking at the managerial characteristics, Chava, Kumar and Warga (2010) showed that factors associated

with managerial entrenchment and managerial fraud have significant impact on the use of bond covenants[8].

The second channel i.e. the risk channel looks at covenants as an additional risk factor that influences CEO and his compensation. Looking at the influence of covenant violations on governance of a firm, Nini, Smith and Sufi (2012) found that covenant violations have direct implications for the firm's CEO. Nini et al. show that, if a firm reports a covenant violation in any financial quarter, then the likelihood of CEO turnover over the next two quarters increases. Considering the high costs associated with job-loss[9], CEO turnover risk is an important risk component for the CEOs. Therefore, combining the above arguments, we contend that since covenant violations increase the likelihood of CEO dismissal, covenants should have positive impact on CEO compensation[10].

Both of the channels, effort channel and risk channel, predict that covenant restrictions should lead to an increase in CEO compensation. In this paper, we do not differentiate between these two channels. For the scope of this paper, we consider the total effect that the covenants have on the compensation.

3. Empirical Method

3.1. Data Sources

In this paper, we use data from a number of sources. Firstly, we use the Mergent Fixed Income Securities Database (FISD) and LPC DealScan databases for data on bonds and bank loans. These databases also provide the information on the bond and loan covenants

[8] Along similar lines, Begley and Feltham (1999) found that managerial-share ownership significantly affects the inclusion of covenants related to dividend payments and further financing.
[9] Empirical studies have shown that fired CEOs often have to wait for considerable amount of time before they find a new job and these new jobs are usually significantly inferior to their earlier positions (Fee and Hadlock 2004).
[10] Abowd and Ashenfelter (1981) showed, both theoretically and empirically, that higher unemployment risk leads to higher compensation. Peters and Wagner (2014) find similar results specifically for CEOs.

associated with these debt contracts. Regarding bank loan agreements, LPC DealScan database provides detailed information, including terms and conditions, on more than 200,000 loans contracts. It compiles data using SEC filings, public documents such as 10Ks, 10Qs and registration statements, as well as from loan syndicators and other internal sources (WRDS). Based on Carey and Hrycray (1999), DealScan provides data on between 50% and 75% of total volume of outstanding commercial loans in US during early 1990s (Chava and Roberts 2008). With regards to public debt, Mergent FISD provides details on more than 140,000 corporate bonds and several other debt securities (FISD).

In DealScan database, the basic unit of loan is referred to as facility. A group of facilities together form a one collective agreement called package (Chava and Roberts 2008). The data on loan covenants is associated with a package and is applicable for all facilities within that package. In the time period 1992 to 2014, there are a total of 102,508 loan facilities, which are a part of 75,262 packages. Consistent with the previous papers, we use the start date of the first facility in a package as the day from which the covenants are applicable on the firm (Chava and Roberts 2008). The covenants are then assumed to be active till the end date on the last facility within the package. We take the difference between these two dates as the maturity of the loan package. The average maturity for a package is approximately 48 months.

In addition to the data on bank loans, we use data from Compustat database to calculate firm-level variables, and data from ExecuComp database to calculate the various components of CEO compensation. In our baseline analysis, we use the data on S&P 1500 firms for the years 1992 to 2014. In the analysis, we use two measures to proxy for covenant restrictions: *number of covenants* (bond and loan covenants) and *distance-to-violation.* The number of loan covenants is calculated as the total number of non-duplicative covenants in bank loan agreements. In other words, if a covenant occurs concurrently in two loan contracts, then it is counted only once. For example, suppose a firm has two outstanding bank loans. If both of these loans are protected by Debt/EBITDA covenant, then this

covenant will be counted only once when calculating the total number of covenants affecting the firm. In a similar manner, the bond covenants are calculated using the bond contracts.

Our final sample consists of a total of 2,772 firms over the 23 years period, which gives a total of 27,608 firm-year observations. Out of the total firm-year observations, we have bond covenant data for 15,151 firm-year observations and loan covenant data on 22,633 firm-year observations. The bond covenants data is available for 1,690 firms and loan covenants data is available for 2,261 firms. The maximum number of bond covenants for a firm in any given year is 18, while the maximum number of loan covenants is 16. Figure 1.1 provides the fraction of firm-year observations that have a specific number of bond covenants. As can be seen, majority of the firms in the sample have 3 to 5 bond covenants. Figure 1.2 provides the fractional distribution for the number of loan covenants.

Table 1 panel A provides the summary on the covenant variables used in the analysis. On average, the firms in our sample are restricted by 5.09 bond covenants and 3.40 loan covenants. In addition to the data on number of covenants, DealScan database also provides data on the type and threshold of financial covenants and Net worth covenants that form part of the loan agreements. Appendix 2 provides the list of various financial and net worth covenants for all DealScan Packages in the period 1992 to 2014, along with the number of loans, average size of the loan and average thresholds of the relevant underlying accounting variables. The most commonly used covenants in the sample are Maximum Debt to EBITDA, Minimum Interest Coverage and Minimum Fixed charge coverage covenants. Appendix 3 provides the list of financial covenants for our final sample (after combining with Compustat and Execucomp databases). Appendix 2 and appendix 3 show that the two samples have predominantly similar type of covenants with similar level of thresholds for the underlying accounting variables. Therefore, our sample seems to give a fairly good representation for all the DealScan's loans. The above distribution of covenants is also consistent with previous literature (Chava and Roberts 2008).

Table 1 panel B provides the summary of the dependent variables and other control variables used in the analysis. In most of our analysis, the dependent variable is the logarithm of total CEO compensation.

3.2. Identification and Basic methodology

The goal of this paper is to ascertain whether debt covenants have any impact on CEO compensation. The two channels, effort channel and risk channel, both predict that this impact would be positive. In most of our analysis, the dependent variable is the logarithm of CEO compensation and the explanatory variables are covenant restrictions. In order to measure the effect of covenants, we primarily use two measures of covenant restrictions: *number of covenants* and *distance-to-violation*.

From the perspective of the effort channel, the first measure, *number of covenants*, can be construed as the number of type of restrictions placed on CEO actions. Each additional covenant in a debt contract either restrict/prohibits actions with regards to certain policy decision such as restrictions on dividend payout and additional debt issuance, or reduces the flexibility of some actions, such as capital expenditure restrictions. Our second measure of covenant restriction, *distance-to-violation*, quantifies the restrictions on the firm with regards to the Financial and Net worth covenants that set a predefined limit in form of a minimum or maximum threshold for certain accounting variables or ratios such as minimum EBITDA, maximum debt-to-EBITDA, maximum Debt-to-Equity etc. It is defined as the difference between the threshold and the reported value of the underlying accounting variable or ratio divided by standard deviation of the accounting variable or ratio. An increase in *distance-to-violation* increases the flexibility available to the management with regards to underlying variable. From the perspective of effort channel, a high *number of covenants* and a low *distance-to-violation* imply a high covenant restriction on CEO, and therefore a high effort level.

On the other hand, from the perspective of the risk channel, the two measures can also be viewed as being associated with the CEO turnover risk. A higher *number of covenants*

enlarge the set of restrictions placed on the firm and the CEO. This larger set of covenants also increases the likelihood of a covenant getting violated[11]. The second variable, *distance-to-violation*, would have a more direct relation to the turnover risk for the CEO. As the value of *distance-to-violation* for any underlying accounting variable reduces, the likelihood of the violation of the associated covenant increases, which would increase the risk of CEO firing (Nini, Smith and Sufi 2012). Therefore, from the perspective of the risk channel, a high *number of covenants* and a low *distance-to-violation* would cause an increase in CEO turnover risk.

We begin our analysis by looking at the impact of *number of covenants* i.e. bond covenants, loan covenants and combined debt covenants, on CEO compensation. We estimate the following specification:

$$\log(\text{Comp}_{it}) = \alpha + \beta_1 \, \text{Covenants}_{it} + \gamma \, X_{it} + \varepsilon_{it} \qquad \text{(Eqn. 1)}$$

The dependent variable $\log(\text{Comp}_{it})$ is the logarithm of total CEO compensation for firm *i* in the year *t*. Variable Covenants_{it} represents the *number of covenants* for the firm. X_{it} represents the firm-level control variables. Here, coefficient β_1 is our coefficient of interest. It represents the effect of each additional covenant on total CEO compensation. Both the channels, effort channel and risk channel, predict a positive relationship between the *number of covenants* and CEO compensation. Therefore, β_1 is expected to be significant and positive.

Next, we look at the impact of *distance-to-violation* measure on CEO compensation. We use the following specification:

$$\log(\text{Comp}_{it}) = \alpha + \beta_2 \, \text{distance}_{it} + \gamma \, X_{it} + \varepsilon_{it} \qquad \text{(Eqn. 2)}$$

[11] The violation of a covenant may not always be in control of the CEO. For example, poor performance in an industry may enhance the likelihood that the firm violates covenants such as minimum EBITDA. Peter and Wagner (2014) showed that CEO turnover risk is affected by the industry performance. Thus, the fact that the poor performance of the firm and covenant violation occured due to poor industry performance may not shield the CEO from loosing his job.

the variable distance_{it} is the *distance-to-violation*, while the remaining of the variables are same as defined in previous specification. Here, coefficient β_2 is our coefficient of interest. It represents the effect of *distance-to-violation* on CEO compensation. Both the channels, effort channel and risk channel, predict a negative relationship between *distance-to-violation* and CEO compensation. Therefore, we expect the coefficient β_2 to be significant and negative.

3.3. Endogeneity Concern

Although the relationship between covenants and CEO compensation seems intuitive, the identification here suffers from some endogeneity concerns. Primarily, we feel there are two sources of endogeneity in this empirical analysis. The first source is based on the relationship between CEO compensation and the decision to encompass debt covenants in the debt contracts. On the other hand, the second source of endogeneity is based on possible omitted factors that influence both debt covenants as well as CEO compensation.

The first source of endogeneity arises because the CEO compensation, total amount and its various components, may have an effect on the number and type of covenants that are included in the debt contracts. The decision to enter into a debt contract, bond or loan, falls under the authority of the management of the firm[12]. A CEO's compensation, total amount and structure, influences the decision he makes within the firm[13]. Therefore, a self-interested CEO, inclined to make decisions that increase his monetary gains, would only indulge in those debt contracts (with or without covenants) that increase his compensation. Thus, any observed relationship between the CEO compensation and covenants, may be biased due to this endogenous selection of CEO compensation and debt covenants.

[12] While one can argue that management may be contrained with regards to the potential clauses that form part of the contract, it still remains a decision for the management as long as they have more than one potential contracts or more than one choice (not entering into a contract is also a choice).

[13] This conclusion can easily be arrived at using the empirical studies, which show that the shareholders commonly tie the compensation of the CEOs to firm performance. This is done it motivate the CEO to take actions in the interest of the shareholders (Aggarwal 2008), and usually involves the use of restricted stocks, stock options etc. as one part of the total compensation paid.

The second source of endogeneity arises due to possibility of an omitted factor that may influence both the debt covenants and CEO compensation. This bias arises due to the inability of any empirical model to accurately control for all potential variables. In essence, this implies that the debt covenants act as a proxy for this omitted variable, and thus the results obtained are not driven by the debt covenants, but are rather driven by the omitted factor.

In order to address these endogeneity concerns, we perform a difference-in-difference analysis. We follow a process similar to Cohen, Katz and Sadka (2012) and utilize an exogenous shock to covenant restrictions. The exogenous shock is based on the accounting standard SFAS 160, which affected the constraints that were imposed by certain covenants. The following section explains the changes that occurred.

3.4. Exogenous Shock

In US, the Financial Accounting Standards Board (FASB) is the organization that is tasked with setting up of the financial accounting and reporting standards for the public and private companies that follow the Generally Accepted Accounting Principles (GAAP). In 2007, FASB passed the amendment of Accounting Research Bulletin (ARB) No. 51, which deals with the consolidated financial statements. This was to bring into effect the Statement of Financial Accounting Standards No. 160 (SFAS 160), which modifies the treatment of non-controlling interest (or Minority Interest) in the consolidated financial statements of any reporting entity.

A Non-controlling interest or Minority interest[14] is defined as the portion of a subsidiary firm's equity that is not directly or indirectly attributable to the parent firm. When a parent company acquires a subsidiary firm, it may not buy 100% of the shares of the subsidiary firm. Minority interest represents the portion of a subsidiary firm's equity that is owned by investors other than the parent company. This portion of equity is generally less than 50% of

[14] Terms 'Minority Interest' and 'Non-controlling Interest' have been used interchangeably in the paper

the outstanding shares of the subsidiary firm and is typically reported in the consolidated balance sheet of the parent company.

Prior to the introduction of SFAS 160 standards, there was limited guidance provided by FASB with regards to the reporting of minority interest. The parent firms, which were mandated by requirements in GAAP to disclose information regarding minority interest, typically reported it as an entry in the liabilities section or the mezzanine section of the consolidated balance sheet (Cohen, Katz and Sadka 2012)[15]. US GAAP mandated the inclusion of minority interest in the consolidated financial statements so that stakeholders in the parent firm are informed about the claim-on-assets belonging to the non-controlling shareholders.

With the introduction of SFAS 160, FASB established a clear accounting and reporting standard for the minority interest in a subsidiary and for the deconsolidation of a subsidiary. It described minority interest in a subsidiary as an ownership interest in the consolidated entity that had to be reported as equity in the consolidated statements (SFAS 160)[16]. As described on the website of FASB, the objective of SFAS 160 is "… *to improve the relevance, comparability, and transparency of the financial information that a reporting entity provides in its consolidated financial statements* ...". Due to the limited guidance earlier, the reporting on this entry varied from one firm to another. By establishing a clear guideline, FASB removed this diversity and improved comparability of financial statements across firms. Furthermore, the firms were required to furnish additional disclosures about the ownership interests like reconciliation for beginning-of-period and end-of-period balances

[15] Mezzanine section is normally located between the liabilities and Equity sections in the balance sheet

[16] In addition, SFAS 160 also mandated some changes in the consolidated income statements. The rule requires that the consolidated net income includes amounts attributable to the parent as well as the non-controlling interest. Furthermore, it should include disclosure about the amount attributable to the parent and to the minority interest. Prior to SFAS 160, the amount attributable to the minority interest was reported as either expense or as other deductions in the consolidated income statement. Considering the scope of this paper, we will be concentrating only on the changes in the balance sheet. This is because Equity section of the consolidated balance sheets are directly related to the equity-related covenants which are the most widespread (Chava and Roberts 2008) and cause most technical defaults (GopalaKrishnan and Parkash 1995).

on equity attributable to parent company and non-controlling owners. Thus, as a whole there was improvement in the completeness, relevance and transparency about the minority interest entry in the consolidated financial statements.

Along with stated objectives, another benefit of SFAS 160 was that it made the accounting standards in US GAAP more coherent with the International Financial Reporting Standards (IFRS), where also the minority interest is incorporated in the equity section. As per the FASB guidelines, the rule was made effective from 15th December 2008. Thus, reporting for all fiscal years that begin after this date, as well as interim periods within those fiscal years, had to be done based on this new rule[17].

Although SFAS 160 rule was brought into effect in the time period around the financial crisis, the basic motivation for the rule was not influenced by financial crisis. This is because the exposure draft for amendment ARB 51 and initial round table discussions were done in 2005, well before the advent of 2008 financial crisis (FASB)[18].

Although, with regards to the performance of a firm, the accounting changes implemented by SFAS 160 seem superficial rather than substantial, these changes had important repercussions for the firms bound by equity-related covenants. This is because the creditors of such firms would now need to re-examine the financial ratios that formed basis of the covenants in their debt contracts (Mulford and Quinn 2008). Mulford and Quinn (2008) examined the anticipated consequences of SFAS 160 and made several observations regarding capital structure and equity sections of various firms that reported minority interest. Using a sample of 876 firms across all industries, Mulford et al. showed that, with the inclusion of minority interest in the equity section, the median percentage change in shareholders' equity is +2.07%. Among the firms that showed maximum increase in equity size, the top 10% of the firms showed an increase of more the 25%. Additionally, the

[17] Adoption of the rule before 15th December 2008 was prohibited.

[18] Another exposure draft was issued in 2006 that acknowledged the material concerns by the respondents to the earlier draft (Unegbu 2015). This is to say that the implementation of this rule in the year 2008 was coincidental.

liabilities-to-shareholders' equity ratio declined on average by 2%. Thus, SFAS 160 provided a positive mechanical shock to the equity size of the firms that had been reporting minority interest.

In the context of this paper, an important question that arises here is: Do changes in accounting rules affect firms that have covenant-based debt contracts. Several papers in accounting literature have looked in this subject (Leftwich 1983) (GopalaKrishnan and Parkash 1995) (Christensen, Lee and Walker 2009). Among these papers, the general insight is that changes in accounting rules do have an effect on the firms because the covenants used in the debt contracts are based on rolling-GAAP. Leftwich (1983) used a sample of private loan agreements to show that the lending agreements use accounting numbers based on rolling-GAAP. Leftwich defined the rolling-GAAP as the GAAP that is in effect on the date of calculation. Gopalakrishnan and Parkash (1995) found similar results using a survey for borrowing and lending firms. Leftwich attributed this usage of rolling-GAAP in debt contracts to the high costs that would otherwise be incurred in case of frozen-GAAP due to the required record keeping and monitoring[19].

3.5. Difference-in Difference Analysis

In the context of this paper, we use the implementation of SFAS 160 standard in 2007-08 as an event[20] to overcome the endogeneity concerns mentioned in the section 3.3.

In order to conduct a difference-in-difference study, SFAS 160 shock should meet three requirements. Firstly, it should bring about some real changes in the constraints imposed by covenants on CEOs. In order to address this requirement, we refer to Cohen, Katz and Sadka (2012), who studied the effects of SFAS 160 shock on the firms that were affected by its application. Cohen et al. find that the treated firms[21] showed an increase in debt after SFAS

[19] Similar reasoning is provided by Frankel, Lee and McLaughlin (2010).
[20] For simplification purposes, we refer to this event as SFAS 160 shock
[21] Treated firms were the firms that were bound by equity-related covenants and had minority interest on their consolidated balance sheets at the time when SFAS 160 was brought into effect.

160 came into effect, and the increase was largest for firms that were either close to violating or were already in violation of the affected covenants. Based on the analysis, Cohen et al. concluded that, firstly, covenants do have a restraining effect on the firm in terms of its financial policy, and secondly, such covenant-affected firms did make changes in their financial policies when the covenant restrictions were relaxed after application of SFAS 160. Thus, in the context of this paper, SFAS 160 shock satisfies the first basic requirement of bringing about a real effect on the firms[22].

The second requirement for conducting a difference-in-difference study is that SFAS 160 shock needs to be unanticipated or at least partly unanticipated. Studying the effect of SFAS 160 on the stock market returns, Frankel, Lee and McLaughlin (2010) find that firms with minority interest showed a positive abnormal return at the time of adoption[23]. Thus, even though the exposure draft and first discussions for ARB 51 took place in 2005, the application in 2007 was at least partly unanticipated.

Finally, the last requirement is that SFAS 160 shock should be exogenous with respect to CEO compensation. Going through the literature around SFAS 160, we haven't found any link between CEO compensation and the event. Thus, based on the above arguments, we conclude that SFAS 160 shock provides a good setting for conducting a difference-in-difference analysis.

In order to perform this analysis, it is important that we choose relevant treatment group and control group. Since SFAS 160 standard provides a shock to the equity section of the consolidated balance sheets by reclassifying minority interest, the treatment in our case depends on two conditions: firstly, the firm should be constrained by at least one equity-related covenant (or affected covenant) at the time of the event; and secondly, the firm should have reported minority interest in its balance sheet in the year before. Both these

[22] In our analysis, we conduct a check to see whether the treated firms show a change in leverage after SFAS 160 shock. The results of these preliminary tests were consistent with findings of Cohen, Katz and Sadka (2012) and are presented with the main results.

[23] The cumulative abnormal return at the release of exposure draft in 2005 was insignificantly different from zero.

characteristics provide a certain degree of variation for analysis. The constraint on the CEO with regards to a covenant depends on the relevant underlying accounting variable and its maximum or minimum threshold provided in the debt contract. On the other hand, the relief provided by the new accounting rule depends on the size of minority interest. Since, the allotment of treatment to the firms needs to be random, we choose the treated group in way that it is independent of the firm characteristics. We focus our analysis on firms that are bound by equity-related covenants. This is because during issuance of debt, the debt contract may include equity-related covenants depending on certain firm characteristics[24]. Therefore, in our analysis, we use the minority interest as the treatment variable.

In order to gauge the impact of the event, we primarily use two specifications, first based on double differencing and the second based on triple differencing. The first specification looks at the impact of presence of minority interest on firms that have debt contracts with equity-related covenants. This specification is given by

$$y_{it} = \alpha_i + \sigma_t + \delta X_{it} + \beta MIB_{2008} * Post_{2008} + \varepsilon_{it} \qquad \text{(Eqn. 3)}$$

The dependent variable y_{it} is the logarithm of CEO compensation for firm *i* in the year *t*. X_{it} are the firm-level control variables. Variable $Post_{2008}$ represents the time period after the SFAS 160 was brought into effect. It is equal to one for the period after 14th Dec 2009[25]. MIB_{2008} is the treatment variable. It takes the value of one for the firms that reported minority interest in the year before SFAS 160, and is zero other wise. The variable α_i and σ_t represent the firm fixed effects and time fixed effects.

In the above specification, coefficient β is the coefficient of interest. It represents the effect of SFAS 160 shock on the CEO compensation for firms that report minority interest greater than zero. SFAS 160 standard mechanically increased the equity portion of consolidated

[24] As mentioned earlier, there are several firm characteristics that influence the use of covenants such as level and type of debt (Malitz 1986) (Ismail 2014), debt maturity, growth opportunities (Billett, King and Mauer 2007) etc.

[25] This is one year after 15th Dec 2008, the date when SFAS 160 was brought into effect. This is because the companies could only change the reporting for the fiscal years that began after this date.

balance sheets, thereby increasing the distance between the thresholds in equity-related covenants and values of underlying accounting variables or ratios. This increase in *distance-to-violation* has implications for the CEO based on both the effort channel and the risk channel. The increased *distance-to-violation* provides more flexibility to the CEO with regards to future financial policy decisions. Therefore based on the effort channel, SFAS 160 shock should have a negative effect on the CEO's effort level and his compensation. On the other hand, the increased *distance-to-violation* lowers the likelihood of covenant violation as well as the risk of CEO turnover. So, the risk channel would also predict a negative effect on CEO compensation. Therefore, both channels, effort channel and risk channel, predict that coefficient β will be significant and negative.

