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Credit Rating Changes of Peer Firms and Corporate Financing

Chi-Hsiou D. Hung
Adam Smith Business School
University of Glasgow
Email: chi-hsiou.hung@glasgow.ac.uk

Shammyla Naeem
Adam Smith Business School
University of Glasgow
Email: shammyla.naeem@glasgow.ac.uk

K.C. John Wei
School of Accounting and Finance
Hong Kong Polytechnic University
Email: johnwei@ust.hk

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Abstract

We find that firms reduce net debt issuance (*NDI*, hereafter) when industry peers with the same credit rating were downgraded in the previous year, as opposed to an average *NDI increase* among all firms. This finding is consistent with the considerations of competition and contagion associated with relative strengths and weaknesses in credit quality. The peer effect on NDI reduction is ubiquitous across both speculative- and investment-grade firms, but is particularly strong for small size firms with speculativegrade ratings, and firms operating in concentrated industries, and in times when the economy is in expansion or outside financial crises.Wealso find that firms reduce leverage when their ratings are lower than the industry average, and that peer firms' ratingeffects remain strong even when controlling for the lower-than-average effect.

JEL Classification: G2, G32
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[*]**Corresponding author**: Chi-Hsiou D. Hung, Adam Smith Business School, University of Glasgow, University Avenue, Glasgow, G12 8QQ, United Kingdom. Tel: (44) -1413305666; Fax: (44) -1413304939. Email: chi-hsiou.hung@glasgow.ac.uk.

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Abstract

We find that firms reduce net debt issuance (*NDI*, hereafter) when industry peers with the same credit rating were downgraded in the previous year, as opposed to an average *NDI increase* among all firms. This finding is consistent with the considerations of competition and contagion associated with relative strengths and weaknesses in credit quality. The peer effect on NDI reduction is ubiquitous across both speculative- and investment-grade firms, but is particularly strong for small size firms with speculativegrade ratings, and firms operating in concentrated industries, and in times when the economy is in expansion or outside financial crises.Wealso find that firms reduce leverage when their ratings are lower than the industry average, and that peer firms' ratingeffects remain strong even when controlling for the lower-than-average effect.

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1. Introduction

Recent research demonstrates the importance of peer firm effects. Graham and Harvey (2001) document that many chief financial officers (CFOs) consider peer firms' financing decisions important for making their own financing decisions. Thierry and Fresard (2014) find that corporate investment increases with the valuation of peers. The peer effect also exists in the decisions of corporate executive compensation (Bizjak, Lemmon, and Naveen (2008)) and cross-border M&As (Francis, Hasan, Sun, and Waisman (2014)). In this paper, we contribute to the literature of peer effects by examining whether credit rating changes of peer firms affect the focal firm's financing decisionsfinancing decisions.

A number of studies demonstrate that credit ratings contain incremental information not reflected in firm characteristics (see, e.g., Millon and Thakor (1985); Elton et al. (2001); Boot, Milbourn, and Schmeits (2006)). This is because credit rating agencies, who specialize in gathering and evaluating information, may receive significant private information about the firm being assessed, and hence are able to provide more reliable measures of a firm's creditworthiness (Kisgen (2006; 2009)). The credit rating downgrades or upgrades of a firm in an industry can generate influential externalities to other firms in the same industry.[1] The well-known examples of the credit rating downgrades of General Motors and Ford, both had the same rating of BBB- as of November 2004 and were later downgraded to 'junk category' by S&P in May 2005, generated significant price movements in the auto sector (Acharya, Schaefer, and Zhang (2015)).

[1] The credit rating of a firm is one of the most important factors that affect corporate debt policy (Graham and Harvey (2001)). Firms that have a debt credit rating have significantly more leverage (Faulkender and Petersen (2006)). A credit rating upgrade or downgrade leads to adjustments in stock and bond prices (e.g., Hand, Holthausen, and Leftwich (1992); Kliger and Sarig (2000)), and affects the firm's access to the commercial paper market, disclosure requirements, as well as third party relationships (Kisgen (2006)). To the extent that different credit rating levels are associated with different costs and benefits, a change in a firm's credit rating level may influence its capital structure (Kisgen (2006; 2009)).

Firms with a higher credit quality enjoy a lower cost of debt capital than their peers. We posit that firms are likely to take credit rating change of their peers into consideration when making the financing decision of their own. In this paper, we study several questions. First, do changes in the credit ratings of peer firms motivate and affect financing activities of firms in the same industry, and if so, what financing actions do firms take? Second, does this peer firm effect vary with firm characteristics, industry competition environments, and economic conditions? To our knowledge, no prior research has examined the important effect of credit rating changes of peer firms on corporate financing of a firm as we do.

Our study offers new insights into the motives of corporate financing and the related actions firms take when they observe changes in the credit rating of peer firms. Our focus is on the revised outcome of credit quality assessment relative to the peers, and we argue from the motives of both contagion and competition considerations associated with the relative strength and weakness in the credit quality of a firm. Our analyses examine whether the credit rating downgrade or upgrade of peer firms is associated with the net debt issuance of a firm. We document strong evidence that credit rating changes of peer firms affect firm's financing decisions. Specifically, we show that a firm, which was not downgraded, but observed its peers being downgraded in a year, changes its financing policy in the next year.

We consider a transmission mechanism of peer effects stemming from the attempt of firms that seek to avoid the contagion effect and to gain the advantage from the relative strength in the credit market. Several papers develop a link from financial distress of a firm to outcomes of other firms in the same industry. For example, Lang and Stulz (1992) analyze both the contagion effect of bankruptcy news announcements of peer firms and the competition channel that benefits the bankrupt firms' competitors. Hertzel and Officer (2012) show that a firm's loan

pricing is affected by financial distress of industry rival firms. As for firms that are connected to firm *i* in other ways, Hertzel, Li, Officer, and Rodgers (2008) show that financial distress of a firm affects its suppliers, and Jorion and Zhang (2009) show a link from financial distress of a firm to its creditors.

Prior studies adopt bankruptcy filings that have much limited occurrences. For example, Lang and Stulz (1992) use 59 bankruptcy filings, and Jorion and Zhang (2007) use 272 filings as the key right-hand side variable. Our use of credit rating changes, which is a measure of changes in default probability, offers two advantages. First, it allows us a larger sample size. In our sample, there are a total of 5,709 events of credit rating changes, of which 3,277 are downgrades and 2,432 are upgrades. Second, a credit rating changes give more granular variation in credit quality and the probability of financial distress. Thus, we are able to observe how financing changes as credit quality of peers gradually improves or worsens, but not so low as to result in bankruptcy.

Importantly, we show that the effect of peer firms' rating changes is a distinct effect not captured by the mimicking behavior of firms, in which a firm follows the financing actions of peer firms, as advocated by Leary and Roberts (2014). If firms learn from peers' financing actions as in Leary and Roberts (2014), then when a rating change happens to a firm, which makes this firm change financing activities, other firms may follow similar financing actions. In all our analyses, we control for the net debt issuance of the peer firms. It is also possible that a common industry shock may cause an overall rating change within an industry, which could potentially drive a wave of industry-wide leveraging or deleveraging. Thus, we further control for the effect of industry-wide credit rating changes, excluding own firm's observation. This essentially controls for the magnitude and direction of common shocks. We find that the effect of

credit rating downgrades of peer firms remains strong, which shows that our findings are a distinct externality effect of peer firms.

We develop and test hypotheses on how the externality effect makes rating upgrades or downgrades of peer firms important for the firm when deciding its financing activities for the next year. We identify firms as peers if they are in the same industry and have an identical credit rating in a given year. By applying for an identical credit rating, we consider firms as peers in their credit quality in the same industry. The rating change effect we analyze pertains to the changes in firm financing, in a given year, of a firm whose peers' credit ratings were either upgraded or downgraded in the previous year but whose own credit rating remained unchanged.