The second specification takes into account the variations in minority interest and whether the covenants constrain the actions of the CEO. This looks at the effect of variation in the size of minority interest and is given by:

$$y_{it} = \alpha_i + \sigma_t + \delta X_{it} + \beta_1 MI_{2008} * Post_{2008} + \beta_2 Constrained_{2008} * Post_{2008} + \beta_3 Constrained_{2008} * MI_{2008} * Post_{2008} + \varepsilon_{it}$$

(Eqn. 4)

The dependent variable y_{it} is the logarithm of CEO total compensation for firm i in the year t. X_{it} are the firm-level control variables. $Post_{2008}$ variable is as described before. MI_{2008} is the treatment variable. It represents the size of minority interest as a fraction of total assets of the firm in the year before SFAS 160. $Constrained_{2008}$ is the dummy variable that takes into account whether a firm is constrained by the affected covenants. A firm is assumed to be constrained if the current value of the underlying variable is less than 30% away from violation. The variable α_i and σ_t represent the firm fixed effects and time fixed effects.

In this specification, the coefficient of interest is β_3, which measures the effect of SFAS 160 shock on the firms that are close to violating the affected covenants. The Constrained firms are the firms that are close to violating the affected covenants; therefore, the effort channel predicts that the CEOs of such firms would have to exert higher effort. After SFAS 160

shock, the *distance-to-violation* for such firms increases, thereby granting more flexibility to the CEOs with regards to their financial policies. The size of increase in *distance-to-violation* depends on the size minority interest. On the other hand, the risk channel would predict that for the Constrained firms, the CEO is at a higher risk of loosing his job. Thus, as the *distance-to-violation* increases, the risk of CEO turnover reduces. Hence, both the effort channel and the risk channel predict that β_3 should be negative and significant.

As mentioned before, we perform the above analysis for the firms that have active debt contracts with at least one equity related covenant. We acknowledge that our treatment variable, minority interest, is not completely independent of the firm characteristics causing a selection bias in the treatment group. Usually, larger firms tend to have minority interests on their balance sheets. Therefore, in addition to the analysis mentioned above, we also conduct the analysis using a propensity score matched sample[26]. This is done to take into account the differences that may be present between the firm in the treated and control sample.

4. Results

We begin the analysis by looking at the impact of bond covenants on CEO compensation. Table 2 presents the estimation results for equation 1 where the explanatory variable is the number of bond covenants. The dependent variable in all the columns is the logarithm of total CEO compensation. Keeping consistent with the previous literature, we use a number of firm-level control variables, which include firm size, market leverage, profitability, cash ratio, R&D, sales growth rate and cash flow volatility. We also use some CEO specific control variables such as age, tenure, and board characteristics such as percentage of

[26] Initial tests showed that the treated and control groups differed from each other in terms of firm size and market leverage. Therefore, we perform the propensity score matching using the variables of firm size and market leverage.

independent directors and duality[27]. In all the three columns, we have a significant and positive coefficient for number of covenant, which is consistent with our expectation.

Table 3 presents the estimation results for equation 1 where the explanatory variable is the number of loan covenants. Since, loan covenants are usually stricter as compared to bond covenants (Berlin and Mester 1992) (Smith and Warner 1979), we expected the coefficients here to be larger. As shown in the results, although size of the coefficient is almost similar to the coefficient in Table 2 for bond covenants, the significance here is higher.

Also, we perform the analysis using the complete set of debt covenants i.e. bond and loan covenants combined together. The results are presented in Table 4 columns (1) to (3), and show a significant positive coefficient for the number of covenants. An important observation as we go from table 2 and table 3 to table 4 is that there is a large drop in the number of observations. This is because for many of the firms we either have data on bond covenants or loan covenants. In columns (4) to (6), we re-conduct the analysis after replacing the missing values with zero[28]. The results remain as expected and consistent with the results in table 2 and table 3.

Table 5 presents the estimation for equation 1 again for combined debt covenants with firm fixed effects and CEO fixed effects. In columns (1) to (3) the analysis is done using the firm fixed effects, while columns (4) to (6) the analysis is done using the CEO fixed effects. Also, The number of debt covenants is the sum of bond and loan covenants, where the missing data on number of loan covenants or bond covenants is coded as zero as described for table 4. The results show a significant and positive coefficient.

While the previous tables looked at the relationship between *number of covenants* and CEO compensation, we next look at the relationship between *distance-to-violat*ion and CEO

[27] Duality refers to the situation where the CEO also holds the position as the chairman of the board.

[28] We code the missing values to zero in the following manner: If the firm has data on number of bond covenant but not on number of loan covenants, then we code the number of loan covenants as zero. Similarly, if a firm has data on number of loan covenant and not on number of bond covenants, then we code the number of bond covenants to zero. This seems reasonable considering that we are looking at the impact of each additional covenant.

compensation. Table 6 provides estimation results for equation 2. Here, columns (1), (2) and (3) present the results for all firms in the sample that possess loan covenants. This includes the firms that are well within the threshold limits laid out for the associated accounting variables/ratios in the covenants, firms that are close to violation and the firms that are already in violation of a covenant. Columns (4), (5) and (6) represent the non-violators or the firms that are within the threshold limit. In columns (1) and (4), the independent variable is the mean of *distance-to-violation* for all covenants that are active for a firm in a given year. Similarly, in columns (2) and (5), it is the median of all *distance-to-violation*, and in columns (3) and (6), it is the minimum of all *distance-to-violation*. Consistent with our expectations, the results across all the columns show a significant negative relationship between the *distance-to-violation* and CEO compensation.

In the columns (7) to (10) of table 6, we use a different measure of covenant restriction. In column (7), the explanatory variable is the fraction of total covenants that are within 30% of *distance-to-violation*. Similarly in columns (8), (9) and (10) the threshold is 50%, 75% and 90%. If the fraction of covenants that are close to violation is higher, then a firm is more constrained. The results for all columns (7) to (10) show a positive significant coefficient. This is consistent with our expectation that higher constraint on the CEO leads to higher compensation.

In the next part of the analysis, we use the difference-in-difference approach around the SFAS 160 shock to overcome the endogeneity issues. Accounting standard SFAS 160 requires the firms to report minority interest in the equity sections of their balance sheets. Since this rule provides a mechanical shock to the equity size of the firms, it holds significance only with regards to the equity-related covenants. In our final sample, there are six such covenants that may be affected due to changes in their underlying accounting variables. These are Maximum debt to equity, Maximum debt to tangible net worth, Maximum leverage ratio, Maximum senior leverage, Tangible net worth and Net worth.

In the analysis, we limit our sample to the firms that are bound by at least one of the aforementioned six covenants. We begin by looking at the firm characteristics for the treated

group and the control group. The treated group consists of firms that reported minority interest in their financial statement in the year before SFAS 160 standard was applied. Table 7 panel A provides the summary of firm characteristics of the control group firms in the year before treatment; panel B provides the summary for the treated group. We used t-tests to compare the characteristics of firms in the two groups and found significant differences in terms of firm size (logarithm of Assets) and market leverage. The remaining variables are comparable across the two groups[29].

Table 8 provides the estimation results for the first specification of the difference-in-difference analysis (Equation 3). The dependent variable in columns (1) to (4) is the logarithm of total CEO compensation. For our baseline results to the difference-in-difference analysis, we use the time period from the year (t-2) to (t+2) excluding the year t, where t represents the year when the treatment occurred. The results are presented in columns (1) and (2) and they show a significant negative effect on CEO compensation, which is consistent with our expectation. In order to ensure that the observed relationship is not driven due to selected short time period, we also perform the analysis using the time period from year (t-3) to (t+3). The results for this are presented in columns (3) and (4). The results are consistent across the two chosen time periods. In all the columns, we use a number of control variables, which include firm-level characteristics as well as CEO-related variables such as logarithm of Age and Tenure[30].

In Addition to the analysis on CEO compensation, we also perform a quick check to see whether SFAS 160 standard causes any change in the capital structure of the firms in our sample. The results of the analysis are presented in Table 8 column (5). Consistent with the results of Cohen, Katz and Sadka (2012), we see a positive impact on the market leverage of

[29] These differences are dealt with later using propensity score matching.

[30] In the unreported results, we perform the analysis with the inclusion of year t and results remain significant. Also, we include additional control variables, like duality, percentage of independent directors, percentage of institutional ownership. The results across all specifications continue to be significant.

the treated firms. These results reinforce the validity of SFAS 160 shock as an event that brings about a real change in the treated firms.

Next, Table 9 presents the estimation results for second specification of difference-in-difference analysis as provided in equation 4. Here, columns (1) and (2) use the time period from (t-2) to (t+2) excluding year t, while columns (3) and (4) use the time period (t-3) to (t+3) excluding year t. The variable constrained represents the firms that have low *distance-to-violation* for the underlying accounting variables. As can be seen, the coefficient for Constrained * MI * Post is significant and negative in all four columns. This is consistent with our expectation. The coefficients for Constrained * Post and MI * Post are both insignificant. This shows that it is only when the firm is constrained and has minority interest that it has any effect on CEO compensation.

In order to ensure that the observed effect is not caused due our selection bias in our sample[31], in the next analysis, we widen the definition for our control group to include all the firms for whom we have loan covenant data. Therefore, for this part of the analysis, the treatment variable Constrained takes a value of one if the firm has an equity-related covenant that has a *distance-to-violation* of less that 30% from threshold, and is zero otherwise. Here, MI represents the size of the minority interest. The results of this analysis are presented in table 10. Here again, columns (1) and (2) use the time period from (t-2) to (t+2) excluding year t, while columns (3) and (4) use the time period (t-3) to (t+3) excluding year t. Consistent with our expectation and previous set of results, the results with this extended control group show a strong negative coefficient for the variable Constrained * MI * Post.

As mentioned earlier, while comparing the firm characteristics between treatment and control groups, we had observed significant differences between the two groups for variables: firm size and market leverage. Therefore, we perform an additional check with a propensity score matched sample. We perform the matching using variables logarithm of assets and market leverage. The summary statistics for the matched sample is provided in

[31] Since the sample in the previous difference-in-difference analysis consisted of only the firms that had debt contracts with atleast one equity-related covenant.

table 7 panel C and panel D. Using the matched sample we again perform the difference-in-difference analysis for the first specification (equation 3). The results of the analysis are provided in table 11. In columns (1), (2) and (3) we use the time period from year (t-2) to (t+2) excluding year t. In all three columns, there is significant negative impact on CEO compensation. Columns (4) and (5), which include an additional year before and after, show similar results. In the end, we again check whether SFAS 160 causes any change in the leverage of the firm. The results are presented in column (6), and show a significant positive impact. We also conducted the analysis on the propensity score matched sample using the triple differencing specification and results were consistent[32].

5. Discussion

The goal of this paper is to study the relationship between the covenants and CEO compensation. As mentioned earlier, there are two channels that may drive this relationship between the covenants and the CEO compensation: Effort channel and Risk channel. In this section, we discuss the obtained results in the light of these two channels.

The first set of analysis looks at the relationship between the covenants and CEO compensation. The results for bond covenants, loan covenants and combined debt covenants, show that covenants have a positive and significant relationship with the CEO compensation. The results are consistent across the two measures for covenant restrictions i.e. *number of covenants* and *distance-to-violation*.

As we had described in the earlier section, the effort channel contends that the compensation paid to the CEO should depend on the amount of effort he exerts. The level of effort depends on the level of monitoring and the flexibility available in relation to future policy decisions. By increasing the involvement of the lenders, covenants increase the level of monitoring; and by reducing the set of available actions, covenants reduce the flexibility in relation to future policy decisions. Based on these arguments, we had contended that the relationship

[32] The results for this analysis are unreported for brevity.

between the covenant restrictions and CEO compensation should be positive. The observed positive relationship between the *number of covenants* and CEO compensation is therefore, consistent with our expectation. Also the observed negative relationship between the CEO compensation and *distance-to-violation* is in line with our expectation. Therefore, if the effort channel is the driving force behind this relationship, then the two results, on *number of covenants* and *distance to violation*, suggest that covenant control does indeed increase the effort level of the CEO.

On the other hand, the observed results are also consistent with the risk channel. The risk channel relies on the relationship between the CEO turnover risk and CEO compensation. Previous studies have shown that covenant violation increase the likelihood of CEO firing. The presence of covenants in the debt contracts and a strict threshold increase the likelihood that a violation might occur. Therefore we argued that a higher *number of covenants* and lower *distance-to-violation* should have a positive impact on CEO compensation in order to compensate the CEO for bearing higher risk. The observed relationships between CEO compensation and the two measures of covenant restrictions are consistent with this assertion. Therefore, if the risk channel is the driving factor behind the relationship, then higher covenant control increases the risk of CEO turnover, and thus affects his compensation.

There is a possibility that the aforementioned results that suggest a significant relationship between covenant control and CEO compensation may suffer from endogeneity bias. Therefore, we supplement them further with a difference-in-difference analysis around the SFAS 160 shock in 2007-08. The SFAS 160 standard brought about a change in the reported size of the equity section of the consolidated balance sheets. As a direct consequence of this, the equity-related covenants, which usually follow rolling-GAAP, became relaxed as the *distance-to-violation* was increased. In order for the event to have relevance for our analysis, it is important that there is some real change in the firm policies after the implementation of SFAS 160 standard. In our preliminary tests around the event, we use market leverage as the dependent variable and find that market leverage of the treated firms does indeed exhibit a

positive change after the event. These results support the argument that the firms that have debt contracts with covenants often find themselves constrained. And when the covenants are relaxed, then such firms may choose to utilize the increased flexibility to increase their leverage.

We run a number of tests around the SFAS 160 shock using double differencing and triple differencing approaches. The results of the double differencing approach shows that, among the firms that possess equity-related covenants, the firms with minority interest do show a negative effect on CEO compensation after the SFAS 160 shock. Taking into account the variations in the size of minority interest, the triple differencing approach also provided consistent results. In order to ensure that our results are robust, we conduct the analysis using 2-year and 3-year windows around the event, along with a number of control factors for firm as well as CEO characteristics. The results across all the specification remain consistent.

From the point of view of the effort channel, the results of the difference-in-difference analysis indicate that, post SFAS 160 implementation in 2007-08, the relaxed covenants reduced the effort level required of the CEO. The results with market leverage as the dependent variable suggest that SFAS 160 increased the flexibility for the firms with regards to their financial policy. This, in turn, reduced the effort level for the CEO and had a negative impact on the compensation. From the perspective of the risk channel, the observed results indicate that the increased *distance-to-violation* after the SFAS 160 shock reduced the risk of CEO turnover, thereby reducing the risk premium required by the CEO.

In the difference-in-difference analysis, although the observed relationship is consistent across all of the specifications, it is important to observe that we obtain a low level of significance. We do not find this low level of significance to be alarming because the expected and observed effect on CEO compensation is negative. This is because, in general, we expect a reduction in CEO compensation to be a more difficult decision.

Although in this paper, we contend that there are two channels through which covenants affect CEO compensation, we acknowledge that the methodology used by us is not sufficient

to distinguish between the two channels. This is partly due the constraint that the measures available on covenant control work the same way and predict same results from the two channels. In addition, it is our contention that the two channels are not completely exclusive to each other. On one hand, the risk of CEO turnover can be one of the reasons that push CEO to increase the effort level; while on the other hand, a low level of effort from the CEO may increase the risk of dismissal. Therefore, for the scope of this paper we limit our analysis to look at whether the debt covenants have an impact on CEO compensation.

6. Conclusion

The goal of this paper is to find whether debt covenants have an impact on CEO compensation. We contend that there are two ways in which the debt covenants can have an effect of CEO compensation. Firstly, by increasing monitoring of CEO actions and reducing flexibility with regards to policy decisions, covenants increase the effort level for the CEO (effort channel). Secondly, covenant violations increase the likelihood of CEO turnover, therefore covenants increase the CEO turnover risk (risk channel).

In the study, we use two measures to proxy for the covenant restrictions: the *number of covenants* and *distance-to-violation*. Our findings show that *number of covenants* has a positive effect on CEO compensation, while *distance-to-violation* has a negative effect. These results are consistent with our expectation. We also, supplement our analysis using a difference-in-difference analysis around the SFAS 160 standard implementation in 2007-08.

Since, the effort channel and the risk channel both predict the same relationship, in this paper we do not differentiate between the two. Further work and analysis is required to ascertain which of the two effects is dominant.

7. Bibliography

Abowd, John M., and Orley Ashenfelter. "Anticipated Unemployment, Temporary Layoffs, and Compensating Wage Differentials." In Studies in Labor Market, by Sherwin Rosen, edited by Sherwin Rosen, 141-170. University of Chicago Press, 1981.

Aggarwal, Rajesh K. Executive Compensation and Incentives. Vol. 2, in Handbook of Empirical Corporate Finance, edited by B. Espen Eckbo, 498-538. 2008.

Aghion, Philippe, and Patrick Bolton. "An Incomplete Contracts Approach to Financial Contracting." The Review of Economic Studies (The Review of Economic Studies Ltd.) 59, no. 3 (July 1992): 473-494.

Bannerjee, Shantanu, Sudipto Dasgupta, and Yungsan Kim. "Bannerjee Dasgupta kim (2008) - JF - Buyer–Supplier Relationships and theStakeholder Theory of Capital Structure.pdf." Journal of Finance 63, no. 5 (October 2008): 2507-2552.

Bebchuk, Lucian, and Alma Cohen. "What matters in corporate governance." Review of Financial Studies 22 (2009): 783-827.

Berlin, Mitchell, and Loretta J. Mester. "Debt Covenants and Renegotiation." Journal of Financial Intermediation 2 (1992): 95-133.

Billett, Matthew T., Tao-Hsien Dolly King, and David C. Mauer. "Growth Opportunities and the choice of Leverage, Debt Maturity, and Covenants." The Journal of Finance 62, no. 2 (April 2007): 697–730 .

Bronars, Stephen G., and Donald R. Deere. "The Threat of Unionization, the Use of Debt, and the Preservation of Shareholder Wealth." The Quarterly Journal of Economics 106, no. 1 (February 1991): 231-254.

Campello, Murillo. "Capital structure and product markets interactions: evidence from business cycles." Journal of Financial Economics 68 (2003): 353–378.

Carey, Mark, and Mark Hrycray. "Credit flow, risk, and the role of private debt in capital structure." Working paper, Federal Reserve Board, 1999.

Chava, Sudheer, and Michael R. Roberts. "How does financing impact Investment? The Role of Debt Covenants." Journal of Finance 63, no. 5 (October 2008): 2085-2121.

Chava, Sudheer, Praveen Kumar, and Arthur Warga. "Managerial Agency and Bond Covenants." The Review of Financial Studies (Oxford University Press) 23, no. 3 (March 2010): 1120–1148.

Chevalier, Judith A. "Capital Structure and Product-Market Competition: Empirical Evidence from the Supermarket Industry." The American Economic Review 85, no. 3 (June 1995): 415-435.

Christensen, Hans B., Edward Lee, and Martin Walker. "Do IFRS Reconciliations Convey Information? The Effect of Debt Contracting." Journal of Accounting Research (Chicago Booth) 47, no. 5 (December 2009): 1167-1199.

Cohen, Moshe, Sharon Katz, and Gil Sadka. "Debt Covenants and Capital Structure: Evidence from an Exogenous Shock to Debt Capacity." working paper, July 2012.

Custodio, Claudia, and Miguel A. Ferreira. "Generalists versus specialists: Lifetime work experience and chief executive officer pay." Hournal of Financial Economics 108 (2013): 471-492.

Dichev, Ilia D., and Douglas J. Skinner. "Large Sample Evidence on the Debt Covenant Hypothesis." Journal of Accounting Research 40, no. 4 (September 2002): 1091-1123.

FASB, Financial Accounting Standards Board. Exposure Doucuments & Public Comment Documents. http://www.fasb.org/jsp/FASB/Page/SectionPage&cid=1176157086783 (accessed March 2018).

Fee, C. Edward, and Charles J. Hadlock. "Management turnover across the corporate hierarchy." Journal of Accounting and Economics 37 (2004): 3-38.

Frankel, Richard, Joshua Lee, and Michael McLaughlin. "The Impact of SFAS 160: An Investigation of the Economic Consequences of the Reclassification of Minority Interest." working paper, February 2010.

GopalaKrishnan, V., and Mohinder Parkash. "Borrower and Lender Perceptions of Accounting Information in Corporate Lending Agreements." Accounting Horizons (American Accounting Association) 9 (March 1995): 13-26.

Hermalin, Benjamin E. "Trends in Corporate Governance." The Journal of Finance 60, no. 5 (October 2005): 2351-2384.

Holmstrom, Bengt, and Paul Milgrom. "Aggregation and Linearity in the Provision of Intertemporal Incentives." Econometrica (The Econometric Society) 55, no. 2 (March 1987): 303-328.

Ismail, Raja Hached. "The Determinants of Financial Covenants on Private Debt: The Case of Listed French Companies." Research Journal of Finance and Accounting 5, no. 15 (2014): 176-183.

Jensen, Michael C., and William H. Meckling. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." Journal of Financial Economics (North-Holland Publishing Company) 3 (1976): 305-360.

Leary, Mark T., and Michael R. Roberts. "Do Peer Firms Affect Corporate Financial Policy?" The Journal of Finance 69, no. 1 (February 2014).

Leftwich, Richard. "Accounting Information in Private Markets: Evidence from Private Lending Agreements." The Accounting Review (American Accounting Association) 58, no. 1 (January 1983): 23-42.

Malitz, Ileen. "On Financial Contracting: The Determinants of Bond Covenants." Financial Management 15, no. 2 (1986): 18-25.

Mulford, Charles W., and Erin Quinn. "The Effects on Measures of Profitability and Leverage of Recently Enacted Changes in Accounting for Minority Interests." Georgia Tech Financial Analysis Lab, April 2008.

Myers, Stewart C. "Determinants of Corporate Borrowing." Journal of Financial Economics (North-Holland Publishing Company) 5 (1977): 147-175.

Nini, Greg, David C. Smith, and Amir Sufi. "Creditor control rights and firm investment policy." Journal of Financial Economics 92 (2009): 400-420.

Nini, Greg, David C. Smith, and Amir Sufi. "Creditor Control Rights, Corporate Governance, and Firm Value." The Review of Financial Studies (Oxford University Press) 25, no. 6 (June 2012): 1713–1761.

Parsons, Chris, and Sheridan Titman. Capital Structure and Corporate Strategy. Vol. 2, in Handbook of Empirical Corporate Finance, by B. Espen Eckbo, 204-234. Elsevier B.V, 2008.

Peters, Florian S., and Alexander F. Wagner. "The executive turnover risk premium." The Journal of Finance 69, no. 4 (August 2014): 1529-1563.

Phillips, Gordon M. "Increased debt and industry product markets an empirical analysis." Journal of Financial Economics 37, no. 2 (February 1995): 189-238.

Roberts, Michael R., and Amir Sufi. "Control Rights and Capital Structure: An Empirical Investigation." The Journal of Finance 64, no. 4 (August 2009): 1657-1695.

Sharpe, Steven A. "Financial Market Imperfections, Firm Leverage, and the Cyclicality of Employment." The American Economic Review 84, no. 4 (September 1994): 1060-1074.

Smith, Clifford W. "A Perspective on Accounting-Based Debt Covenant Violations." The Accounting Review (American Accounting Association) 68, no. 2 (April 1993): 289-303.

Smith, Clifford W., and Jerold B. Warner. "On Financial Contracting: An Analysis of Bond Covenants." Journal of Financial Economics (North-Holland Publishing Company) 7 (1979): 117-161.

SUMMARY OF STATEMENT NO. 160. Financial Accounting Standards Board. http://www.fasb.org/summary/stsum160.shtml (accessed March 2018).

Tirole, Jean. Theory of Corporate Finance. Princeton University Press, 2006.

Titman, Sheridan. "The effect of capital structure on a firm's liquidation decision." Journal of Financial Economics (North-Holland Publishing Company) 13 (1984): 137-151.

Titman, Sheridan, and Roberto Wessels. "The Determinants of Capital Structure Choice." The Journal of Finance (Wiley for the American Finance Association) 43, no. 1 (March 1988): 1-19.

Unegbu, Angus O. "Contentious Issues in Financial Statements' Consolidation: Non-controlling Interests' Share of Excess Losses." European Journal of Accounting Auditing and Finance Research (European Centre for Research Training and Development UK) 3, no. 5 (May 2015): 20-29.

Valta, Philip. "Competition and the cost of debt." Journal of Financial Economics 105 (2012): 661–682.

WRDS. Mergent Fixed Income Securities Database (FISD). http://www.whartonwrds.com/datasets/fisd/ (accessed April 9, 2018).

—. WRDS Overview of DealScan. https://wrds-www.wharton.upenn.edu/pages/support/data-overview/wrds-overview-

dealscan/?_ga=2.142078711.453870684.1523247571-2102587886.1488198993 (accessed April 9, 2018).

Figure 1

The following graphs show the fraction of firms in our sample that have a given number of covenants.

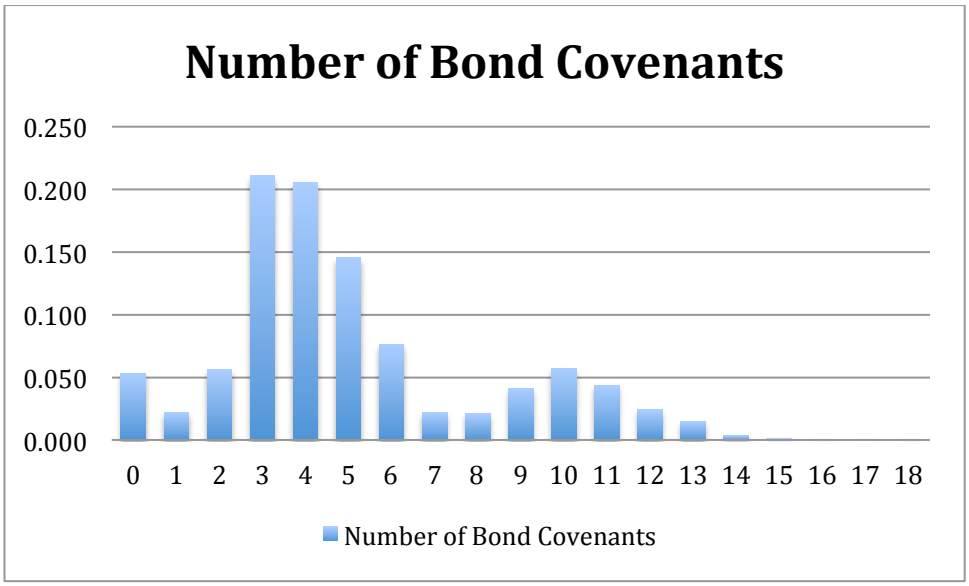

Fig 1.1: Fraction of firms that have given number of bond covenants

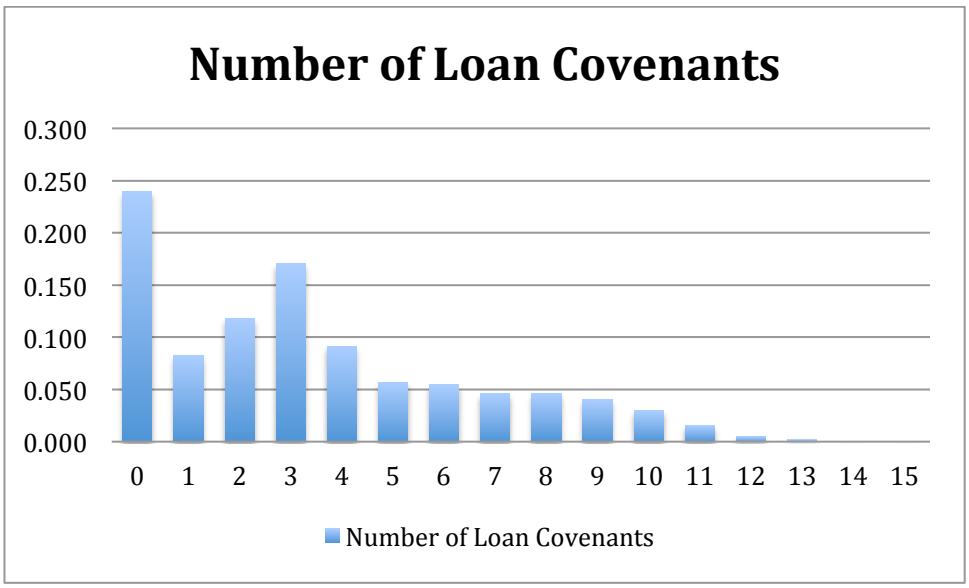

Fig 1.2: Fraction of firms that have a given number of Loan Covenants

Table 1: Summary Statistics for the Final Sample

The table provides the summary statistics for the variables used in the analysis. It shows the mean, standard deviations, 25th percentile, 50th percentile (median) and 75th percentile values of the various variables. The sample has been compiled using four databases: Execucomp, Compustat, LPC DealScan and Mergent FISD. It represents the top S&P 1500 firms for the period 1992 to 2014. Panel A provides data on the number of covenants that are active on a firm in a given year. Debt Covenants represent the sum of bond covenants and Loan covenants. Debt Covenants (coded 0) represents sum of bond covenants and loan covenants where the missing values are coded to zero. Panel B provides summary statistics for the firm level characteristics.

Variable	N	mean	sd	p25	p50	p75
Panel A – Number of Covenants						
Bond Covenants	15151	5.09	3.15	3	4	6
Loan Covenants	22633	3.43	3.12	1	3	5
Debt Covenants	10176	9.21	5.35	5	8	13
Debt Covenants (coded 0)	27608	5.61	4.82	3	4	8
Panel B – Firm level Characteriestics						
Log (total compensation)	27608	8.03	1.14	7.30	8.06	8.77
Log (Fixed)	27608	6.84	0.91	6.46	6.85	7.25
Log (Incentive)	27608	7.17	2.03	6.37	7.61	8.52
logAssets	27596	7.79	1.71	6.57	7.60	8.86
Market to Book	26874	1.79	1.37	1.10	1.43	2.00
Market Leverage	26849	0.26	0.22	0.09	0.21	0.38
Profitability	26784	0.13	0.10	0.08	0.13	0.18
CashRatio	27120	0.11	0.13	0.02	0.06	0.15
R&D	27608	0.02	0.05	0.00	0.00	0.02
Sale Growth	26763	0.12	0.36	-0.01	0.07	0.18
Cash Flow Volatility	24666	0.11	0.17	0.03	0.07	0.13
HHI FF48	27428	0.07	0.07	0.04	0.05	0.07
logarithm (Age)	26511	4.01	0.13	3.93	4.03	4.09
Logarithm (Tenure)	26924	1.67	0.90	1.10	1.79	2.30
ga	15899	0.06	1.01	-0.71	-0.10	0.62
avg held	21858	0.72	1.83	0.57	0.74	0.87
Duality	27608	0.44	0.50	0.00	0.00	1.00
% of independent Directors	17366	0.71	0.17	0.62	0.75	0.86

Table 2: Bond Covenants vs. CEO compensation

This table summarizes the estimation results specification provided in equation 1. The dependent variable is the logarithm of total CEO compensation. The explanatory variable is Bond Covenants, which represents the number of bond covenants that are active on a firm in a given year. The sample has been compiled using four databases: Execucomp, Compustat, LPC DealScan and Mergent FISD. It represents the top S&P 1500 firms for the period 1992 to 2014. The definitions of the variables can be found in Appendix 1. The table reports the coefficients for various independent variables and below them in parentheses are the robust standard errors clustered to heteroskedasticity and within firm dependence. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Log (CEO Compensation)		
	(1)	(2)	(3)
Bond Covenants	0.013***	0.016**	0.021***
	(0.005)	(0.006)	(0.007)
logAssets	0.425***	0.414***	0.413***
	(0.014)	(0.016)	(0.018)
Market to Book	0.087***	0.076***	0.108***
	(0.018)	(0.027)	(0.031)
MarketLeverage	-0.606***	-0.630***	-0.594***
	(0.084)	(0.119)	(0.140)
Profitability	0.433***	0.507**	0.317
	(0.161)	(0.208)	(0.243)
Cash Ratio	0.225	0.054	-0.138
	(0.183)	(0.270)	(0.386)
R&D	0.198	0.186	0.321
	(0.324)	(0.486)	(0.620)
Sale Growth	0.072***	0.154***	0.108**
	(0.026)	(0.041)	(0.047)
Volatility Cash Flow	-0.054	-0.082	-0.061
	(0.138)	(0.201)	(0.335)
HHI-ff48	0.901**	0.240	-0.548
	(0.423)	(0.564)	(0.964)
lnAge		-0.129	-0.122
		(0.180)	(0.203)
lnTenure		0.030	0.050**
		(0.021)	(0.024)
ga		0.122***	0.129***
		(0.018)	(0.019)
avg held			0.476***
			(0.129)
Duality			-0.018
			(0.049)
IndptDirector (%)			0.186
			(0.158)
E_Index			0.038**
			(0.016)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
No. Of Observations	12842	6784	4507
Adjusted R-Sq	0.441	0.427	0.402

Table 3: Loan Covenants vs. CEO Compensation

This table summarizes the estimation results specification provided in equation 1. The dependent variable is the logarithm of total CEO compensation. The explanatory variable is Loan Covenants, which represents the number of Loan covenants that are active on a firm in a given year. The sample has been compiled using four databases: Execucomp, Compustat, LPC DealScan and Mergent FISD. It represents the top S&P 1500 firms for the period 1992 to 2014. The definitions of the variables can be found in Appendix 1. The table reports the coefficients for various independent variables and below them in parentheses are the robust standard errors clustered to heteroskedasticity and within firm dependence. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Log (CEO Compensation)		
	(1)	(2)	(3)
Loan Covenants	0.018***	0.018***	0.015***
	(0.003)	(0.004)	(0.005)
logAssets	0.470***	0.463***	0.452***
	(0.012)	(0.011)	(0.015)
Market to Book	0.099***	0.096***	0.120***
	(0.010)	(0.011)	(0.015)
MarketLeverage	-0.444***	-0.485***	-0.412***
	(0.056)	(0.081)	(0.101)
Profitability	0.473***	0.748***	0.595***
	(0.115)	(0.142)	(0.215)
Cash Ratio	0.073	0.241	0.191
	(0.180)	(0.157)	(0.207)
R&D	0.864***	1.040***	1.246***
	(0.238)	(0.296)	(0.413)
Sale Growth	0.094***	0.108***	0.087*
	(0.027)	(0.033)	(0.052)
Volatility Cash Flow	0.076	0.000	-0.104
	(0.082)	(0.123)	(0.160)
HHI-ff48	0.582*	-0.050	-0.472
	(0.312)	(0.360)	(0.680)
lnAge		-0.194*	-0.252*
		(0.115)	(0.142)
lnTenure		0.015	0.027
		(0.014)	(0.019)
ga		0.114***	0.119***
		(0.014)	(0.017)
avg held			0.242***
			(0.084)
Duality			0.076**
			(0.034)
IndptDirector (%)			0.334***
			(0.106)
E_Index			0.038***
			(0.014)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
No. Of Observations	20366	11092	5830
Adjusted R-Sq	0.503	0.521	0.534

Table 4: Debt Covenants vs. CEO Compensation

This table summarizes the estimation results specification provided in equation 1. The dependent variable is the logarithm of total CEO compensation. The explanatory variable is debt Covenants, which represents the number of bond and loan covenants that are active on a firm in a given year. In columns (1), (2) and (3), variable Debt Covenants represents sum of bond covenants and loan covenants for the firm. In columns (4), (5) and (6), the variable debt covenants represent again the sum of bond and loan covenants, but here the missing values are coded to zero (See the variable Debt Covenants0 in Appendix 1). The sample has been compiled using four databases: Execucomp, Compustat, LPC DealScan and Mergent FISD. It represents the top S&P 1500 firms for the period 1992 to 2014. The definitions of the variables can be found in Appendix 1. The table reports the coefficients for various independent variables and below them in parentheses are the robust standard errors clustered to heteroskedasticity and within firm dependence. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Log (CEO Compensation)					
	(1)	(2)	(3)	(4)	(5)	(6)
Debt Covenants	0.010***	0.011***	0.015***	0.012***	0.011***	0.013***
	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)
logAssets	0.451***	0.433***	0.429***	0.448***	0.441***	0.432***
	(0.013)	(0.018)	(0.019)	(0.012)	(0.012)	(0.016)
Market to Book	0.111***	0.091***	0.130***	0.091***	0.089***	0.108***
	(0.018)	(0.021)	(0.021)	(0.010)	(0.014)	(0.020)
MarketLeverage	-0.571***	-0.645***	-0.606***	-0.500***	-0.517***	-0.506***
	(0.085)	(0.131)	(0.138)	(0.056)	(0.077)	(0.103)
Profitability	0.306*	0.592**	0.192	0.495***	0.696***	0.634***
	(0.185)	(0.247)	(0.274)	(0.108)	(0.136)	(0.191)
Cash Ratio	0.098	0.149	0.180	0.175	0.206	0.035
	(0.158)	(0.198)	(0.223)	(0.156)	(0.178)	(0.280)
R&D	0.324	0.430	0.393	0.735***	0.904***	1.162***
	(0.369)	(0.494)	(0.621)	(0.221)	(0.292)	(0.430)
Sale Growth	0.075*	0.092*	0.071	0.089***	0.139***	0.106***
	(0.039)	(0.049)	(0.062)	(0.022)	(0.030)	(0.041)
Volatility Cash Flow	-0.170	-0.380	-0.520*	0.076	0.028	0.043
	(0.207)	(0.304)	(0.277)	(0.074)	(0.113)	(0.168)
HHI-ff48	1.067**	0.217	-0.451	0.559*	0.030	-0.559
	(0.452)	(0.565)	(0.899)	(0.299)	(0.356)	(0.714)
lnAge		-0.314*	-0.303		-0.117	-0.129
		(0.168)	(0.194)		(0.122)	(0.153)
lnTenure		0.020	0.030		0.018	0.038**
		(0.022)	(0.026)		(0.014)	(0.018)
ga		0.120***	0.126***		0.117***	0.121***
		(0.019)	(0.021)		(0.014)	(0.016)
avg held			0.179			0.348***
			(0.125)			(0.093)
Duality			0.043			0.034
			(0.052)			(0.033)
IndptDirector (%)			0.342**			0.237**
			(0.138)			(0.115)
E_Index			0.030			0.043***
			(0.019)			(0.013)
Ind. Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Yr. Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9623	5121	3405	23585	12755	6932
Adjusted R-Sq	0.528	0.508	0.492	0.461	0.471	0.461

Table 5: Firm Fixed effects and CEO fixed effects

This table summarizes the estimation results specification provided in equation 1. The dependent variable is the logarithm of total CEO compensation. The explanatory variable is debt Covenants, which represents the sum of bond and loan covenants, where the missing values are coded to zero (See the variable Debt Covenants0 in Appendix 1). The sample has been compiled using four databases: Execucomp, Compustat, LPC DealScan and Mergent FISD. It represents the top S&P 1500 firms for the period 1992 to 2014. The definitions of the variables can be found in Appendix 1. The table reports the coefficients for various independent variables and below them in parentheses are the robust standard errors clustered to heteroskedasticity and within firm dependence. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Log (CEO Compensation)					
	(1)	(2)	(3)	(4)	(5)	(6)
Debt Covenants	0.007***	0.009***	0.007**	0.008***	0.008**	0.009*
	(0.002)	(0.003)	(0.003)	(0.002)	(0.004)	(0.005)
logAssets	0.396***	0.409***	0.418***	0.373***	0.416***	0.400***
	(0.018)	(0.028)	(0.041)	(0.020)	(0.026)	(0.041)
Market to Book	0.116***	0.114***	0.097***	0.116***	0.114***	0.097***
	(0.011)	(0.016)	(0.018)	(0.013)	(0.017)	(0.021)
MarketLeverage	-0.701***	-0.892***	-1.006***	-0.745***	-0.882***	-0.965***
	(0.062)	(0.092)	(0.108)	(0.064)	(0.101)	(0.139)
Profitability	0.446***	0.650***	0.728***	0.545***	0.743***	0.739***
	(0.147)	(0.202)	(0.281)	(0.141)	(0.196)	(0.257)
Cash Ratio	0.059	0.170	0.161	0.102	0.279*	0.302
	(0.106)	(0.144)	(0.177)	(0.102)	(0.158)	(0.202)
R&D	-0.006	0.529	0.721	-0.061	0.206	0.479
	(0.319)	(0.437)	(0.544)	(0.274)	(0.375)	(0.506)
Sale Growth	0.085***	0.091***	0.050	0.072***	0.060*	0.041
	(0.022)	(0.031)	(0.043)	(0.023)	(0.033)	(0.043)
Volatility Cash Flow	-0.038	-0.146	-0.033	0.008	-0.049	-0.075
	(0.097)	(0.147)	(0.119)	(0.077)	(0.114)	(0.152)
HHI-ff48	0.187	0.086	-0.081	-0.063	-0.123	-1.495**
	(0.303)	(0.390)	(0.592)	(0.314)	(0.393)	(0.687)
lnAge		-0.032	0.262		1.156	0.934
		(0.186)	(0.266)		(0.952)	(1.270)
lnTenure		-0.005	-0.014		-0.012	-0.041
		(0.017)	(0.022)		(0.027)	(0.035)
ga		0.070***	0.088***		0.027	0.080
		(0.019)	(0.023)		(0.043)	(0.058)
Duality			0.001			0.030
			(0.033)			(0.031)
IndptDirector (%)			-0.015			-0.085
			(0.205)			(0.287)
Firm Fixed Effects	Yes	Yes	Yes	No	No	No
CEO Fixed Effect	No	No	No	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
No. Of Observations	23585	12755	8773	23585	12755	8773
Adjusted R-Sq	0.666	0.629	0.609	0.732	0.680	0.657

Table 6: Distance-to-violation vs. CEO Compensation

This table summarizes the estimation results specification provided in equation 2. The dependent variable is the logarithm of total CEO compensation. The explanatory variable is the variable Distance, which represents the *distance-to-violation*. The sample has been compiled using four databases: Execucomp, Compustat, LPC DealScan and Mergent FISD. It represents the top S&P 1500 firms for the period 1992 to 2014. In Column (1), (2) and (3), the sample consists of all firms, which includes the firms that are well within the threshold limits laid out for the associated accounting variables/ratios in the covenants, firms that are close to violation and the firms that are already in violation of a covenant. In, Columns (4), (5) and (6), the sample consists of non-violators, which are the firms that are not in violation of any covenants. In columns (1) and (4), the independent variable is the mean of distance-to-violation for all covenants that are active for a firm in a given year. Similarly, in columns (2) and (5), it is the median of all distance-to-violation, and in columns (3) and (6), it is the minimum of all distance-to-violation. In column (7), the variable Fraction represents the fraction of total covenants that are within 30% of *distance-to-violation*. Similarly in columns (8), (9) and (10), it represents the fraction of covenants that are within 50%, 75% and 90% of *distance-to-violation* respectively. The definitions of the variables can be found in Appendix 1. The table reports the coefficients for various independent variables and below them in parentheses are the robust standard errors clustered to heteroskedasticity and within firm dependence. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Log(Compensation)									
	All Firms			Non-violators			All firms			
	Mean	Median	Minimum	Mean	Median	Minimum	Dist. < 0.3	Dist. < 0.5	Dist. < 0.75	Dist. < 0.9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Distance	-0.005***	-0.004***	-0.002*	-0.004***	-0.003***	-0.003**				
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)				
Fraction							0.085*	0.091**	0.096**	0.087**
							(0.048)	(0.046)	(0.044)	(0.043)
logAssets	0.501***	0.500***	0.498***	0.511***	0.511***	0.510***	0.497***	0.497***	0.498***	0.498***
	(0.012)	(0.012)	(0.012)	(0.015)	(0.015)	(0.015)	(0.012)	(0.012)	(0.012)	(0.012)
Market to Book	0.085***	0.085***	0.085***	0.077***	0.077***	0.077***	0.083***	0.083***	0.083***	0.083***
	(0.013)	(0.014)	(0.014)	(0.015)	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)
MarketLeverage	-0.461***	-0.439***	-0.413***	-0.303**	-0.278**	-0.256**	-0.429***	-0.435***	-0.441***	-0.438***
	(0.103)	(0.103)	(0.108)	(0.128)	(0.127)	(0.128)	(0.101)	(0.100)	(0.099)	(0.100)
Profitability	1.097***	1.092***	1.073***	1.496***	1.489***	1.486***	1.097***	1.101***	1.107***	1.104***
	(0.251)	(0.251)	(0.249)	(0.317)	(0.317)	(0.317)	(0.255)	(0.255)	(0.256)	(0.256)
Cash Ratio	0.448***	0.438***	0.428***	0.565***	0.553***	0.545***	0.424***	0.424***	0.426***	0.425***
	(0.156)	(0.156)	(0.156)	(0.146)	(0.146)	(0.146)	(0.156)	(0.156)	(0.156)	(0.156)
R&D	0.940**	0.937**	0.959**	0.975**	0.978**	0.988**	0.944**	0.941**	0.937**	0.939**
	(0.425)	(0.426)	(0.427)	(0.475)	(0.478)	(0.478)	(0.426)	(0.426)	(0.426)	(0.426)
Sale Growth	-0.031	-0.029	-0.022	-0.188	-0.185	-0.181	-0.022	-0.022	-0.023	-0.023
	(0.117)	(0.117)	(0.116)	(0.247)	(0.248)	(0.246)	(0.117)	(0.117)	(0.117)	(0.117)
Vol. Cash Flow	0.206*	0.210*	0.223**	0.292***	0.298***	0.307***	0.216*	0.213*	0.210*	0.211*
	(0.110)	(0.111)	(0.113)	(0.092)	(0.092)	(0.093)	(0.114)	(0.114)	(0.113)	(0.113)
HHI-ff48	-1.053*	-1.052*	-1.064*	-0.927	-0.928	-0.929	-1.083**	-1.085**	-1.083**	-1.084**
	(0.546)	(0.546)	(0.549)	(0.697)	(0.697)	(0.698)	(0.546)	(0.545)	(0.545)	(0.546)
ga	0.073**	0.074**	0.074***	0.092***	0.093***	0.093***	0.074**	0.074**	0.074**	0.074**
	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
Ind. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yr. Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8818	8818	8818	5306	5306	5306	8818	8818	8818	8818
Adjusted R-Sq	0.414	0.414	0.413	0.453	0.453	0.452	0.413	0.413	0.413	0.413

Table 7: Summary Statistics – Difference in Difference

This table provides the summary statistics for the sample used difference-in-difference analysis for the year of treatment. The sample consists of only the firms that have debt contract with at least one equity-related covenants. The treatment variable is minority interest, which equals one when the firm reports a minority interest greater than one. Panel A and Panel B provide the summary statistics for the complete sample. Panel A provides the firm characteristics for the control group, while panel B provides the summary statistics for the treated group. Since in the initial sample, the treated group and control group differed from each other in firm size and market leverage. Panel C and Panel D provide the summary statistics for the sample after the propensity score matching is done using Firm size and Market leverage. The table shows the mean, standard deviations, 25th percentile, 50th percentile (median) and 75th percentile values of the various variables.