We use a sample of U.S. firms over the period 1985-2014 and find strong evidence that credit rating downgrades of peer firms are an important determinant of a firm's financing decision. We find that firms witnessing an upgrade to peer firms' rating do not make significant changes in *NDI*. In contrast, firms witnessing a downgrade to peer firms' rating significantly reduce leverage. Such firms, on average, *reduce* their net debt issuance (*NDI*) by 1.53% relative to total assets. In our sample, this translates into an average reduction in net debt issuance of 112.5 million dollars a year, given that the average total assets of the sample firms are 7.352 billion dollars. This 1.53% *reduction* in net debt issuance is economically significant from two perspectives: i) the financing action of such firms goes to an opposite direction to the average *NDI increase* of 2.4% in our sample (shown in Table 3), and ii) the average *NDI* reduction of such firms is large relative to the average *NDI* of all firms in our sample.

We find that, firms reduce debt but do not make significant changes in equity when witnessing a downgrade to peer firms' rating. Moreover, the debt reduction is mainly attributable to the reduction in debt issuance, which in turn, mainly comes from the reduction in the long-

term debt. The peer effect we document is prevalent across firms and over time, and time-varying external financing costs do not drive our findings. The peer effect in reducing net debt is stronger for investment-grade firms than for speculative-grade firms, for firms in concentrated industries than for those in competitive industries, and for small firms than for large firms. The peer effect is also stronger when the economy is in expansion than in recession.

Moreover, we find stronger and more pronounced reductions in net debt issuance of firms in the highest rating levels in the investment- and speculative-grade categories. Top investment-grade firms (with S&P ratings of A- or above) react strongly to a rating downgrade to peer firms. These high credit quality firms typically have less cash flow problems and are more financially flexible, which enable them to embark on significant reduction in net debt issuance. This finding is important because the majority of credit rating upgrades and downgrades occur to investment-grade firms (reported in Appendix Table 1). Furthermore, firms with high speculative grades of BB+, BB and BB-, those whose credit ratings are near the boundary between investment-grade and speculative-grade, reduce net debt issuance by 2.21% to total assets when peer firms are downgraded.

Next, we ask the following questions: if a firm's credit rating is lower than the industry average, would the firm be prone to reduce leverage to improve its rating? How the pressure of having a lower-than-average rating would play out when peer firms are receiving rating upgrades or downgrades? We first show evidence of a significant lower-than-average effect in that the average credit rating of an industry serves as a reference point for all firms in that industry. When a firm's rating is below this reference point, it tends to reduce its debt. We find that firms, on average, reduce their net debt issuance by 2.44% if their rating is below the industry average in the previous year. Moreover, the leverage reduction in the light of rating changes of peer firms

is a distinct effect from the effect of firms having a below-average rating. A firm that faced downgraded peers reduces its net debt issuance by 1.79% even after controlling for the lower-than-average effect.

The rest of the paper is organized as follows. Section 2 develops hypotheses for our analyses. Section 3 describes our ratings data and explains the sample and methodology employed in this study. Section 4 discusses summary statistics and reports our main results on the effects of rating changes of peer firms on firms' financing policies. Section 5 conducts cross-sectional analyses to examine whether heterogeneous variations exist in the peer rating effect. Section 6 performs additional analyses to determine whether there is interplay between the peer effect and the below-average credit quality effect and whether the peer effect varies over time. Section 7 concludes the paper.

2. Hypothesis Development

Firms in an industry with the same credit rating level are perceived to have a similar credit quality. A credit rating downgrade to a firm reflects an increase in its probability of default, for which the literature shows that it may negatively affect industry peers through two channels. First, the business relations channel gives rise to counterparty risk (e.g., Jarrow and Yu (2001); Jorion and Zhang (2009)). Second, there exists an information channel where peers are impacted by the emergence of negative shocks, even without business relations with the downgraded firm, leading to investors' revision of required risk premiums. Lang and Stulz (1992) find that negative news announcements of Chapter 11 filings by bankrupt firms result in declines in stock prices of the firm's competitors. Similarly, Ferris, Jayaraman, and Makhija (1997) show that bankruptcy announcements generate a dominant contagion effect.