Variable	N	Mean	Std. dev.	p25	p50	p75
Panel A *- Firms that do not have Minority Interest (Control Group)*						
Log (Compensation)	249	8.01	1.05	7.34	8.05	8.71
Log (Assets)	250	8.00	1.62	6.77	7.94	9.00
Market to Book	239	1.21	0.57	0.91	1.07	1.38
Market Leverage	239	0.33	0.23	0.15	0.29	0.49
Profitability	231	0.11	0.09	0.08	0.11	0.16
CashRatio	241	0.09	0.11	0.02	0.05	0.13
R&D	250	0.01	0.03	0.00	0.00	0.00
Sale Growth	235	0.05	0.55	-0.08	0.02	0.10
Cash Flow Volatility	221	0.08	0.08	0.02	0.04	0.09
Panel B *- Firms that have Minority Interest (Treatment Group)*						
Log (Compensation)	186	8.11	1.81	7.63	8.36	8.87
Log (Assets)	186	8.49	1.27	7.62	8.50	9.30
Market to Book	171	1.24	0.66	0.92	1.08	1.32
Market Leverage	171	0.41	0.24	0.21	0.42	0.57
Profitability	137	0.11	0.11	0.08	0.12	0.16
CashRatio	175	0.08	0.10	0.02	0.04	0.11
R&D	186	0.01	0.03	0.00	0.00	0.00
Sale Growth	170	0.09	0.43	-0.04	0.07	0.15
Cash Flow Volatility	166	0.08	0.11	0.02	0.04	0.08
Panel C *– Matched Sample – Firms that do not have Minority Interest (Control Group)*						
Log (Compensation)	103	8.13	1.12	7.54	8.13	8.74
Log (Assets)	103	8.41	1.54	7.31	8.40	9.51
Market to Book	103	1.13	0.40	0.87	1.02	1.25
Market Leverage	103	0.38	0.25	0.18	0.34	0.58
Profitability	98	0.09	0.10	0.06	0.10	0.14
CashRatio	103	0.08	0.08	0.02	0.06	0.10
R&D	103	0.01	0.02	0.00	0.00	0.00
Sale Growth	101	0.08	0.81	-0.09	0.00	0.09
Cash Flow Volatility	91	0.08	0.08	0.02	0.04	0.10
Panel D *– Matched Sample – Firms that have Minority Interest (Treatment Group)*						
Log (Compensation)	171	8.22	1.46	7.66	8.39	8.90
Log (Assets)	171	8.42	1.26	7.61	8.40	9.16
Market to Book	171	1.24	0.66	0.92	1.08	1.32
Market Leverage	171	0.41	0.24	0.21	0.42	0.57
Profitability	133	0.11	0.11	0.08	0.12	0.16
CashRatio	171	0.08	0.10	0.02	0.04	0.11
R&D	171	0.01	0.03	0.00	0.00	0.00
Sale Growth	166	0.09	0.44	-0.05	0.07	0.15
Cash Flow Volatility	154	0.08	0.11	0.02	0.04	0.08

Table 8: Difference in Difference Specification 1

The table provides the estimation results for difference-in-difference specification provided in equation 3. The dependent variable is the logarithm of total CEO compensation. Variable Post represents the time period after the SFAS 160 was brought into effect. It is equal to one for the period after 14th Dec 2009. Variable MIB is the treatment variable. It takes the value of one for the firms that reported minority interest in the year before SFAS 160, and is zero other wise. The sample has been compiled using four databases: Execucomp, Compustat, LPC DealScan and Mergent FISD. It represents the top S&P 1500 firms, which had debt contracts with equity-related covenants, for the period around the event year. In columns (1) and (2), the time period is from year (t-2) to (t+2) excluding year t. In columns (3) and (4), the time period is from year (t-3) to (t+3) excluding year t. In column (5), the dependent variable is the market leverage of firm. The definitions of the variables can be found in Appendix 1. The table reports the coefficients for various independent variables and below them in parentheses are the robust standard errors clustered to heteroskedasticity and within firm dependence. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Log(Compensation)	Log(Compensation)	Log(Compensation)	Log(Compensation)	Market Leverage
	(t-2) to (t+2)	(t-2) to (t+2)	(t-3) to (t+3)	(t-3) to (t+3)	(t-2) to (t+2)
	(1)	(2)	(3)	(4)	(5)
MIB * Post	-0.105*	-0.103*	-0.091*	-0.100**	0.025**
	(0.055)	(0.055)	(0.050)	(0.050)	(0.012)
logAssets	0.392***	0.391***	0.360***	0.359***	0.055**
	(0.094)	(0.093)	(0.065)	(0.064)	(0.022)
Market to Book	-0.009	-0.012	0.038	0.043	-0.059***
	(0.049)	(0.052)	(0.034)	(0.035)	(0.012)
Market Leverage	-0.463*	-0.470*	-0.283	-0.246	
	(0.266)	(0.256)	(0.191)	(0.190)	
Profitability	0.924**	0.949***	1.543***	1.548***	-0.481***
	(0.391)	(0.360)	(0.257)	(0.261)	(0.077)
CashRatio	0.587	0.533	0.405	0.440	0.042
	(0.362)	(0.353)	(0.290)	(0.302)	(0.110)
R&D	-0.258	-0.231	-0.602	-0.620	0.465***
	(0.716)	(0.712)	(0.854)	(0.838)	(0.091)
Sale Growth	0.164*	0.177**	0.087*	0.087*	0.012
	(0.086)	(0.086)	(0.049)	(0.049)	(0.015)
Volatility CashFlow	0.217	0.256	0.015	-0.011	0.230***
	(0.312)	(0.300)	(0.228)	(0.207)	(0.083)
HHI	1.690	1.690	0.442	0.045	-0.473
	(1.542)	(1.483)	(1.386)	(1.161)	(0.319)
log(Age)		-0.171		-0.405	
		(0.406)		(0.269)	
log(Tenure)		0.058		0.074**	
		(0.044)		(0.030)	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
No. Of Observation	1511	1494	2215	2182	1511
Adjusted R-sq	0.103	0.110	0.130	0.142	0.257

Table 9: Difference in Difference – Specification 2

The table provides the estimation results for difference-in-difference specification provided in equation 4. The dependent variable is the logarithm of total CEO compensation. Variable Post represents the time period after the SFAS 160 was brought into effect. It is equal to one for the period after 14th Dec 2009. Variable MI is the treatment variable. It represents the size of minority interest of the firm in the year prior to SFAS 160 implementation. Variable Constrained is the dummy variable that takes into account whether a firm is constrained by the equity-related covenants. A firm is assumed to be constrained if the current value of the variable underlying the covenant is less than 30% away from violation. The sample has been compiled using four databases: Execucomp, Compustat, LPC DealScan and Mergent FISD. It represents the top S&P 1500 firms, which had debt contracts with equity-related covenants, for the period around the event year. In columns (1) and (2), the time period is from year (t-2) to (t+2) excluding year t. In columns (3) and (4), the time period is from year (t-3) to (t+3) excluding year t. The definitions of the variables can be found in Appendix 1. The table reports the coefficients for various independent variables and below them in parentheses are the robust standard errors clustered to heteroskedasticity and within firm dependence. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Log(Compensation)			
	(t-2) to (t+2)	(t-2) to (t+2)	(t-3) to (t+3)	(t-3) to (t+3)
Constrained * Post	-0.029	-0.041	-0.042	-0.044
	(0.077)	(0.073)	(0.074)	(0.071)
MI * Post	-0.004	-0.001	-0.006	-0.005
	(0.012)	(0.011)	(0.011)	(0.011)
Constrained * MI * Post	-0.054*	-0.055*	-0.066*	-0.068*
	(0.031)	(0.030)	(0.040)	(0.041)
Log Assets	0.374***	0.370***	0.340***	0.337***
	(0.095)	(0.094)	(0.064)	(0.062)
Market to Book	-0.007	-0.009	0.040	0.045
	(0.049)	(0.052)	(0.034)	(0.035)
Market Leverage	-0.465*	-0.468*	-0.269	-0.235
	(0.272)	(0.261)	(0.194)	(0.191)
Profitability	0.905**	0.947***	1.547***	1.555***
	(0.399)	(0.367)	(0.259)	(0.262)
CashRatio	0.552	0.497	0.370	0.401
	(0.363)	(0.352)	(0.291)	(0.303)
R&D	-0.186	-0.163	-0.530	-0.546
	(0.708)	(0.704)	(0.806)	(0.791)
Sale Growth	0.171**	0.183**	0.087*	0.088*
	(0.085)	(0.085)	(0.048)	(0.048)
Volatility CashFlow	0.230	0.268	0.027	0.000
	(0.313)	(0.301)	(0.227)	(0.207)
HHI	1.288	1.282	0.105	-0.305
	(1.493)	(1.441)	(1.355)	(1.131)
log(Age)		-0.146		-0.385
		(0.411)		(0.273)
log(Tenure)		0.056		0.072**
		(0.044)		(0.030)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
No. Of Observation	1511	1494	2215	2182
Adjusted R-sq	0.100	0.107	0.130	0.141

Table 10: Difference in Difference Specification 2 with extended control group

The table provides the estimation results for difference-in-difference specification provided in equation 4. The dependent variable is the logarithm of total CEO compensation. Variable Post represents the time period after the SFAS 160 was brought into effect. It is equal to one for the period after 14th Dec 2009. Variable MI is the treatment variable. It represents the size of minority interest of the firm in the year prior to SFAS 160 implementation. Variable Constrained is the dummy variable that takes into account whether a firm is constrained by the equity-related covenants. A firm is assumed to be constrained if the current value of the variable underlying the covenant is less than 30% away from violation. The sample has been compiled using four databases: Execucomp, Compustat, LPC DealScan and Mergent FISD. It represents the top S&P 1500 firms for the period around the event year. In columns (1) and (2), the time period is from year (t-2) to (t+2) excluding year t. In columns (3) and (4), the time period is from year (t-3) to (t+3) excluding year t. The table reports the coefficients for various independent variables and below them in parentheses are the robust standard errors clustered to heteroskedasticity and within firm dependence. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Log(Compensation)			
	(t-2) to (t+2)	(t-2) to (t+2)	(t-3) to (t+3)	(t-3) to (t+3)
Constrained * Post	0.010	0.006	-0.004	0.008
	(0.077)	(0.074)	(0.074)	(0.072)
MI * Post	0.007	0.010	-0.003	0.005
	(0.011)	(0.011)	(0.008)	(0.010)
Constrained * MI * Post	-0.063**	-0.063**	-0.070*	-0.078**
	(0.030)	(0.029)	(0.037)	(0.037)
Log Assets	0.413***	0.419***	0.402***	0.417***
	(0.055)	(0.055)	(0.039)	(0.040)
Market to Book	0.013	0.016	0.065**	0.069**
	(0.033)	(0.034)	(0.027)	(0.028)
Market Leverage	-0.545***	-0.598***	-0.442***	-0.493***
	(0.167)	(0.166)	(0.124)	(0.126)
Profitability	0.617**	0.660**	0.990***	1.023***
	(0.261)	(0.260)	(0.228)	(0.236)
CashRatio	0.683***	0.532***	0.444***	0.381**
	(0.218)	(0.191)	(0.164)	(0.161)
R&D	-0.257	-0.126	-0.264	-0.158
	(0.617)	(0.573)	(0.500)	(0.466)
Sale Growth	0.111**	0.104**	0.078**	0.074**
	(0.046)	(0.044)	(0.032)	(0.031)
Volatility CashFlow	-0.050	-0.019	0.047	0.062
	(0.108)	(0.109)	(0.084)	(0.080)
HHI	-0.853	-0.855	-0.830	-1.185
	(1.069)	(1.055)	(0.874)	(0.818)
log(Age)		-0.118		-0.228
		(0.291)		(0.215)
log(Tenure)		0.021		0.037
		(0.033)		(0.025)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
No. Of Observation	3304	3254	4822	4729
Adjusted R-sq	0.088	0.090	0.113	0.121

Table 11: Difference in Difference – Propensity score matched Sample

The table provides the estimation results for difference-in-difference specification for propensity score matched sample (specification given by equation 3). The dependent variable is the logarithm of total CEO compensation. Variable Post represents the time period after the SFAS 160 was brought into effect. It is equal to one for the period after 14th Dec 2009. Variable MIB is the treatment variable. It takes the value of one for the firms that reported minority interest in the year before SFAS 160, and is zero other wise. Propensity score matching is done to using variables logAssets and Market Leverage. The sample has been compiled using four databases: Execucomp, Compustat, LPC DealScan and Mergent FISD. It represents the top S&P 1500 firms, which had debt contracts with equity-related covenants, for the period around the event year. In columns (1), (2) and (3), the time period is from year (t-2) to (t+2) excluding year t. In columns (4) and (5), the time period is from year (t-3) to (t+3) excluding year t. In column (5), the dependent variable is the market leverage of firm. The table reports the coefficients for various independent variables and below them in parentheses are the robust standard errors clustered to heteroskedasticity and within firm dependence. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Log(Compensation) (t-2) to (t+2)	Log(Compensation) (t-2) to (t+2)	Log(Compensation) (t-2) to (t+2)	Log(Compensation) (t-3) to (t+3)	Log(Compensation) (t-3) to (t+3)	Market Leverage (t-2) to (t+2)
MIB * Post	-0.142**	-0.139**	-0.115*	-0.115*	-0.106*	0.027*
	(0.071)	(0.068)	(0.067)	(0.062)	(0.062)	(0.014)
logAssets		0.310**	0.341**	0.355***	0.373***	0.023
		(0.144)	(0.148)	(0.095)	(0.094)	(0.027)
Market to Book		-0.047	-0.027	0.038	0.065	-0.066***
		(0.110)	(0.106)	(0.083)	(0.077)	(0.018)
Market Leverage		-0.837***	-0.683**	-0.653***	-0.536**	
		(0.320)	(0.292)	(0.248)	(0.240)	
Profitability		0.734	0.617	1.470***	1.503***	-0.452***
		(0.453)	(0.462)	(0.362)	(0.359)	(0.102)
CashRatio		0.538	0.572	0.062	0.086	0.130
		(0.406)	(0.421)	(0.325)	(0.322)	(0.177)
R&D		0.046	0.007	-0.535	-0.639	0.501***
		(0.669)	(0.648)	(0.893)	(0.860)	(0.093)
Sale Growth		0.224*	0.261**	0.118	0.119	0.014
		(0.130)	(0.132)	(0.083)	(0.081)	(0.020)
Volatility CashFlow		-0.083	0.039	-0.125	-0.081	0.241**
		(0.485)	(0.477)	(0.342)	(0.332)	(0.106)
HHI		0.713	0.705	0.564	-0.215	-0.660
		(2.053)	(1.975)	(2.117)	(1.831)	(0.518)
log(Age)			-0.285		-0.311	
			(0.619)		(0.411)	
log(Tenure)			0.104		0.094**	
			(0.067)		(0.044)	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
No. Of Observation	826	826	815	1217	1196	826
Adjusted R-sq	0.044	0.094	0.096	0.129	0.141	0.255

Appendix 1: Variable Definitions

This table provides the definition for the various variables used in the analysis

Variable	Definition	Source
Panel A: Debt Covenants		
Loan Covenants	The total number of non-duplicative bank loan covenants a firm has in the current year	DealScan
Bond Covenants	The total number of non-duplicative bond covenants a firm has in the current year	FISD
Debt Covenants	The total number of covenants, including both bank loan covenants and bond covenants, a firm has in the current year	DealScan, FISD
Debt Covenants0	The total number of covenants, including both bank loan covenants and bond covenants, a firm has in the current year with missing values coded as zero. Specifically, the number of bank loan (bond) covenants is coded as zero if the number of bond (bank loan) covenants is non-missing	DealScan, FISD
Distance	The difference between current accounting ratio (covenant threshold) and the covenant threshold (accounting ratio), scaled by the standard deviation of the corresponding accounting ratio if the covenant specifies a minimum (maximum) level	DealScan
Panel B: CEO Characteristics		
Log(Comp)	The natural logarithm of total compensation which is comprised of the following: salary, bonus, other annual, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), long-term incentive payouts and all other compensation (tdc1)	ExecuComp
Log(Fixed)	The natural logarithm of cash and bonus pay	ExecuComp
Log(Incentive)	The natural logarithm of compensation in the form of restricted stocks and options	ExecuComp
GA-index	General ability index (GA-index) is the first factor from principal component analysis of five proxies of general management ability: (1) number of past positions (X1), (2) number of past firms (X2), (3) number of industries (X2), (4) dummy for CEO experience (X4), (5) dummy for conglomerate experience (X5). The general ability index (GA-index) is calculated by applying the scores of each component to the standardized general ability component. GAI = 0.268*X1+0.312*X2+0.309*X3+ 0.218*X4+0.153*X5	Custódio et al. (2013)
CEO tenure	Number of years as CEO of the current firm	ExecuComp
CEO age	The current age of CEOs	ExecuComp

(continued)

Panel C: Firm Characteristics		
Log(Assets)	Natural logarithm of book value of assets	Compustat
Market to book	Market value of assets divided by book value of assets, calculated as (at-(at-lt+txditc)+(prcc_f×csho))/at	Compustat
Profitability	Return on assets, defined as EBITDA (i.e., oibdp) divided by total assets	Compustat
Market leverage	Book value of debt scaled by the sum of market capitalization and the book value of debt	Compustat, CRSP
Cash ratio	Cash and short-term investments scaled by the book value of assets	Compustat
R&D	R&D expenses scaled by book assets	Compustat
Sales growth	Average annual sales growth in the past two years	Compustat
Sd. CFO	The standard deviation of operating cash flows (scaled by total assets) in the past five years	Compustat
HHI	Herfindahl and Hirschman index of industry net sale which is defined as the sum of the squared market shares of firms in each Fama-French 48 industry	Compustat
% of independent directors	The percentage of independent directors in the board of directors	ISS
Avg held	The percentage of institutional ownership, defined as the average of quarterly institutional ownership	Thomson Reuters 13F
Duality	A dummy variable equals one if the CEO also holds the position of chairman of the board	ISS
E index	Entrenchment index proposed by Bebchuk et al. (2009)	ISS
MIB	Minority interest at the end of 2008 scaled by book value of assets	Compustat

Appendix 2: Financial and Net worth Covenants – All DealScan Packages between 1992 to 2014

This table provides the list of financial and Net Worth Covenants for all DealScan loan packages in the period 1992 to 2014. Number of loans is the total number of loan facilities. Average threshold represents the simple average of the threshold given in the package. Max. Capex, Min. Ebitda, Net worth, Tangible Net Worth Thresholds are expressed in millions USD

Covenant Type	Number of Loans	Number of Packages	Number of Firms	Average Facility Size	Median Facility Size	Average Threshold
Max. Debt to EBITDA	16903	10218	3963	286	125	4.03
Min. Interest Coverage	13883	8557	3619	299	150	2.56
Min. Fixed Charge Coverage	11798	7328	3179	177	80	1.45
Max. Capex	7722	4314	2309	164	75	54.7
Tangible Net Worth	6844	5003	2823	123	30	1200
Net Worth	6108	4215	2190	227	100	2050
Max. Leverage ratio	5399	4114	1667	396	200	0.59
Max. Debt to Tangible Net Worth	3807	2719	1794	113	15	2.47
Min. Current Ratio	3790	2571	1503	103	25	1.30
Min. Debt Service Coverage	3419	2223	1414	116	25	1.55
Max. Senior Debt to EBITDA	3391	1796	1034	221	100	3.36
Min. EBITDA	2985	1761	1194	99	40	82.2
Min. Quick Ratio	944	675	491	26	8	1.39
Min. Cash Interest Coverage	535	304	235	232	100	2.05
Max. Debt to Equity	481	315	269	218	50	2.86
Max. Senior Leverage	192	134	78	403	243	0.52
Max. Loan to Value	118	90	68	212	125	2.93
Min. Equity to Asset Ratio	14	8	7	640	275	10.26
Max. Total Debt (including Contingent Liabilities) to Tangible Net Worth	10	6	6	72	48	1.11
Max. Net Debt to Assets	6	3	3	127	51	20.68
Min. Net Worth to Total Asset	3	3	3	446	500	125

Appendix 3: Financial and Net Worth Covenants – Final Sample

This table provides the list of financial and Net Worth Covenants for the DealScan loan packages that are present in our final sample in the period 1992 to 2014. The final sample is obtained after merging the data from four databases: Execucomp, Compustat, Mergent FISD, LPC DealScan. Number of loans is the total number of loan facilities. Average threshold represents the simple average of the threshold given in the package. Max. Capex, Min. Ebitda, Net worth, Tangible Net Worth Thresholds are expressed in millions USD

Covenant Type	Number of Loans	Number of Packages	Number of Firms	Average Facility Size	Median Facility Size	Average Threshold
Max. Debt to EBITDA	7279	4661	1505	403	200	3.72
Min. Interest Coverage	5689	3722	1291	438	250	2.76
Min. Fixed Charge Coverage	4512	3025	1147	264	150	1.56
Max. Leverage ratio	3041	2387	815	521	300	0.58
Net Worth	2630	1926	856	364	175	1460
Max. Capex	2473	1409	680	256	150	93
Tangible Net Worth	1639	1286	683	262	108	662
Max. Senior Debt to EBITDA	1105	604	318	324	175	2.98
Min. EBITDA	714	463	300	195	90	83
Max. Debt to Tangible Net Worth	708	534	332	308	75	2.25
Min. Current Ratio	688	494	256	207	82	1.30
Min. Debt Service Coverage	570	391	250	233	100	1.67
Min. Quick Ratio	236	177	115	60	25	1.21
Min. Cash Interest Coverage	139	87	63	426	250	2.18
Max. Senior Leverage	117	90	49	484	300	0.41
Max. Debt to Equity	110	74	65	368	150	2.21
Max. Loan to Value	41	33	22	248	190	0.75
Min. Equity to Asset Ratio	5	3	2	1455	1600	4.87
Max. Net Debt to Assets	1	1	1	381	381	0.85
Min. Net Worth to Total Asset	1	1	1	500	500	

Does Customer Industry affect the Financial Policy of a firm?

Varun Verma[†]

Abstract

This paper shows that across large customer-supplier relationships, the customer industry plays an important role in determining the capital structure of a supplier firm. Specifically, I find that customer industry's leverage has a positive impact on the supplier firm's leverage. In order to address the endogeneity concerns, I use the idiosyncratic returns of the customer's peer firms as an instrument for the financial policy of the firms in the customer industry. I find that the observed relationship is neither driven by the linked customer firm nor by the supplier firm's peers in its own industry. Also, the observed impact is more pronounced for the durable goods industries. These results seem consistent with the bargaining theory of capital structure, where the suppliers increase their leverage in tandem with their customers in order to maintain the bargaining status quo.

Key Words: Financial Policy, Capital Structure, Leverage, Customer-Supplier, Bargaining Theory, Stakeholder Theory

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* I am grateful to Prof. Carsten Bienz for his invaluable guidance and support. I thank Prof. Tyler Hull for his guidance in the initial stages of this project. I am also thankful to Francisco Santos, Jøril Mæland, Svein-Arne Persson, Aksel, Mjøs, Karin S. Thorburn, Tommy Stamland, Xunhua Su, Nils Friewald, Jørgen Haug, Michael Kisser, Tore Leite, Konrad Raff, Chunbo Liu, participants at NHH Brownbag seminar and SWFA conference 2016 for their comments and suggestions.

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1. Introduction

Among the factors that affect the corporate policies of a firm, industry is a factor that has widespread impact on almost all major firm policy decisions[1]. Considering this strong influence of industry on the firms that lie within, an important question arises about whether it also influences firms that lie outside but are closely associated. In other words, does an industry influence the policies of a firm that has strong ties to it through supply chain linkages?[2] While there can be several characteristics of an industry that can influence an outside associated firm, in this paper, I focus on one characteristic, industry leverage. More specifically, I focus on testing empirically whether the leverage of firms in a customer industry affects the leverage of a supplier firm.

While there are several theoretical frameworks that look at capital structure policy of a firm, I refer to two prominent theories that propose opposing effects with regards to the relationship between customer industry leverage and supplier firm leverage[3]: the stakeholder theory and the bargaining theory. The stakeholder theory of capital structure classifies customers and suppliers of a firm as non-financial stakeholders. It predicts that supplier firms in major bilateral relationships should maintain low leverage in order to reduce the likelihood of a spillover distress to or from their major customers (Titman 1984) (Titman and Wessels 1988) (Banerjee, Dasgupta and Kim 2008). In contrast, bargaining theory advocates that debt has a positive effect on the bargaining position of a firm with respect to its customers and suppliers (Bronars and Deere 1991) (Dasgupta and Sengupta 1993) (Sarig 1998) (Hennessy and Livdan 2009). This incentivizes suppliers in major bilateral

1 Some of the corporate policies affected by industry are capital structure (Leary and Roberts 2014), pricing policy (Bertrand 1883), product output (Cournot 1838), labor practices (Bizjak, L. and Naveen 2008) etc. This influence of industry happens through mechanisms like interaction between financial structures and product market competition (Bolton and Scharfstein 1990), herding behavior by managers (Zeckhauser, Patel and Hendricks 1991) etc.

2 Influence of customer-supplier relationship on leverage has been studied in some papers in the past but works on influence of customer industry are quite limited.

3 Both these frameworks do not differentiate between customers and potential customer, which are constituents of the customer industry.

relationships to increase their debt to improve their bargaining position[4]. Therefore, considering these opposing predictions of stakeholder theory and bargaining theory, it is an interesting empirical question to see whether there is a significant relationship between customer industry leverage and supplier firm leverage, and if it is significant then which of the two effects is more dominant[5]. To the best of my knowledge this is the first paper that explicitly explores the customer industry as a potential determinant for the financial policy of a supplier firm.

The major challenges in conducting this analysis, similar to most empirical capital structure related research papers, are the endogeneity concerns arising due to close association of a firm's financial policy with other policies such as operations, investment policy, etc. Since the customer industry and the supplier firm are connected by an operational link, there can be a number of factors that affect both these entities simultaneously. Several of these factors are observable and controlled for in the analysis; however, there can be further omitted factors that may cause the analysis to produce biased results. Some of these omitted factors may be attributed to the operational linkage between the customer industry and the supplier firm, while others may be due to presence of similar institutional environments for the two entities.

In this paper, I take two steps to address these endogeneity concerns: In the first step, I start by segregating the customer industry into two parts: the major *customer firm* (here on referred to as *customer firm*) and the *rest of the customer industry*. Here, the *rest of the customer industry* (here on referred to as customer peers) consists of only those firms that

[4] A higher leverage allows the supplier firm to extract a greater share of the *divisible pie* or *total profit*.

[5] An important question that arises here is: why do we look at the effect of entire customer industry. The effect a customer firm has on its supplier often depends on the condition and characteristics of other firms in the customer industry. For example, Hertzel, Lia, Officer and Rodgers (2008) showed that the spillover effects of customer bankruptcy on a supplier firm are larger when the distress is spread across the entire customer industry. In addition, the customer industry also influences the relationship between a supplier firm and customer firm. For example, the competitive environment of the customer industry influences the bargaining power of a supplier firm with respect to its customer (Porter 2008). Therefore, we can see that it isn't just the customer firms rather it is also the customer industry that influences a supplier firm.

have no operational link to the supplier firm. Now, for studying the impact of customer industry leverage, I focus on the leverage of these customer peers (referred to as customer peers leverage). In the second step, I follow an instrumental variable approach similar to Leary and Roberts (2014) and instrument the customer peers leverage using the idiosyncratic returns of these customer peers. Here, the idiosyncratic returns are used as possible cause of exogenous variations in the customer peers leverage[6].

The idiosyncratic returns for the firms are generated using an augmented market model. Following a process similar to Leary et al. (2014), I use two factors, market return and industry return for calculating the expected stock returns[7], and use these expected stock returns to obtain the idiosyncratic returns for the customer peers. Customer peers leverage is then instrumented using the average idiosyncratic return of all firms in the customer peer group. As shown by Leary et al. (2014), this instrument satisfies both the relevance condition and exclusion restriction for being a valid instrumental variable[8] [9].

In the analysis, I define customer industry as the industry that contains at least one major customer of a firm, where a major customer is a firm that consumes more that 10% of sales of the supplier firm. The final dataset comprises of all the customer-supplier relationships for which the data is available between the years 1976 and 2009.

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6 In Leary et al. (2014), authors instrument the leverage of the industry peers using the idiosyncratic returns of the peer firms. The instrument fulfills the relevance condition and exclusion restriction for instrumental variable analysis because: firstly, they are firm specific; and secondly, they are a possible source of exogenous variation in peer firms' leverage.

7 I have also performed the analysis using an augmented 3-factor model (excess market return, SMB, HML, excess industry return) and the results of the analysis remain consistent.

8 This instrument satisfies the relevance condition since stock returns have an influence on the financing decision of a firm (Myers 1977) (Marsh 1982). Also, it satisfies the exclusion restriction because, firstly, it does not include the return for the customer firm, and secondly, they are firm specific since the augmented market model takes into account the industry factor.

9 The basic assumption here is that the customer peers represent the customer industry, which seems reasonable since customer peers consists of all firms except customer firm. Another way to view this would be that customer peers leverage (instrumented using the customer peers idiosyncratic return) further acts as instrument for the customer industry leverage.

Following the procedure similar to Leary et al. (2014), I use an instrumental variable approach, where the dependent variable is supplier firm leverage, the endogenous variable is the customer peers leverage and the instrumental variable is the average idiosyncratic return of customer peers. The baseline results of the analysis show that the customer peers leverage has a significant positive impact on the supplier firm leverage. Since, customer peers leverage represents customer industry leverage, the obtained results indicate that the leverage in the customer industry has a positive impact on the leverage of the supplier firm. I find that these results are robust to different specifications for supplier firm leverage (long-term leverage, total leverage, book leverage, market leverage) and different specifications for the customer peers group[10]. In all of the analyses, I control for several firm-level and industry-level characteristics. Also, I conduct additional tests to ensure that the observed effect is not attributable to either the customer firm or the supplier firm's own industry.

I supplement the above analysis by taking a closer look at the Durable goods industries and the Non – durable goods and Non- manufacturing industries (NDNM)[11]. For this part of the analysis, I segregate the sample of observations between these two categories of industries. I find that the coefficients are more significant and larger in magnitude for the first sample (consisting of durable goods industry) as compared to the coefficients for the second sample (consisting of NDNM industries). Consistent with the expectation, these results show that the customer peers leverage (or customer industry leverage) is a more significant and stronger determinant of leverage for the supplier firms belonging to the durable goods industries.

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10 The peers group for a customer firm are constituted in a number of ways (explained further in later sections) to overcome the possibility that the observed results may be driven by the method of peer selection.

11 In durable goods industries, the products traded are generally non-standardized and the firms often make higher relationship specific investments (Banerjee, Dasgupta and Kim 2008). As a consequence customer-supplier relationships in these industries carry a higher level of significance. Therefore, I expect any observed relationships in the leverage to be more significant in case of durable goods industries.

In the final part of the analysis, I compare the customer industry and the supplier firm's own industry (using supplier firms peers) as a determinant of capital structure for the supplier firm. The results show that when the supplier firm belongs to the durable goods industry, the customer industry has a more significant and stronger influence on the capital structure of the supplier firm. The impact of the supplier firm's own industry is insignificant. In contrast, for the NDNM industries, it is the supplier firm's own industry, and not the customer industry, that seems to have mild influence on financial policy of the supplier firm[12].

Overall, the results presented in this paper suggest that customer industry is an important determinant of leverage of a supplier firm. A one standard deviation increase in the average leverage within a customer industry leads to a 6.5% increase in the leverage of supplying firm. This observed influence of the customer industry is stronger in the industries where the customer–supplier relationships carry higher significance, and is not driven by the customer firm or the supplier firm's own industry. The observed positive relationship between the customer industry leverage and supplier firm leverage seems consistent with the predictions of the bargaining theory of capital structure. This suggests that the supplier firms increase their leverage in tandem with the firms in their customer industries in order to maintain the bargaining status quo. Although the results presented here quite conclusively demonstrate a positive relationship, there is a further need to test whether they are indeed driven by the bargaining theory effect.

This paper broadly relates to the literature that looks into the factors determining the capital structure of a firm. A large part of previous literature looks into bankruptcy costs, transaction costs, taxes, adverse selection and agency conflicts as the major explanations for use of debt financing (Frank and Goyal 2007). However, the roles of a firm's industry and other related industries have received less attention. There have been some recent empirical

[12] These results are not in conflict with Leary et al. (2014) because the sample used in the analysis is characteristically different. The most important difference is that the sample used here consists of only those firms that have a significant customer; while Leary et al. (2014) used all firms from the Compustat database.

works that explore industry leverage as an important determinant and find that industry does indeed have strong influence on financial policy of a firm (MacKay and Phillips 2005) (Frank and Goyal 2009) (Leary and Roberts 2014). This paper also relates to the subset of literature that studies the interactions between a firm and its non-financial stakeholders like customer, supplier and employees. Looking at the financial policy of a firm, several papers have found that firms often use leverage to improve their bargaining positions with respect to their suppliers and employees (Bronars and Deere 1991) (Dasgupta and Sengupta 1993) (Hanka 1998) (Sharpe 1994). There are also some recent works that have also looked at the influence of customer firms on the financial policy of a supplier firm; however, the results among these have been mixed (Demirci 2013) (Chu and Wang 2014)[13]. The influence of customer industry as a determinant of capital structure has largely been ignored in the literature. This is the first paper that partly fills this gap by empirically examining this relationship.

The rest of the paper is organized as follows. Section 2 gives the motivation and empirical background where I present many of the previous studies looking into the bargaining theory of capital structure and the stakeholder theory. Section 3 provides information about data sources and methodology including the development of the instrument. Section 4 presents the main results and analysis, and discusses the results in light of the previous literature. Section 5 presents the conclusion.

2. Motivation and Empirical Background

The basic motivation for this empirical analysis comes from the opposing predictions of two theoretical frameworks: Stakeholder theory and Bargaining theory of capital structure. In this section, I discuss the predictions of these theories along with the previous research that support their assertions.

[13] Demirci (2013) investigates the impact of customer risk on the supplier leverage, and finds that customer risk (measured by credit rating, industry adjusted leverage and stock return volatility) has a negative impact on the supplier leverage. The negative relationship is attributed to the low payment capacity and low future viability of the customer firm. Chu and Wang (2015), on the other hand find a positive relationship between a supplier firm leverage and the customer firm leverage.

The stakeholder theory defines the non-financial stakeholders of a firm as entities that are directly or indirectly interested in the long-term viability of the firm (Parsons and Titman 2008). Several papers in the past have studied the capital structure policy of firms involved in major customer–supplier relationships. The general insight among these papers is that such firms often maintain *lower* leverage (Titman 1984) (Titman and Wessels 1988) (Banerjee, Dasgupta and Kim 2008). This observed phenomenon has been attributed to several reasons often pertaining to likelihood of financial distress and long-term viability of the firm. For instance, studying such relationships, Bannerjee, Dasgupta and Kim (2007) found that suppliers, especially in durable goods industries[14], usually maintain a low leverage to protect themselves against any spillover effects from their customer's distress. Although financial distress can have negative effects on any firm[15], it is particularly costly for the firms in major customer-supplier relationships. Firms involved in such relationships suffer worse in industry downturns (Opler and Titman 1994) and their financial distress can often spillover to the associated firms (Hertzel, Li, Officer and Rodgers 2008)[16].

Therefore, considering the negative effects of financial distress among firms in major customer-supplier relationship, firms involved in such relationships should look to keep a low leverage. Hence, the stakeholder theory predicts a negative relationship between the customer industry leverage and supplier firm leverage. This is however, in contrast, to the predictions made by the bargaining theory of capital structure that predicts a positive relationship.

The bargaining theory of capital structure argues that firms use leverage to improve their bargaining position with respect to their customers, suppliers and some other stakeholders like employees, labor unions etc. (Bronars and Deere 1991) (Chu 2012) (Matsa

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[14] Firms in durable goods industries often trade in non-standardized products and often make larger relationship specific investments.

[15] Several papers have looked at the costs associated with financial distress (Andrade and Kaplan 1998) (Opler and Titman 1994) (Titman 1984) (Maksimovic and Titman 1991)

[16] Hertzel et al. (2008) found that when a major customer firm files for bankruptcy, the supplier firm observes a significant negative stock return. Their findings also show that this spillover effect is one-sided i.e. it happens only from customer to supplier.

2010) (Dasgupta and Sengupta 1993). Bronars and Deere (1991) find that the firms use leverage to protect the interests of the shareholders from the threat of unionization. Dasgupta and Sengupta (1993) show how the debt can be optimally used in the bilateral bargaining with the workers and suppliers of a firm. Chu (2012) develops a theoretical model to show that the firm leverage decreases with the degree of competition between the suppliers, and also finds empirical evidence supporting the model. Therefore, considering that a higher level of debt improves the bargaining position of a firm, the bargaining theory predicts a positive relationship between the customer industry leverage and supplier firm leverage.

Considering these opposing effects predicted by the stakeholder theory and the bargaining theory, an important empirical question emerges about which of the two effects is more dominant. Therefore, in this paper, I explore the capital structure policy of the supplier firms with regards to the capital structure of the firms in their customer industry. To the best of my knowledge this is the first paper that explicitly explores the customer industry as a potential determinant for the financial policy of a supplier firm.

3. Data and Methodology

3.1 Sample construction

In order to study the influence of customer industry on supplier firm leverage, it is important that the relationship between the supplier firm and the customer industry is *significant*. Thus, I define the customer industry as the industry that contains at least one major customer of the supplier firm. The definition of a major customer (here on referred to as *customer firm*) is chosen as per the guidelines given by Financial Accounting Standards Board[17]. As per the requirements set under Statement of Financial Accounting Standards no. 131, public business enterprises following US Generally Accepted Accounting Principles (GAAP) need to provide some selected information about their operating activities in their interim and annual financial reports issued to the shareholders (FASB 1997). As a part of this disclosure, the firm is required to release information about the industry segment that

[17] This method of identification of the major customer–supplier relationship is consistent with the previous literature (Demirci 2013) (Cohen and Frazzini 2008) (Chu and Wang 2014).

comprises of more than 10% of its sales and also about the customers that purchase more than the 10% of the total sales of the firm. The information regarding the identity of the major customer of a firm is available on the Compustat database[18].

In this paper, a number of firm-level characteristics, along with stock market information, have been used for generating the requisite variables. I use data for all the firms available on the Compustat database for the period 1976 to 2009 with non-missing values for book debt, sales, assets, year-end share prices, EBITDA and PPE[19]. I use the Compustat database for the annual firm-level characteristics and the CRSP database for the monthly data on stock prices. Additionally, I obtain the data for the return on market portfolio and risk free rates from the website of Prof. Kenneth French.

3.2 Summary Statistics

The Compustat sample for the years 1976 to 2009 includes 367,639 firm-year observations. I start by removing the observations with missing values for debt, assets, EBITDA, PPE (net) and sales. Appendix – 2 provides the definitions of the variables used. Panel A of Table 1 shows the summary of firm-level characteristics of all the firms in the sample. This represents the entire cross section of firms on Compustat (after the observations with missing values are removed). Panel B shows the summary for firm-level characteristics of the firms that have been reported as a major customer by at least one of the firms. A comparison between panel A and panel B shows a notable difference between the sales variable for the firms in the two samples. The sales of an average customer firm are about 21 times the sales of an average firm in the total sample. This difference is attributable to the

[18] Compustat provides the names of the customer firm, so the name of the customer firm has to be them matched with the correct firm identifier. I would thank Prof. Lauren Cohen for providing the data on the customer-supplier links. The dataset obtained has already matched the firms with their identifiers and is similar to the dataset used by Cohen and Frazzini (2009) with extension up to the year 2009.

[19] EBITDA is the Earnings before interest, Taxes, Depreciation and Amortization while PPE is Property plant and Equipment (Net)

large size of customer firms and is consistent with other papers that use similar dataset (Cohen and Frazzini 2008).

Panel C presents the summary statistics for the supplier firms. The characteristics of firms in this group mimic more closely to the characteristics of total sample presented in panel A. The supplier firms in the sample represent almost the entire cross section of firms on Compustat database. Panel D presents the characteristics for the customer peers groups. The characteristics of the firms in a customer peers group are first averaged to obtain the customer peers group variables. The summary statistics are calculated over these averages.

In the sample, there are 2,322 different suppliers and 1,058 different customers that appear over the period from 1976 to 2009. Out of the total suppliers 1,395 suppliers disclose only one customer industry for all of the years in which they have reported, while there are 927 suppliers which have reported two or more major customers.

3.3 Methodology

3.3.1 Endogeneity Issues

Capital structure is an important policy decision in a firm that is often closely related to its investment policy, its corporate strategy and its performance in the product market. These relationships are often quite intricate, which makes it difficult to examine them empirically. Therefore, similar to most capital structure related papers, the major challenges for the analysis in this paper are the endogeneity concerns that arise due to these interconnected firm policies. While looking at the supplier firm leverage and customer industry leverage, the major source of endogeneity is the operational link that exists between these two entities. Due to this operational link, there can be several factors, observable and unobservable, that impact the supplier firm and the customer industry simultaneously. Although, in the analysis, I control for several determinants of capital structure, still there is a possibility of some omitted factors that influence both the supplier firm leverage and customer industry leverage. Some of these omitted factors may be attributed to the

operational link between the customer firm and the supplier firm[20], while others may be attributed to the presence of similar institutional environments for the supplier firm and the customer industry. In essence, the endogeneity concerns arise because the measures for customer industry leverage act as proxy for such omitted factors thereby producing biased results.

In this paper, I undertake two steps to address these endogeneity concerns: In the first step, I start by segregating the customer industry into two parts: the major *customer firm* and the *rest of the customer industry*. The *customer firm* is the part of customer industry that has direct operational link to the supplier firm. On the other hand, the *rest of the customer industry* (here on referred to as customer peers) consists of only those firms that have no direct operational link to the supplier firm. Now, for studying the impact of customer industry leverage, I focus on the leverage of these customer peers (referred to as customer peers leverage). Next, in the second step, I follow an instrumental variable approach similar to Leary et al. (2014) and instrument the customer peers leverage using the idiosyncratic returns of these customer peers. Here, the idiosyncratic returns are used as a possible cause of exogenous variations in the customer peers leverage. The process of instrument calculation and how it resolves the endogeneity concerns have been discussed further in section 3.3.3.

3.3.2 Selecting the Peer firms

In this paper, the leverage of the customer industry has been proxied using the leverage of the customer peers. In generating these peer groups for a customer-supplier relationship, it is essential that there is no operational link between the firms included in the peer group and the supplier firm. Also, it is important that it is not the peer selection process that drives the results of the analysis. Therefore, I construct the customer peers group in four ways with varied level of strictness to ensure no operational link.

[20] For example, if the customer firm obtains a new sales contract, it would also mean greater sales for the supplier firm. In this case, both customer firm and supplier firm may change their leverage. However, the change in supplier firm leverage here may not necessarily be driven by the customer firm leverage, but rather the driving force can be the expected increase in sales.

For the baseline analysis, the customer peers group is constituted in the following manner. Based on each customer-supplier relationship, a firm is included in the customer peers group if: firstly, it belongs to the same 3-digit SIC code industry as the customer. Secondly, it is not included as a major customer of the supplier in given customer-supplier relationship (For clarification look at Appendix – 1 figure 1.1, which provides a possible scenario for the customer-supplier relationships in two industries). Based on these two conditions, the final sample for the baseline case (Peer G1) consists of 17,669 observations.

The sample from the Peer G1 includes some observations where the customer firm and supplier firm belong to the same industry. Therefore, in the second type of peer group (Peer G2), I reduce the sample to only those customer-supplier relationships where the customer firm and supplier firm belong to different industries. This ensures that it is not the supplier firm's own industry that drives the results. After removing such customer-supplier relationships, the sample size reduces to 14,796 observations.

While constituting the third type of peer group, I take into account the relative size of the customer firms in their industries. As discussed in the summary statistics, the customer firms in the sample are usually big firms in the industry and are among the top 10 percentile of firms by size on the Compustat database. Thus, for the third peer group (Peer G3), I consider an additional criterion: The firms in the peer group should be among the top 10 percentile of the firms in the industry by asset size, while ensuring that there are at least 5 firms in the peer group. If the number of firms in the industry is less than 5, then all the firms are taken in the peer group.

Lastly, for constituting the fourth type of peer group (Peer G4), I impose the strictest conditions to ensure the only association between the firms in the customer peers group to the supplier firm is that they belong to its customer industry. Here, the customer peer group consists of only those firms that have no link to the supplier firm or to any other firm in the supplier firm's industry (See Appendix – 1 figure 1.3).

The aforementioned four procedures are used for generating four different types of customer peers group. Also, in some of the analyses, I use controls for the peers of the supplier firms themselves. For these analyses, the peer group for a supplier firm consists of all the firms that belong to the same industry as the supplier firm (industry again being identified by the 3-digit SIC code). The peer group for the supplier firm is hereon referred to as the supplier peers group.

3.3.3 Construction of the Instrument

As mentioned earlier, in order to overcome the endogeneity concerns, I first segregate the customer industry into customer firm and customer peers, and then instrument the customer peers leverage using the idiosyncratic return of customer peers. In this section, I discuss the construction and validity of the required instrument.

For constructing the instrument, I first calculate the Expected Annual Returns on all the firms. I use the data of monthly stock returns over past 60 months to obtain the monthly betas. Using these betas, I estimate the expected stock returns for the firm over the next 12 months. I closely follow the approach given by Leary et al. (2014).

I use the following augmented market model for obtaining the expected returns:

$$r_{ijt} = \alpha_{ijt} + \beta^{m}_{ijt}\,(rm_t - rf_t) + \beta^{IND}_{ijt}\left(\bar{r}_{-ijt} - rf_t\right) + \varepsilon_{ijt}$$

where r_{ijt} is the return on the stock of firm *i* in industry *j* in the time period *t*, rm_t is the market return in time period *t*, rf_t is the risk free return, $\bar{r}_{-ijt}$ is the return on the peer group of the firm *i*. The last factor in the above model $\left(\bar{r}_{-ijt} - rf_t\right)$ is used to remove variations in the stock returns that are common across the firms in the same industry. The above regression yields Betas that are used for estimating the expected returns for the firm.

$$\hat{r}_{ijt} = \hat{\alpha}_{ijt} + \hat{\beta}^{m}_{ijt}\,(rm_t - rf_t) + \hat{\beta}^{IND}_{ijt}\left(\bar{r}_{-ijt} - rf_t\right)$$

where $\hat{r}_{ijt}$ is the expected return for the stock of firm *i* in industry *j* in time period *t*, while $\hat{\alpha}_{ijt}$, $\hat{\beta}_{ijt}^{m}$ and $\hat{\beta}_{ijt}^{IND}$ are the estimated values obtained from the first regression. I winsorize the returns at 1% level in order to remove the impact of any extreme values.

I use the actual monthly stock returns for the firms and subtract from it the expected monthly stock returns. Thus, I obtain the monthly idiosyncratic return for the firm.

$$\hat{\eta}_{ijt} = r_{ijt} - \hat{r}_{ijt}$$

where $\hat{\eta}_{ijt}$ is the idiosyncratic return for the stock of firm *i* in industry *j* for time period *t*. These monthly idiosyncratic returns are then compounded over the 12 months of the year to obtain the Annual idiosyncratic return. Table 2 summarizes the results of the above analysis. Each of the regressions has 60 observations for each of the months in the 5-year window. The average R-square is 18.1% while the adjusted R-square is 15.2%. Once the annual idiosyncratic return is obtained, I use these idiosyncratic returns to calculate the customer peers idiosyncratic returns and supplier peers idiosyncratic returns. Customer peers idiosyncratic return is the equally weighted mean of the idiosyncratic returns of the firms that constitute the customer peers group. And supplier peers idiosyncratic return is the equally weighted mean of the idiosyncratic returns of the firms that constitute the supplier peers group.

As mentioned before, I use customer peers idiosyncratic return as the instrument for customer peers leverage. In order for this to be a valid instrument, it needs to satisfy the two conditions: relevance condition and exclusion restriction. Since, one of the determinants of the capital structure of the firm is the stock return (Marsh 1982), the relevance condition is easily satisfied. Also, the customer peers idiosyncratic return calculated by the above process satisfies the exclusion restriction requirement for the instrumental variable analysis. The stock return of a firm can be broken down into two components: the systematic component and the idiosyncratic component. The systematic part of the return in the above calculation takes into consideration the market return and the industry return. So, this part of the return relates to the economic and industrial environment within which the firm operates. On the

other hand, the idiosyncratic component of the stock returns takes into consideration the firm-specific factors. Since, the customer peers group constituted in the earlier section excludes the *customer firm*, the customer peers idiosyncratic return should not have any direct impact on the leverage of the supplier firm. Therefore, customer peers idiosyncratic return satisfies both conditions for being a valid instrument.

In the analysis, I use the customer peers idiosyncratic return lagged by one year. This helps in ensuring that there is no mechanical relationship between the peer firm returns and various leverage ratios. Thus, I obtain the lagged customer peers idiosyncratic return, which I shall use as the instrument for customer peers leverage.

3.3.4 Analysis

In this paper, I focus primarily on the long-term leverage of the firms; this ensures that any impact observed is not caused by changes in the short-term and current liabilities. I look at the effect of long-term leverage[21] of customer peers group on the supplier long-term leverage. During the analysis, four categories of control variables have been used: Characteristics of the supplier firm, characteristics of the supplier peers group, characteristics of the customer firm and characteristics of the customer peers group. Among the characteristics are the traditionally used determinants of capital structure, namely sales, market-to-book, profitability and tangibility (Rajan and Zingales 1995) (Lemmon, Roberts and Zender 2008) (Frank and Goyal 2007). In addition to the aforementioned control variables, I also include the corresponding idiosyncratic returns of the supplier firms to ensure that any effect observed is not due to the stock returns of supplier firms themselves. The customer peers group characteristics are calculated as the average characteristics of the firms in the customer peers group. Similarly, the supplier peers group characteristics are the average characteristics of the firms in the supplier peers group.

In the main analysis, I use the instrumental variable approach to gauge the impact of customer peers LT leverage on supplier LT leverage. Here, the customer peers idiosyncratic

[21] For the remainder of the paper, I represent long-term leverage as LT leverage for simplification

return has been used as the instrument for the customer peers leverage. A number of tests have been performed using levels and first differences of supplier market leverage and supplier book leverage as the dependent variables. I conduct the analysis over four types of peer groups as described in this previous section.

Furthermore, I conduct separate tests over the durable goods industries and non-durable non-manufacturing industries. Firms in the durable goods industry make larger relationship specific investments, and often sell products that are non – standardized (Banerjee, Dasgupta and Kim 2008). Therefore, customer-supplier relationships are generally more significant in durable goods industries. Based on this, I expect that any relationship between the customer industry leverage and the supplier firm leverage should be more pronounced in the case of durable goods industries. For this part of the analysis, I split the sample into two subsamples. The first subsample consists of all the observations in which the supplier firm belongs to a durable goods industry. The durable goods industry is defined as industries with 4-digit SIC code lying between 3400 and 3999. The second subsample consists of all the observations that are not included in the first subsample, thus comprises of non – durable goods industries and non – manufacturing industries.

In addition to the above analysis, I perform a number of robustness checks using different controls and alternative approaches.

4. Results

4.1 Results – OLS Regression

I begin the analysis with a simple OLS regression, results of which are presented in Table 3. I look at both book leverage as well as market leverage of the supplier firms. In columns (1) and (2), the dependent variables are supplier LT market leverage and supplier LT book leverage respectively, while the independent variable is the LT market leverage of customer peers group. All the control variables have been lagged by one year. As can be seen, there is a significant positive coefficient obtained for market leverage. I perform a similar check also for supplier total leverage using total market leverage of customer peers

group as independent variable. The results are presented in columns (3) and (4). Here, we can see a mildly significant positive relationship in case of total market leverage. The coefficients of all the supplier firm-level controls are consistent in sign and magnitude with the previous literature (Leary and Roberts 2014). The results of the regression here provide a preliminary check, however they suffer from endogeneity issues as described in the earlier sections. In order to resolve these concerns, I next perform the instrumental variable analysis.

4.2 Main Results

4.2.1 Results – 2SLS

In the main analysis, I begin with a reduced form version of 2SLS analysis, the results of which are presented in Table 4. The analysis is done with supplier LT market leverage and supplier LT book leverage as the dependent variable in both levels and first differences. In columns (1) and (2), all of the variables are in levels, while in columns (3) and (4), all of the variables are in the first differences except for the instrument. The instrumental variable is the customer peers idiosyncratic return and is same across all four columns. All the control variables in the analysis, which include the supplier firm-specific characteristics and customer peers group characteristics, have been lagged by one year. In this current setting for the reduced form, the bargaining theory predicts a negative relationship between the supplier leverage and customer peers idiosyncratic return, while the stakeholder theory predicts a positive relationship[22].

The results of the reduced form show that the coefficient for the customer peers idiosyncratic return is significant and negative. These results are consistent with the bargaining theory of capital structure. Among the control variables, all supplier firm

[22] Based on previous literature, idiosyncratic return has a negative impact on a firm's leverage (Marsh 1982). Therefore, customer peers idiosyncratic return should have negative impact on the customer peers leverage. As discussed in earlier sections, if the effect ascribed to bargaining theory is dominant, then customer peers leverage would have a positive impact on the supplier leverage. On the other hand, if the effect ascribed to stakeholder theory is dominant, the supplier firm would want to protect itself against the risk of customer industry, and consequently customer peers leverage would have a negative impact on the supplier leverage.

characteristics have significant coefficients with sign that is consistent with the previous studies (Leary and Roberts 2014). In the unreported results, I find that these results remain robust to inclusion of additional control variables pertaining to the customer firm and the supplier peers group.

Table 5 presents the baseline results of the main 2SLS analysis. In the basic structure of this analysis, the Supplier LT leverage is the dependent variable, customer peers LT market leverage is the endogenous variable and customer peers idiosyncratic return is the instrumental variable. The results of the first stage of the analysis show that the customer peers idiosyncratic return is strongly negatively related to the customer peers market leverage. The negative relationship is consistent with the previous studies (Marsh 1982) (Myers 1977). Also, the magnitude of the impact of the instrument over the customer peers leverage is economically significant. I test for the endogeneity and find that customer peers leverage is endogenous. The adjusted R-square and F-statistic values for the first stage of the analysis are 0.77 and 86 respectively.

In Table 5, columns (1) and (2) reveal a positive relationship between the customer peers LT market leverage and both the supplier firm LT market leverage as well as supplier firm LT book leverage. These results seem consistent with the predictions of the bargaining theory of capital structure. In columns (3) and (4), the results again point to a positive relationship between the changes in supplier firm LT leverages and changes in the customer peers LT market leverage. Comparing the coefficients across the determinants, one can see that the customer peers LT leverage is among the large determinants of supplier firm LT leverage. Also, the coefficients for the firm–specific factors obtained in the IV analysis are similar in magnitude to their coefficients in the OLS regression. Table 6 presents the results for the IV analysis over the total leverage variables for the supplier firm.

Although the above analysis showed a strong positive relationship between supplier firm leverage and customer peers leverage, there are two factors that need additional examination: customer firm and supplier firm's own industry (supplier peers). Leary et al. (2014) showed that firms operating in same industry affect each other's financial policy. An

argument can be made that financial policies of customer peers and the customer firms are interlinked, and therefore the customer firm drives the observed relationship. On the other hand, it is also possible that the supplier peers may have an impact on the supplier firm. The argument here is that some supplier peers may also be linked to firms in the customer peers group, and consequently, it is the supplier peers who are driving the observed relationship. Therefore, I conduct additional tests to ensure that the observed effect is not attributable to either the customer firm or the supplier firm's own industry.

In Table 7, columns (1) and (2) present the results of the IV regression while controlling for the customer firm characteristics. Apart from the traditional capital structure determinants, the controls for customer firm characteristics include the customer firm LT market leverage. If the customer firm is the factor that is driving the observed relationship then the observed coefficients in this analysis should be insignificant. However, the results show that the relationship between the supplier leverage and customer peers leverage continues to be significant. Similarly, in columns (3) and (4), I further add controls for supplier peers characteristics, which include supplier peers market leverage. If the supplier peers are the driving force behind the observed relationship, then the coefficients in this analysis should be insignificant. As can be seen from column (3) and (4), the results continue to persist. In the unreported results, I also conduct the first – difference analysis and find that the results remain consistent with the results given in Table 5.

4.2.2 Durable Goods Industry vs. NDNM industries

Bilateral customer – supplier relationships carry greater significance in the durable goods industries (Banerjee, Dasgupta and Kim 2008). Thus, I split the sample into two subsamples. The first sample consists of the supplier firms that belong to the Durable goods industries, while the second sample consists of those supplier firms that belong to the Non – durable and Non – manufacturing industries.

Table 8 compares the supplier firm leverage – customer peers leverage relationship between the firms belonging to the two types of industries. Columns (1) and (2) present the

results for the durable goods industries, while columns (3) and column (4) present the results for NDNM industries. The results show that for the durable goods industries, customer peers LT leverage has a strong positive relationship with the supplier LT market leverage. However, for the NDNM industries, the impact of the customer peers LT leverage on the supplier firm LT leverage is insignificant and small. Also, comparing the impact of customer peers characteristics between the durable goods industries and NDNM industries, we can see that, while Market to book ratio and Sales are significant factors for the durable goods industries, none of the customer peers characteristics are significant for the NDNM industries. Table 9 presents the analysis after controlling for the customer characteristics and supplier peer group characteristics. The results are consistent with the expectation based on the previous literature.

Since the results in table 8 and table 9 are significant only for the durable goods industry, I conduct further tests to compare this observed relationship with the peer relationship described in Leary et al. (2014)[23]. In Table 10, I look at the influence of supplier peers leverage and customer peers leverage on the supplier leverage in durable goods industries. Columns (1) and (2) look at the impact of the supplier peers LT market leverage on the supplier LT leverage. Here the supplier peers leverage has been instrumented using the supplier peers idiosyncratic return. Columns (3) and (4) look into the relationship between the Supplier LT leverage and customer peers LT market leverage. Comparing the results between columns (1) & (2) and columns (3) & (4), we can see that for the durable goods industries, the supplier peers leverage does not have an impact on the supplier firm leverage; however, the customer peers leverage has a significant impact on the supplier firm leverage. I conduct a similar test for NDNM industries. The results showed that in case of NDNM industries, the supplier peers group seems to have an impact on the supplier firm

[23] Leary et al. (2014) look at how the financial policy of peers of a firm (which belong to the same industry as the firm) affects the firm's financial policy. As mentioned earlier, Leary et al. used the idiosyncratic return of the peer firms as an instrument for their financial policy.

leverage, while there the customer peers leverage does not seem to have any impact over the supplier firm leverage[24].

4.3 Robustness Checks

Among the robustness tests, I begin by checking for reverse causality i.e. whether Supplier firm leverage has an impact on the customer peers LT leverage. For this analysis, the supplier firm LT market leverage has been instrumented using the supplier firm's idiosyncratic return. Table 11 shows that the supplier firm's long-term market leverage does not have any significant impact on the customer peers LT leverage. All the control factors and the instrument in the analysis have been lagged by one year. These results show that there is no reverse-causality when it comes to relationship between the supplier firm LT leverage and customer peers LT leverage.

In the earlier section, I had described four types of peer groups. In the next test, I conduct the analysis using these different types of peer groups (Peer G2, Peer G3 and Peer G4). Table 12 presents the results for the various peer groups. As can be seen, the results remain consistent across the different peer groups. This reinforces the validity of the conclusion drawn in the previous section.

In order to further address any concerns regarding the possibility that the relationship observed between the customer peers leverage and supplier firm leverage may be driven by the customer firm, I conduct an additional test using the residuals of customer peers leverage. Here, the customer peers leverage is first regressed over the customer firm leverage, and then the residuals obtained are used as the endogenous variables in the IV analysis. Therefore, here the customer peers idiosyncratic return is used as an instrument for the residuals (obtained by the regressing customer peers leverage over customer firm leverage) to see if the relationship between the customer peers leverage and supplier firm leverage continues to be significant.

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[24] The results obtained are mildly significant at 10% level and have been omitted for brevity

Table 13 presents the results for the above analysis. In columns (1) and (2), the sample consists of firms in all customer-supplier relationships. On the other hand, columns (3) and (4) represent only the firms in durable goods industries, and columns (5) and (6) represent only the firms in NDNM industries. Consistent with the earlier results, the residuals have a strong positive relationship with the supplier firm leverage for columns (1), (2), (3) and (4), which represent all firms and firms in durable goods industries. Another important observation here is that the customer firm leverage is significant only in the case of durable goods industries, this is consistent with the findings in the previous literature that customer–supplier relationships are important in the durable goods industries (Banerjee, Dasgupta and Kim 2008).

4.4 Discussion

In this paper, I look at the impact of the customer industry leverage on the leverage of a supplier firm. In such a study it is important to take note of the endogeneity issues that arise due to the strong ties that exist between a supplier firm and its customer industry. Thus, in order to study the impact of the industry, first, I isolated the customer firm from the rest of its industry (or peers), and then used an instrumental variable approach similar to the one used by Leary and Roberts (2014).

In the main analysis, the results of the first stage show that the Customer peers idiosyncratic return is strongly negatively associated with the Customer peers LT Market leverage. This negative impact of the idiosyncratic return is consistent with the previous studies that relate the total stock returns to leverage of a firm (Marsh 1982). The results of the second stage show that the customer peers LT market leverage is positively associated with the supplier firm LT market leverage. On comparing the results with the OLS regression, we can see that the coefficient for the customer peer LT market leverage in the IV analysis is larger and more significant. I use a number of robustness checks to ensure that the customer firm or the supplier industry does not drive the observed effect. The results across all the specifications remain consistent and significant.

The results of the 2SLS analysis reveal that the customer industry is a major determinant of the leverage of a firm. The leverage in the customer industry has a positive relationship with the leverage of the supplier firm. This effect is consistent with the bargaining theory of capital structure. Therefore the results indicate support for the argument that, while developing the financial policy, a firm's management considers the effects that the firm's leverage would have on its bargaining power with respect to its customers and other firms in the customer industry. And the observed effect on the supplier firm leverage is economically significant, where a one standard deviation increase in the average leverage within a customer industry leads to a 6.5% increase in the leverage of supplier firm. Leary et al. (2014) showed that one standard deviation change in the leverage of the industry peers brings about a change of 10% in the firm's leverage. In comparison, the effect seen here due to the customer industry is small but still comparable.

Within durable goods industries, it is typical for firms to have high relationship specific investments, and the goods being traded to be specialized and non-standardized (Banerjee, Dasgupta and Kim 2008). Thus, the customer – supplier relationships are more important in durable goods industries. In the context of this paper, it is expected that any relationship between the supplier firm leverage and the customer peers leverage would be stronger and more significant for the durable goods industry. Results in Table 8 show the impact of the customer peers leverage on supplier firm leverage for the durable goods industries and NDNM industries. The comparison between the coefficient of customer peers leverage for the durable goods industries and the coefficient of customer peers leverage for NDNM industries shows the relative importance of the customer industry leverage for the leverage of supplier firms in durable goods industries. The results show that the financial policy of the customer industry plays a significant role in determining the financial policy of the supplier firm. Looking at the coefficients of the customer peers group variables, we can note that in case of durable goods industry, the market to book ratio and sales are also significant in determining the leverage of the supplier firm. However, in case of NDNM industries, none of the characteristics of the customer peers group are significant. This

reinforces the notion that the importance of customer industry is higher for the supplier firms in the durable goods industries as compared to supplier firms in NDNM industries.

Leary et al. (2014) find that the firms in an industry affect each other's financial policy. Thus, it is interesting to compare the influence of a firm's peers with the influence of the firm's customer industry. Before we interpret the obtained results, it is important to note that there are two important distinctions between the sample of observations in the current paper and the sample used in Leary et al. (2014). Firstly, the sample of observations used in the analysis here constitutes much fewer observations as compared to Leary et al. (2014). Secondly, there is one important characteristic distinction between the firm samples in the two papers. The observations in Leary et al. (2014) include firms from the entire cross section of Compustat database; while for the current paper, the sample used is limited to the firms that have reported a major customer. As shown in several previous papers, presence of large operational linkages with other firm affect the financial policy of the firm[25]. Thus, the relationships of these firms with their customer or supplier may affect their responses to the changes in the financial policies of other firms in their industry.

Considering that the customer–supplier relationships are particularly important in the durable goods industries, I look at the results for the durable goods industries (see table 10). One can see that the supplier peers group does not have any major impact on the supplier firm leverage, while the customer peers leverage has a strong positive impact over the supplier firm leverage. This suggests that for the financial policy of a firm in durable goods industry, the customer industry is more important than the peers of the firm. Reconciling the results of the current paper with the results of Leary et al. (2014), it seems that the results in the this paper are primarily driven by the durable goods industries, while those in Leary et al. (2014) are driven by the firms in Non-durable and Non-manufacturing industries and firms that do not have a major customer.

5. Conclusion and future scope

[25] The firms that have a large dependent supplier or customer tend to maintain low leverages within their industries (Titman 1984) (Titman and Wessels 1988) (Banerjee, Dasgupta and Kim 2008).

Based on the analysis, I conclude that Customer industry leverage has a positive impact on the leverage of the supplier firm. The impact is more prominent when the supplier firm belongs to the durable goods industry.

Although the positive impact is consistent with the bargaining theory of capital structure, there needs to be more tests to see if it is indeed the bargaining theory which is at play here. Also, it would be interesting to look into the characteristic differences between the durable goods industries and NDNM industries to see which are the characteristics that explain the differences between the behaviors of the firms in these industries.

6. Bibliography

Ahern, Kenneth R. "Bargaining power and industry dependence in mergers." Journal of Financial Economics 103 (2012): 530–550.

Andrade, Gregor, and Steven N. Kaplan. "How Costly is Financial(Not Economic) Distress? Evidence from Highly LeveragedTransactions that Became Distressed." The Journal of Finance 53, no. 5 (October 1998): 1443-1493.

Baker, Malcolm, and Jeffrey Wurgler. "The market timing theory of capital structure." Journal of Finance, no. 57 (2002): 1-30.

Banerjee, Shantanu, Sudipto Dasgupta, and Yungsan Kim. "Buyer–Supplier Relationships and the Stakeholder Theory of Capital Structure." Journal of Finance 63, no. 5 (2008): 2507–2552.

Bertrand, Joseph. "Theorie Mathematique de la Richesse Sociale." Journal des Savants 67 (1883): 499–508.

Bizjak, John M., Lemmon Michael L., and Lalitha Naveen. "Has the use of peer groups contributed to higher levels of executive compensation?" Journal of Financial Economics 90 (2008): 152–168.

Bolton, Patrick, and David Scharfstein. "A Theory of Predation Based on Agency Problems in Financial Contracting." American Economic Review 1, no. 80 (1990): 93-106.

Bronars, Stephen G., and Donald R. Deere. "The Threat of Unionization, the Use of Debt, and the Preservation of Shareholder Wealth." Quarterly Journal of Economics 106, no. 1 (1991): 231–254.

Chu, Yongqiang. "Optimal Capital structure, bargaining and the supplier market structure." Journal of Fiancial Economics 106, no. 1 (2012): 411-426.

Chu, Yongqiang, and Liying Wang. "Capital Structure along the Supply Chain: How Does Customer Leverage Affect Supplier Leverage Decisions?" Working paper, 2014.

Cohen, Lauren, and Andrea Frazzini. "Economic Links and Predictable Returns." Journal of Finance, 2008.

Cohen, M. A., and H. L. Lee. "Strategic Analysis of Integrated Production-Distribution Systems: Models and Methods." Operation Research 36: 216-228.

Cournot, Augustin. "Recherches sur les Principes Mathematiques de la Theorie des Richesses." 1838.

Dasgupta, Sudipto, and Kunal Sengupta. "Sunk investment, bargaining and choice of capital structure." International Economics REview, 1993: 203-220.

Demirci, Irem. "Does Customer Risk affect Suppliers' Capital Structure Decisions?" working paper, 12 2013.

Devenow, Andrea, and Ivo Welch. "Rational herding in financial economics." European Economic Review, no. 40 (2004): 603-615.

Eckbo, B. Espen. Handbook of Corporate Finance. 2008.

FASB, Financial Accounting Standards Board. "Statement of Financial Accounting Standards No. 131." fasb.org. Financial Accounting Standards Board. June 1997.

http://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1218220124541&acceptedDisclaimer=true.

Frank, Murray Z., and Vidhan K. Goyal. "Capital structure decisions: Which factors are reliably important?" Financial Management 38 (2009): 1-37.

Frank, Murray Z., and Vidhan K. Goyal. "Trade-off and pecking order theories of debt." By Espen Eckbo, edited by Eckbo and B. Espen. 2007.

French, Kenneth R. Kenneth R. French - Data Library. http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html (accessed june 2017).

Gregor Andrade, Gregor, and Steven N. Kaplan. "How Costly is Financial (Not Economic) Distress? Evidence from Highly Leveraged Transactions that Became Distressed." Journal of Finance 53, no. 5 (10 1998): 1443–1493.

Hanka, Gordon. "Debt and the Terms of Employment." Journal of Financial Economics, no. 4 (1998).

Hennessy, Christopher A., and Dmitry Livdan. "Debt, bargaining, and credibility in firm–supplier relationships." Journal of Financial Economics 93 (2009): 382–399.

Hertzel, Michael G., Zhi Lia, Micah S. Officer, and Kimberly J. Rodgers. "Inter-firm linkages and the wealth effects of financial distress along the supply chain." Journal of Financial Economics 87, no. 2 (2 2008): 374–387.

Kale, Jayant R., and Husayn Shahrur. "Corporate capital structure and the characteristics of suppliers and customers ." Journal of Financial Economics 83 (2007): 321-365.

Kolay, Madhuparna, Michael L. Lemmon, and Elizabeth Tashjian. "Spillover E□ects in the Supply Chain: Evidence from Chapter 11 Filings." september 2011.

Leary, Mark T., and Michael R. Roberts. "Do Peer firms affect Corporate Financial Policy." Journal of Finance, 2014.

Lemmon, Michael, Michael R. Roberts, and Jaime Zender. "Back to the Beginning: Persistence and the Cross-Section of Corporate capital Structures." Journal of Finance 63 (2008): 1575-1608.

MacKay, Peter, and Gordon, M. Phillips. "How Does Industry Affect Firm Financial Structure?" The Review of Financail Studies 18, no. 4 (2005).

Maksimovic, Vojislav, and Sheridan Titman. "Financial Policy and Reputation for Product Quality." Review of Financial Studies 4, no. 1 (1991): 175-200.

Marsh, Paul. "The Choice between Equity and Debt: An Empirical Study." Journal of Finance, 1982.

Matsa, David. "Capital structure as a strategic variable: Evidence from collective bargaining." Journal of Finance 65, no. 3 (2010): 1197–1232.

Myers, Stewart C. "Determinants of corporate borrowings." Journal of Financial Economics 5, no. 2 (1977): 147–175.

Opler, Tim C., and Sheridan Titman. "Financial Distress and Corporate Performance." Journal of Finance 49, no. 3 (1994): 1015-1040.

Parsons, Chris, and Sheridan Titman. Capital Structure and Corporate Strategy. Vol. 2, in Handbook of Empirical Corporate Finance, by Espen B. Eckbo, 204-234. 2008.

Porter, Michael E. "The Five Competitive Forces That Shape Strategy." In Harvard Business Review, by Michael E. Porter, 25-41. 2008.

Rajan, Raghuram G., and Luigi Zingales. "What do we know about capital structure: Some evidence from international data." Journal of Finance, no. 50 (1995): 1421-1460.

Sarig, Oded H. "The effect of leverage on bargaining with a corporation." Financial Review 33 (1998).

Sharpe, Steven A. "Financial Market Imperfections, Firm Leverage, and the Cyclicality of Employment." American Economic Review 84, no. 4 (1994): 1060–1074.

Stigler, George. "Price and Non-price competition." Journal of Political Economy 76 (1968): 149-154.

Titman, Sheridan. "The effect of capital structure on a firm's liquidation decision." Journal of Financial Economics 13, no. 1 (1984): 137-151.

Titman, Sheridan, and Roberto Wessels. "The determinants of capital structure." Journal of Finance 43, no. 1 (1988): 1-19.

Welch, Ivo. "Capital Structure and Stock Returns." Journal of Political Economy, no. 112 (2004): 106-131.

Zeckhauser, Richard, Jayendu Patel, and Darryll Hendricks. "Nonrational actors and financial market behavior." Theory and Decisions 31 (1991): 257-287.

APPENDIX 1: Constituting Peer Groups

The peer groups for the firms are selected in the manner described below.

Figure 1.1: Peer G1

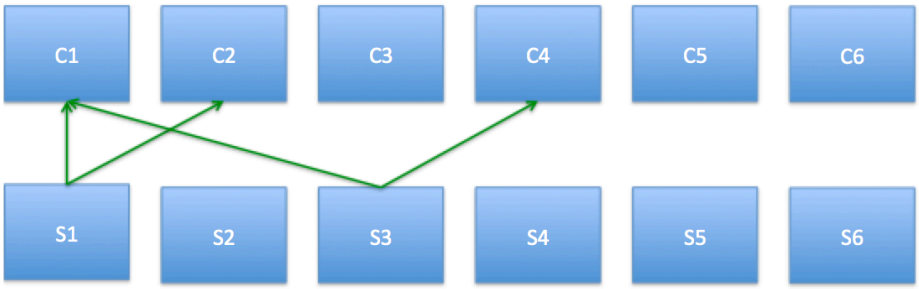
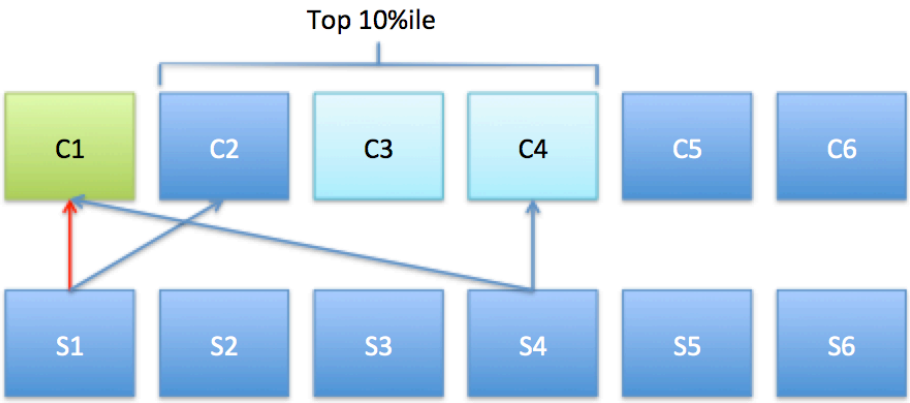


Figure 1: Customer – supplier linkages. Firms C1, C2, C3, C4, C5 and C6 are the firms in the customer industry. Firms S1, S2, S3, S4, S5 and S6 are the firms in the supplier industry. The green lines represent the firms that are inter-connected by the customer-supplier relationship. While considering the customer – supplier link C1-S1, the peer group for C1 would include C3, C4, C5 and C6.

Peer G2

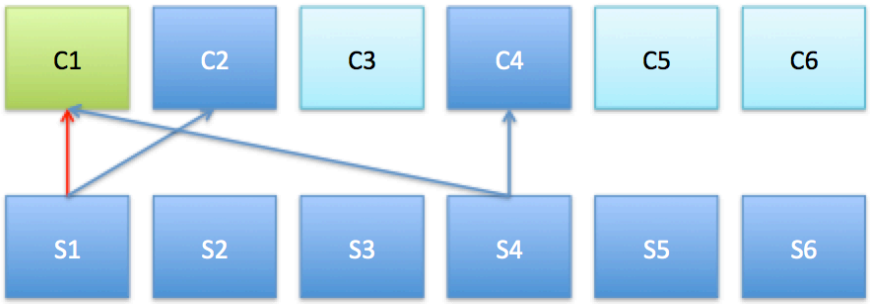
Here the peer group is the same as the Peer G1 while the observations where the customer and supplier firms belong to the same industry have been dropped.

Figure 1.2: Peer G3



While considering the customer – supplier link C1-S1, the peer group for C1 would include C3 & C4. Here, only those firms are considered for being in the peer group that belong to the top 10 percentile of firms in the industry. In the above demonstration, for clarity of methodology of choosing peers, only two firms C3 and C4 have been shown as the peers. But in actual calculations, it has been ensured that there are at least 5 firms in the peer group.

Figure 1.3: Peer G4



While considering the customer – supplier link C1-S1, the peer group for C1 would include C3, C5 and C6. Here C4 has not been included in the peer group because it is linked to the firm S4 which is in the same industry as the supplier firm S1.

Appendix 2: Variable Definitions

The table provides the definition for the variables used in the analysis

Variable Name	Definition / Formula used
Log (sales)	Logarithm of total sales
EBITDA	EBITDA divided by total Assets
Market Leverage	Book value of debt divided by sum of market value of equity and book value of debt
Book Leverage	Book value of debt divided by book value of assets
Market long-term Leverage	Book value of long-term debt divided by sum of market value of equity and book value of debt
Book long-term Leverage	Book value of long-term debt divided by book value of assets
Market to Book	Sum of Market value of Equity and book value of debt divided by book value of total assets
Tangibility	Property, Plant and Equipment (Net) divided by book value of assets
Percentage Sales	Percentage of total sales from the supplier that go to the designated customer

Table 1: Summary Statistics

The table provides summary statistics for the variables used in the analysis. It shows the mean, standard deviations, median, 25th percentile and 75th percentile values of the variables. Data on sales is in million USD. In Panel A, the sample consists of all the US firms from Compustat database with non-missing data on stock prices, debt, sales, EBITDA, PPE (net) and Total assets between the years 1976 and 2009. According to the requirements set in SFAS 160, firms are required to disclose information about their major customers who buy more than 10% of their sales. Panel B shows the summary statistics for all the firms that have been reported as a major customer by at least one firm. Panel C provides summary statistics for the firms that have reported at least one major customer. The firms in the industry of major customer that are not directly linked to the supplier constitute the customer peer group (the process of designing a peer group is explained in Appendix-1). Panel D provide summary statistics for the customer peer groups (Peer G1). Panel E provides data about the customer and supplier linkages. The definition of the variables are given in Appendix - 2

PANEL A - Summary Statistics for the firm-year data on Compustat (All firms)

Variable	Mean	Std. Dev.	p25	p75	Median
Market Leverage	0.266	0.229	0.060	0.431	0.221
Market Long-term	0.212	0.202	0.030	0.345	0.160
Book leverage	0.240	0.201	0.080	0.353	0.217
Book Long-term leverage	0.182	0.174	0.028	0.284	0.149
Sales	2358	10149	66	1201	283
Market-to-book	1.613	1.259	0.986	1.708	1.184
EBITDA/Assets	0.098	0.162	0.051	0.171	0.116
PPE/Assets	0.308	0.250	0.103	0.460	0.252

PANEL B - Summary Statistics for the firm-year data on Compustat (Customers only)

Variable	Mean	Std. Dev.	p25	p75	Median
Market Leverage	0.290	0.227	0.111	0.431	0.222
Market Long-term	0.215	0.167	0.084	0.327	0.173
Book leverage	0.263	0.157	0.145	0.357	0.256
Book Long-term leverage	0.192	0.122	0.104	0.268	0.187
Sales	51368	68445	7821	64904	25548
Market-to-book	1.718	1.156	1.064	1.898	1.320
EBITDA/Assets	0.138	0.074	0.091	0.175	0.137
PPE/Assets	0.350	0.214	0.166	0.519	0.318

(continued)

PANEL C - Summary Statistics for the firm-year data on Compustat (Suppliers)					
Variable	Mean	Std. Dev.	p25	p75	Median
Market Leverage	0.240	0.220	0.036	0.389	0.193
Market Long-term	0.190	0.198	0.010	0.308	0.133
Book leverage	0.238	0.214	0.059	0.358	0.216
Book Long-term leverage	0.183	0.183	0.015	0.291	0.149
Sales	1616	5678	60	973	234
Market-to-book	1.783	1.407	1.019	1.914	1.300
EBITDA/Assets	0.088	0.182	0.058	0.169	0.118
PPE/Assets	0.309	0.240	0.121	0.440	0.241

Summary Statistics for the firm-year data on Compustat (Customer Peer group average)					
Variable	Mean	Std. Dev.	p25	p75	Median
Market Leverage	0.287	0.162	0.152	0.395	0.252
Market Long-term	0.219	0.121	0.119	0.309	0.199
Book leverage	0.256	0.118	0.170	0.335	0.239
Book Long-term leverage	0.194	0.090	0.125	0.256	0.185
Sales	27721	38334	3274	35326	12711
Market-to-book	1.652	0.735	1.167	1.872	1.432
EBITDA/Assets	0.112	0.060	0.080	0.156	0.117
PPE/Assets	0.340	0.195	0.193	0.494	0.288

Summary Statistics for the firm-year Relationship data					
Variable	Mean	Std. Dev.	p25	p75	Median
Percentage Sales	0.183	0.174	0.100	0.220	0.140

Table 2 – Regression Results for Betas

The table presents the mean, median and standard deviation of the estimates of alpha and Beta. The sample consists of the entire cross section of US firms on the CRSP database for the years 1976 to 2009 that have non-missing stock price values.
The equation used for estimation:

$$r_{ijt} = \alpha_{ijt} + \beta^{m}_{ijt}\,(rm_t - rf_t) + \beta^{IND}_{ijt}\left(\bar{r}_{-ijt} - rf_t\right) + \varepsilon_{ijt}$$

where r_{ijt} is the return on the stock of firm *i* in industry *j* in the time period *t*, rm_t is the market return in time period *t*, rf_t is the risk free return, $\bar{r}_{-ijt}$ is the return on the peer group of the firm *i*.

Variable	Mean	Median	Std. Dev.
α	0.043	0.027	0.093
β mkt	0.882	0.824	0.716
β ind	0.088	0.055	0.228
R2	0.181	0.152	0.137
Adjusted R2	0.152	0.122	0.141
Actual Monthly Return	0.010	0.000	0.273
Expected Monthly ret.	0.014	0.011	0.076
Monthly Idiosyncratic Ret.	-0.003	-0.007	0.272

Table 3 – OLS regression – Results

The table summarizes the estimation results with supplier leverage as the dependent variable and customer peers leverage as explanatory variable. The sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009. The dependent variables are given at the top of each column and include book and market values of total and long-term Supplier leverage. The independent variable is the customer peers LT market leverage is constructed as the simple average of the LT market leverage for all the firms that constitute the customer peers group in the given year. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into four categories of controls, namely supplier firm characteristics, customer firm characteristics, customer peers group characteristics and supplier peers group characteristics. Firm- specific factors are the characteristics of the supplier firm. The analysis is a simple OLS regression. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Long-Term		Total Leverage	
	Supplier Market Leverage (1)	Supplier Book Leverage (2)	Supplier Market Leverage (3)	Supplier Book Leverage (4)
Customer Peer LT Market leverage	0.086**	0.058		
	(2.00)	(1.54)		
Customer Peer total Market leverage			0.069*	0.051
			(1.93)	(1.57)
Supplier Firm-specific Factors				
Idiosyncratic return	-0.017***	-0.002	-0.029***	-0.007*
	(-6.38)	(-0.55)	(-9.66)	(-1.83)
Market-to-book	-0.026***	-0.004	-0.036***	-0.003
	(-11.58)	(-1.29)	(-13.38)	(-0.64)
Log (sales)	0.020***	0.018***	0.019***	0.016***
	(8.41)	(7.26)	(7.11)	(6.05)
EBITDA/AS	-0.176***	-0.236***	-0.265***	-0.406***
	(-8.70)	(-7.12)	(-11.67)	(-8.54)
PPE/AS	0.133***	0.171***	0.142***	0.201***
	(4.80)	(5.85)	(4.74)	(6.32)
Customer firm characteristics	Yes	Yes	Yes	Yes
Customer Peers characteristics	Yes	Yes	Yes	Yes
Supplier Peers characteristics	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes
Supplier Ind. Fixed Effects	Yes	Yes	Yes	Yes
Customer Ind. fixed effects	Yes	Yes	Yes	Yes
Observations	14406	14406	14240	14387

Table 4 – Reduced Form

The table summarizes the estimation results with supplier leverage as the dependent variable and customer peers idiosyncratic return as explanatory variable. The sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009. The dependent variables are given at the top of each column and include book and market values of long-term Supplier leverage and their first differences. The independent variable is the customer peers idiosyncratic return. It is constructed as the simple average of the idiosyncratic return for all the firms that constitute the customer peers group in a given year. The construction of customer peers group is explained in Appendix 1. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into two categories of controls, namely supplier firm characteristics and customer peers group. Firm- specific factors are the characteristics of the supplier firm. The analysis is an OLS regression. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Long term		First Difference	
	Supplier Market leverage (1)	Supplier Book leverage (2)	Supplier Market leverage (3)	Supplier Book leverage (4)
Customer peers Idiosyncratic return	-0.018***	-0.010*	-0.023***	-0.007**
	(-3.40)	(-1.80)	(-5.47)	(-1.98)
Supplier Firm - Specific Factors				
Idiosyncratic Return	-0.016***	-0.001	-0.016***	0.000
	(-6.19)	(-0.38)	(-8.65)	(0.17)
Market-to-book	-0.027***	-0.004	0.000	0.002
	(-11.89)	(-1.36)	(-0.26)	(1.13)
Log (sales)	0.020***	0.018***	0.008	0.006
	(8.39)	(7.38)	(1.40)	(0.97)
EBITDA/AS	-0.174***	-0.231***	-0.037**	0.016
	(-8.75)	(-7.00)	(-2.18)	(0.51)
PPE/AS	0.136***	0.171***	0.060**	0.043
	(4.96)	(5.92)	(2.07)	(1.36)
Customer Peers average factors				
Market-to-book	-0.005	-0.005	-0.007	-0.012*
	(-0.95)	(-1.10)	(-1.21)	(-1.70)
Log (sales)	0.000	0.003	0.010	0.005
	(0.05)	(0.62)	(1.11)	(0.70)
EBITDA/AS	-0.156***	-0.053	0.004	0.008
	(-2.86)	(-0.89)	(0.06)	(0.11)
PPE/AS	-0.006	-0.001	-0.005	0.010
	(-0.14)	(-0.02)	(-0.05)	(0.11)
Year Fixed effects	Yes	Yes	Yes	Yes
Supplier Industry Fixed Effects	Yes	Yes	No	No
Customer industry fixed effects	Yes	Yes	No	No
Observations	14,647	14,647	12,869	12,869

Table 5 – Main Results – 2SLS analysis – Long Term Leverage

The table summarizes the estimation results for the 2SLS analysis with supplier leverage as the dependent variable, customer peers leverage as the endogenous variable and customer peers idiosyncratic return as the instrumental variable. The sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009. The dependent variables are given at the top of each column and include book and market values of long-term Supplier leverage and their first differences. Customer peers group idiosyncratic return is constructed as the simple average of the idiosyncratic return for all the firms that constitute the customer peers group in a given year. The construction of customer peer group is explained in Appendix 1. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into two categories of controls, namely supplier firm characteristics and customer peers group. Firm- specific factors are the characteristics of the supplier firm. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. The results of the first stage can be seen at the bottom. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Long term		First Difference	
	Supplier Market leverage (1)	Supplier Book leverage (2)	Supplier Market leverage (3)	Supplier Book leverage (4)
Customer Peer LT Market leverage	0.517*** (3.21)	0.285* (1.78)	0.307*** (5.18)	0.098* (1.88)
Supplier Firm - Specific Factors				
Idiosyncratic Return	-0.016*** (-6.12)	-0.001 (-0.32)	-0.016*** (-8.64)	0.000 (0.17)
Market-to-book	-0.027*** (-12.08)	-0.004 (-1.42)	0.000 (0.01)	0.002 (1.19)
log(sales)	0.020*** (8.54)	0.018*** (7.48)	0.007 (1.29)	0.006 (0.98)
EBITDA/AS	-0.176*** (-8.87)	-0.232*** (-7.10)	-0.036** (-2.13)	0.016 (0.51)
PPE/AS	0.134*** (4.97)	0.170*** (5.96)	0.058** (2.01)	0.043 (1.33)
Customer Peers average factors				
Market-to-book	0.021*** (2.67)	0.009 (1.10)	-0.005 (-0.90)	-0.010 (-1.46)
Log (sales)	0.004 (0.94)	0.005 (1.06)	0.009 (1.01)	0.005 (0.66)
EBITDA/AS	0.082 (0.88)	0.077 (0.84)	0.031 (0.49)	0.020 (0.29)
PPE/AS	-0.027 (-0.57)	-0.011 (-0.25)	-0.016 (-0.14)	0.008 (0.08)
First Stage				
Customer peers idiosyncratic return	-0.035*** (-9.27)	-0.035*** (-9.27)	-0.070*** (-26.91)	-0.070*** (-26.91)
Year Fixed effects	Yes	Yes	Yes	Yes
Supplier Industry Fixed Effects	Yes	Yes	No	No
Customer industry fixed effects	Yes	Yes	No	No
Observations	14,634	14,634	12,769	12,769

Table 6 – Main Results – 2SLS analysis – Total Leverage

The table summarizes the estimation results for the 2SLS analysis with supplier leverage as the dependent variable, customer peers leverage as the endogenous variable and customer peers idiosyncratic return as the instrumental variable. The sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009. The dependent variables are given at the top of each column and include book and market values of total Supplier leverage and their first differences. Customer peers group idiosyncratic return is constructed as the simple average of the idiosyncratic return for all the firms that constitute the customer peers group in a given year. The construction of customer peer group is explained in Appendix 1. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into two categories of controls, namely supplier firm characteristics and customer peers group. Firm- specific factors are the characteristics of the supplier firm. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. The results of the first stage can be seen at the bottom. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Total Leverage		First Difference	
	Supplier Market leverage	Supplier Book leverage	Supplier Market leverage	Supplier Book leverage
	(1)	(2)	(3)	(4)
Customer Peer LT Market leverage	0.280**	0.115	0.251***	0.052
	(2.16)	(0.88)	(5.00)	(1.17)
Supplier Firm - Specific Factors				
Idiosyncratic Return	-0.028***	-0.006*	-0.024***	-0.003
	(-9.65)	(-1.77)	(-12.26)	(-1.35)
Market-to-book	-0.037***	-0.003	-0.002	0.000
	(-13.80)	(-0.75)	(-1.36)	(0.20)
Log (sales)	0.018***	0.016***	0.007	0.013**
	(7.18)	(6.22)	(1.24)	(2.16)
EBITDA/AS	-0.266***	-0.402***	-0.090***	-0.037
	(-11.93)	(-8.56)	(-5.38)	(-1.18)
PPE/AS	0.138***	0.200***	0.120***	0.101***
	(4.75)	(6.40)	(3.63)	(3.18)
Customer Peers average factors				
Market-to-book	0.010	-0.004	0.007	-0.004
	(1.35)	(-0.52)	(0.73)	(-0.67)
Log (sales)	0.002	0.004	0.009	0.010
	(0.43)	(0.86)	(0.94)	(1.27)
EBITDA/AS	-0.013	0.014	-0.064	-0.072
	(-0.15)	(0.15)	(-0.72)	(-1.18)
PPE/AS	0.028	-0.009	-0.038	0.045
	(0.43)	(-0.14)	(-0.39)	(0.48)
First Stage				
Customer peers idiosyncratic return	-0.046***	-0.046***	-0.080***	-0.080***
	(-10.05)	(-9.99)	(-28.07)	(-28.28)
Year Fixed effects	Yes	Yes	Yes	Yes
Supplier Industry Fixed Effects	Yes	Yes	No	No
Customer industry fixed effects	Yes	Yes	No	No
Observations	14,466	14,617	12,597	12,756

Table 7 – Main Results – 2SLS analysis with controls for customer firm and supplier industry

The table summarizes the estimation results for the 2SLS analysis with supplier leverage as the dependent variable, customer peers leverage as the endogenous variable and customer peers idiosyncratic return as the instrumental variable. The sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009. The dependent variables are given at the top of each column and include book and market values of long-term Supplier leverage and their first differences. Customer peers group idiosyncratic return is constructed as the simple average of the idiosyncratic return for all the firms that constitute the customer peers group in a given year. The construction of customer peer group is explained in Appendix 1. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into four categories of controls, namely supplier firm characteristics, customer firm characteristics, customer peers group characteristics and supplier peers group characteristics. Firm- specific factors are the characteristics of the supplier firm. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. The results of the first stage can be seen at the bottom. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Long term		Long term	
	Supplier Market leverage (1)	Supplier Book leverage (2)	Supplier Market leverage (3)	Supplier Book leverage (4)
Customer Peer LT Market leverage	0.565*** (3.25)	0.324* (1.90)	0.537*** (3.18)	0.275* (1.64)
Supplier Firm - Specific Factors				
Idiosyncratic return	-0.016*** (-6.19)	-0.001 (-0.35)	-0.016*** (-6.16)	-0.001 (-0.42)
Market-to-book	-0.027*** (-12.04)	-0.005 (-1.44)	-0.026*** (-11.76)	-0.004 (-1.32)
Log (sales)	0.020*** (8.59)	0.018*** (7.40)	0.020*** (8.58)	0.018*** (7.37)
EBITDA/AS	-0.176*** (-8.87)	-0.233*** (-7.12)	-0.178*** (-8.87)	-0.237*** (-7.24)
PPE/AS	0.131*** (4.89)	0.169*** (5.91)	0.131*** (4.83)	0.170*** (5.91)
Customer Firm leverage	0.019 (0.85)	0.000 (-0.02)	0.022 (1.01)	0.004 (0.210)
Supplier Peers Leverage			-0.090 (-1.61)	-0.132*** (-2.59)
First Stage				
Customer peers idiosyncratic return	-0.033*** (-8.12)	-0.033*** (-8.12)	-0.034*** (-8.40)	-0.034*** (-8.40)
Customer firm Characteristics	Yes	Yes	Yes	Yes
Supplier Peers Avg. Characteristics	No	No	Yes	Yes
Customer Peers Avg. Characteristics	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes
Supplier Industry Fixed Effects	Yes	Yes	Yes	Yes
Customer industry fixed effects	Yes	Yes	Yes	Yes
Observations	14,634	14,634	14,393	14,393

Table 8 – Results – 2SLS analysis – Durable vs. NDNM industries

The table summarizes the estimation results for the 2SLS analysis with supplier leverage as the dependent variable, customer peers leverage as the endogenous variable and customer peers idiosyncratic return as the instrumental variable. The sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009. The sample is divided into two segments: Durable goods industries and NDNM (non-durable and non-manufacturing) industries. The dependent variables are given at the top of each column and include book and market values of long-term Supplier leverage for the Durable goods industry in columns (1) and (2), and for NDNM industries in columns (3) and (4). Customer peers group idiosyncratic return is constructed as the simple average of the idiosyncratic return for all the firms that constitute the customer peers group in a given year. The construction of customer peer group is explained in Appendix 1. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into two categories of controls, namely supplier firm characteristics and customer peers group. Firm- specific factors are the characteristics of the supplier firm. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. The results of the first stage can be seen at the bottom. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Durable Goods Industries, Long Term		NDNM Industries, Long Term	
	Supplier Market leverage	Supplier Book leverage	Supplier Market leverage	Supplier Book leverage
	(1)	(2)	(3)	(4)
Customer Peer LT Market leverage	0.638***	0.500**	0.306	0.091
	(2.76)	(2.45)	(1.43)	(0.40)
Supplier Firm - Specific Factors				
Idiosyncratic Return	-0.016***	-0.002	-0.016***	-0.001
	(-4.00)	(-0.65)	(-4.67)	(-0.21)
Market-to-book	-0.031***	-0.008**	-0.024***	-0.002
	(-9.76)	(-2.04)	(-8.15)	(-0.40)
Log (sales)	0.021***	0.016***	0.019***	0.019***
	(5.18)	(4.28)	(7.10)	(6.14)
EBITDA/AS	-0.196***	-0.174***	-0.167***	-0.270***
	(-6.43)	(-4.26)	(-6.65)	(-6.03)
PPE/AS	0.138***	0.178***	0.129***	0.152***
	(2.94)	(3.95)	(4.11)	(4.23)
Customer Peers average factors				
Market-to-book	0.025**	0.016*	0.012	0.003
	(2.44)	(1.68)	(1.08)	(0.23)
Log (sales)	0.012*	0.010	-0.004	0.000
	(1.65)	(1.55)	(-0.85)	(-0.02)
EBITDA/AS	0.011	0.075	0.063	0.004
	(0.10)	(0.77)	(0.47)	(0.03)
PPE/AS	0.050	0.047	-0.049	-0.052
	(0.74)	(0.74)	(-0.80)	(-0.91)
First Stage				
Customer peers idiosyncratic return	-0.034***	-0.034***	-0.037***	-0.037***
	(-6.65)	(-6.65)	(-6.92)	(-6.92)
Year Fixed effects	Yes	Yes	Yes	Yes
Supplier Industry Fixed Effects	Yes	Yes	Yes	Yes
Customer industry fixed effects	Yes	Yes	Yes	Yes
Observations	6,299	6,299	8,335	8,335

Table 9 – Results – 2SLS analysis – Durable vs. NDNM industries with controls for customer firm and supplier peer group

The table summarizes the estimation results for the 2SLS analysis with supplier leverage as the dependent variable, customer peers leverage as the endogenous variable and customer peers idiosyncratic return as the instrumental variable. The sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009. The sample is divided into two segments: Durable goods industries and NDNM (non-durable and non-manufacturing) industries. The dependent variables are given at the top of each column and include book and market values of long-term Supplier leverage for the Durable goods industry in columns (1) and (2), and for NDNM industries in columns (3) and (4). Customer peers group idiosyncratic return is constructed as the simple average of the idiosyncratic return for all the firms that constitute the customer peers group in a given year. The construction of customer peer group is explained in Appendix 1. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into four categories of controls, namely supplier firm characteristics, customer firm characteristics, customer peers group characteristics and supplier peers group characteristics. Firm- specific factors are the characteristics of the supplier firm. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. The results of the first stage can be seen at the bottom. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Durable Goods Industries, Long Term		NDNM Industries, Long Term	
	Supplier Market leverage	Supplier Book leverage	Supplier Market leverage	Supplier Book leverage
	(1)	(2)	(3)	(4)
Customer Peers LT Market leverage	0.605***	0.428***	0.422*	0.135
	(2.70)	(2.19)	(1.69)	(0.51)
Supplier Firm - Specific Factors				
Idiosyncratic return	-0.017***	-0.003	-0.016***	-0.001
	(-4.06)	(-0.84)	(-4.49)	(-0.16)
Market-to-book	-0.030***	-0.008*	-0.023***	-0.001
	(-9.43)	(-1.92)	(-8.02)	(-0.34)
Log (sales)	0.022***	0.016***	0.019***	0.018***
	(5.35)	(4.39)	(6.89)	(5.85)
EBITDA/AS	-0.200***	-0.178***	-0.169***	-0.275***
	(-6.55)	(-4.45)	(-6.67)	(-6.15)
PPE/AS	0.131***	0.176***	0.122***	0.150***
	(2.86)	(3.98)	(3.83)	(4.12)
Customer Firm leverage	0.046	0.029	-0.010	-0.033
	(1.37)	(1.05)	(-0.39)	(-1.25)
Supplier Peers Average leverage	-0.260**	-0.257***	-0.072	-0.116**
	(-2.48)	(-2.84)	(-1.18)	(-2.03)
First Stage				
Customer peers idiosyncratic return	-0.035***	-0.035***	-0.032***	-0.032***
	(-6.50)	(-6.50)	(-5.33)	(-5.33)
Customer Firm Characteristics	Yes	Yes	Yes	Yes
Supplier Peers Avg. Characteristics	Yes	Yes	Yes	Yes
Customer Peers Avg. Characteristics	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes
Supplier Industry Fixed Effects	Yes	Yes	Yes	Yes
Customer industry fixed effects	Yes	Yes	Yes	Yes
Observations	6,259	6,259	8,134	8,134

Table 10 – Results – Durable - Supplier peers vs. Customer industry

The table summarizes the estimation results for the 2SLS analysis with supplier leverage as the dependent variable. The sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009 for the durable goods industries segment. The table compares the effects of supplier peers and customer industry. The dependent variables are given at the top of each column and include book and market values of long-term Supplier leverage. The endogenous variable in columns (1) and (2) is supplier peers LT market leverage, which is instrumented by supplier peers group idiosyncratic return. The endogenous variable in columns (3) and (4) is customer peers LT market leverage, which is instrumented by customer peers group idiosyncratic return. Customer peers group idiosyncratic return is constructed as the simple average of the idiosyncratic return for all the firms that constitute the customer peers group in a given year. Supplier peers group idiosyncratic return is constructed in a similar manner. The construction of customer peer group is explained in Appendix 1. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into three categories of controls, namely supplier firm characteristics, customer peers group characteristics and supplier peers group characteristics. Firm- specific factors are the characteristics of the supplier firm. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. The results of the first stage can be seen at the bottom. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Long term		Long term	
	Supplier Market leverage (1)	Supplier Book leverage (2)	Supplier Market leverage (3)	Supplier Book leverage (4)
Customer Peers LT Market leverage			0.638***	0.500**
			(2.76)	(2.45)
Supplier Peers LT Market leverage	0.949	1.125		
	(0.47)	(0.68)		
Supplier Firm - Specific Factors				
Idiosyncratic Return	-0.019***	-0.005	-0.016***	-0.002
	(-4.37)	(-1.27)	(-4.00)	(-0.65)
Market-to-book	-0.032***	-0.007	-0.031***	-0.008**
	(-9.65)	(-1.51)	(-9.76)	(-2.04)
Log (sales)	0.022***	0.017***	0.021***	0.016***
	(5.41)	(4.46)	(5.18)	(4.28)
EBITDA/AS	-0.175***	-0.177***	-0.196***	-0.174***
	(-5.81)	(-3.58)	(-6.43)	(-4.26)
PPE/AS	0.178***	0.215***	0.138***	0.178***
	(3.55)	(4.54)	(2.94)	(3.95)
Customer Peers average factors				
Market-to-book			0.025**	0.016*
			(2.44)	(1.68)
Log (sales)			0.012*	0.010
			(1.65)	(1.55)
EBITDA/AS			0.011	0.075
			(0.10)	(0.77)
PPE/AS			0.050	0.047
			(0.74)	(0.74)
First Stage				
Customer peers idiosyncratic return			-0.034***	-0.034***
			(-6.65)	(-6.65)
Supplier peers idiosyncratic return	-0.010***	-0.010***		
	(-2.13)	(-2.13)		
Supplier Peers Avg. Characteristics	Yes	Yes	No	No
Year Fixed effects	Yes	Yes	Yes	Yes
Supplier Industry Fixed Effects	Yes	Yes	Yes	Yes
Customer industry fixed effects	No	No	Yes	Yes
Observations	6,658	6,658	6,299	6,299

Table 11 – Results – Reverse causality

The table summarizes the estimation results for the 2SLS analysis with customer peers leverage as the dependent variable, supplier firm LT leverage as the endogenous variable and supplier firm idiosyncratic return as the instrumental variable. The sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009. The dependent variables are given at the top of each column and include book and market values of long-term Supplier leverage. The construction of customer peer group is explained in Appendix 1. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into two categories of controls, namely supplier firm characteristics and customer peers group. Firm- specific factors are the characteristics of the supplier firm. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. The results of the first stage can be seen at the bottom. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Customer Peers Long Term	
	Market leverage (1)	Book leverage (2)
Supplier firm LT Market leverage	0.033	0.047
	(0.70)	(1.31)
Customer Peers average factors		
Idiosyncratic Return	-0.035***	-0.009**
	(-8.63)	(-2.25)
Market-to-book	-0.049***	-0.018***
	(-15.64)	(-5.67)
Log (sales)	-0.007***	-0.008***
	(-4.57)	(-5.94)
EBITDA/AS	-0.457***	-0.175***
	(-18.25)	(-8.52)
PPE/AS	0.042**	0.038***
	(2.24)	(2.59)
Supplier Firm - Specific Factors		
Market-to-book	0.001	0.002*
	(1.11)	(1.72)
Log (sales)	-0.001	-0.001
	(-0.55)	(-1.20)
EBITDA/AS	0.008	0.012
	(0.85)	(1.63)
PPE/AS	0.000	-0.001
	(0.05)	(-0.18)
First Stage		
Supplier firm idiosyncratic return	-0.016***	-0.016***
	(-6.15)	(-6.15)
Year Fixed effects	Yes	Yes
Supplier Industry Fixed Effects	Yes	Yes
Customer industry fixed effects	Yes	Yes
Observations	14,634	14,634

Table 12 – Comparison across different peer groups

The table summarizes the estimation results for the 2SLS analysis with supplier leverage as the dependent variable, customer peers leverage as the endogenous variable and customer peers idiosyncratic return as the instrumental variable. The sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009. The dependent variables are given at the top of each column and include book and market values of long-term Supplier leverage. Customer peers group idiosyncratic return is constructed as the simple average of the idiosyncratic return for all the firms that constitute the customer peers group in a given year. The construction of customer peer group is explained in Appendix 1. For columns (1) and (2), the customer peer group is chosen based on Peer G1 criteria, for columns (3) and (4) peer group is chosen based on Peer G2 criteria, and so on. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into two categories of controls, namely supplier firm characteristics and customer peers group. Firm- specific factors are the characteristics of the supplier firm. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. The results of the first stage can be seen at the bottom. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	Peer G1 Long Term		Peer G2 Long Term		Peer G3 Long Term		Peer G4 Long Term	
	Supplier Market leverage	Supplier Book leverage	Supplier Market leverage	Supplier Book leverage	Supplier Market leverage	Supplier Book leverage	Supplier Market leverage	Supplier Book leverage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Customer Peer LT Market leverage	0.517***	0.285*	0.453***	0.295*	0.694***	0.434***	0.482***	0.286*
	(3.21)	(1.78)	(2.92)	(1.89)	(3.88)	(2.74)	(3.02)	(1.82)
Supplier Firm - Specific Factors (Supplier)								
Idiosyncratic Return	-0.016***	-0.001	-0.016***	0.000	-0.015***	-0.003	-0.016***	0.000
	(-6.12)	(-0.32)	(-5.70)	(0.13)	(-4.79)	(-1.10)	(-5.66)	(0.12)
Market-to-book	-0.027***	-0.004	-0.027***	-0.005	-0.024***	-0.007***	-0.027***	-0.005
	(-12.08)	(-1.42)	(-11.15)	(-1.35)	(-8.13)	(-2.80)	(-11.18)	(-1.36)
Log (sales)	0.020***	0.018***	0.018***	0.017***	0.019***	0.017***	0.019***	0.018***
	(8.54)	(7.48)	(8.01)	(7.43)	(7.06)	(6.84)	(8.01)	(7.44)
EBITDA/AS	-0.176***	-0.232***	-0.161***	-0.220***	-0.164***	-0.133***	-0.160***	-0.220***
	(-8.87)	(-7.10)	(-7.13)	(-5.63)	(-6.59)	(-4.81)	(-7.12)	(-5.63)
PPE/AS	0.134***	0.170***	0.136***	0.160***	0.142***	0.180***	0.136***	0.160***
	(4.97)	(5.96)	(4.85)	(5.26)	(4.64)	(5.46)	(4.85)	(5.25)
First Stage								
Customer peers idiosyncratic return	-0.035***	-0.035***	-0.038***	-0.038***	-0.031***	-0.031***	-0.037***	-0.037***
	(-9.27)	(-9.27)	(-8.80)	(-8.80)	(-11.75)	(-11.75)	(-8.93)	(-8.93)
Customer Peers Avg. factors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supplier Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Customer industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,634	14,634	12,277	12,277	8,889	8,889	12,277	12,277

Table 13 – 2SLS analysis using Residuals

The table presents the results of the two stages of the 2SLS analysis. The dependent variables are given at the top of each column and include book and market values of long-term Supplier leverage. I first regress the customer peer LT leverage on customer leverage. The residuals thus obtained form the endogenous variable, which is instrumented by customer peers group idiosyncratic return. In columns (1) and (2), the sample consists of all the major customer-supplier relationships listed in the years 1976 to 2009. Columns (3) and (4) look at only the observations where supplier firm is in the durable goods industry. Columns (5) and (6) look at only the observations where supplier firm is in the NDNM industry. The construction of customer peer group is explained in Appendix 1. Several control factors have been used to control for various firm-level and industry-level characteristics. For simplifications, I divide them into three categories of controls, namely supplier firm characteristics, customer firm characteristics and customer peers group characteristics. Firm- specific factors are the characteristics of the supplier firm. The definition for the various variables can be found in Appendix – 2. The table reports the estimated coefficients and t-statistics robust to heteroskedasticity and within firm dependence in parentheses. The results of the first stage can be seen at the bottom. All of the right hand side variables are lagged by one time period. Statistical significance at 10%, 5% and 1% levels are denoted by '*','**' and '***' respectively.

	All Firms, Long Term		Durable Goods Industries, Long Term		NDNM Industries, Long Term	
	Supplier Market leverage	Supplier Book leverage	Supplier Market leverage	Supplier Book leverage	Supplier Market leverage	Supplier Book leverage
	(1)	(2)	(3)	(4)	(5)	(6)
Residuals	0.544***	0.320*	0.608***	0.481**	0.426*	0.204
	(3.08)	(1.82)	(2.63)	(2.32)	(1.70)	(0.77)
Supplier Firm - Specific Factors						
Idiosyncratic Return	-0.016***	-0.001	-0.017***	-0.003	-0.016***	-0.001
	(-6.23)	(-0.36)	(-4.16)	(-0.75)	(-4.73)	(-0.23)
Market-to-book	-0.027***	-0.005	-0.030***	-0.008**	-0.024***	-0.002
	(-12.00)	(-1.44)	(-9.72)	(-2.01)	(-8.25)	(-0.46)
Log (sales)	0.020***	0.018***	0.022***	0.016***	0.019***	0.019***
	(8.58)	(7.40)	(5.31)	(4.38)	(6.99)	(5.93)
EBITDA/AS	-0.176***	-0.233***	-0.198***	-0.175***	-0.169***	-0.272***
	(-8.87)	(-7.12)	(-6.49)	(-4.29)	(-6.69)	(-6.07)
PPE/AS	0.131***	0.169***	0.129***	0.172***	0.129***	0.153***
	(4.89)	(5.91)	(2.78)	(3.84)	(4.10)	(4.23)
Customer firm leverage	0.069***	0.030	0.090***	0.052**	0.033	-0.005
	(3.35)	(1.61)	(2.81)	(2.01)	(1.34)	(-0.21)
First Stage						
Customer peers idiosyncratic return	-0.032***	-0.032***	-0.033***	-0.033***	-0.031***	-0.031***
	(-7.84)	(-7.84)	(-6.29)	(-6.29)	(-5.41)	(-5.41)
Customer Peers Avg. Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Customer firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Supplier Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Customer industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,634	14,634	6,299	6,299	8,335	8,335