Hertzel and Officer (2012) show that loan spreads widen surrounding industry bankruptcy waves. Jorion and Zhang (2007) find evidence of contagion effects for Chapter 11 bankruptcies. Financial distress of a firm also has a negative impact on the stock price of its suppliers (Hertzel, Li, Officer, and Rodgers (2008)). Akhigbe, Madura, and Whyte (1997) document the impact of peer firm bond rating downgrades on share prices. Thus, we posit that cautious managers will take actions on leverage reduction to safeguard from this contagion effect occurring to their own firm.

On the other hand, a credit rating downgrade to peer firms is an opportunity for a firm to gain competitive advantages over its peers by standing at a higher credit quality, enjoying lower discrete costs (Kisgen (2006)), having a better access to the debt market (Hahn (1993)) and higher market equity value (Hand, Holthausen, and Leftwich (1992)), while the downgraded firm may find itself becoming more difficult to finance with debt (Kisgen (2006)). Grinblatt and Titman (2002) and Kisgen (2006) provide excellent discussions on the clientele effect that institutional investors often are restricted by statutory constraints and cannot invest in debt securities with credit rating levels lower than a certain threshold.

Lang and Stulz (1992) also consider the competition channel that a bankruptcy announcement could result in the redistribution of wealth from the bankrupt firms to their competitors. The extant theory and empirical evidence do not offer a clear ex-ante direction of firms' actions when a peer firm's credit rating is downgraded. We conjecture that the competition effect can potentially drive firms to reduce leverage in order to maintain a higher credit rating than their downgraded competitors. Our arguments discussed in the development of Hypothesis 4 and our results reported in Table 10 indicate that firms in concentrated industries

reduce their net debt issuance much more aggressively than firms in competitive industries when peer firms experience credit rating downgrades.

The above evidence, taken together, suggests that, in the light of credit rating downgrades of peer firms, a firm may want to safeguard itself from the contagion effect and seize the benefit from the competition effect. Thus, we form and test our first hypothesis that credit rating downgrades of peer firms lead firms to cut back on debt financing.

Hypothesis 1 (H1): C*redit rating downgrades of peer firms lead firms to reduce leverage.*

Conversely, extant empirical evidence shows that a credit rating upgrade to a firm contains little incremental information content due to the relatively transparent nature of positive news of a firm. Prior studies, in general, do not find a significant market response to bond upgrades (e.g., Holthausen and Leftwich (1986); Hand, Holthausen, and Leftwich (1992); Goh and Ederington (1993)). The evidence suggests that rating upgrades of peer firms are not perceived as a significant information signal. Thus, we conjecture that credit rating upgrades of peer firms do not lead to any significant adjustments in capital structure. This leads to our second hypothesis in the form of a null hypothesis as follows.

Hypothesis 2 (H2): C*redit rating upgrades of peer firms do not lead firms to change leverage.*

Our credit ratings are based on a debt issuer's rating, which places more weight on long-term debt than short-term debt. As a result, if a firm wants to maintain its rating level when peer firms' ratings are downgraded, reducing long-term debt would be more effective than reducing short-term debt. In addition, long-term debt issuing activities is the most relevant to capital structure (Welch (2004)). The above discussion leads to our third hypothesis.

Hypothesis 3 (H3): *The effect of credit rating downgrades of peer firms on a firm's debt reduction mainly works through long-term debt.*

All else equal, firms in concentrated industries would be under heavier pressure than firms in competitive industries to maintain good credit ratings when peer firms experience rating changes. This is because of the relatively smaller number of firms within a concentrated industry in which the rating upgrade (or downgrade) of one or more firms directly results in a competitive disadvantage (or advantage) of other firms. As such, these firms would reduce their leverage more aggressively than firms in competitive industries.

Similarly, small firms will also be subject to more pressure than large firms to maintain good existing credit quality when peer firms' ratings are downgraded. The reason is that smaller firms are more vulnerable and it is relatively costlier for them to secure finance than it is for larger firms if they lose their existing credit rating status. Badoer and James (2016) report that the term to maturity of an issue increases with issue size. Hence, small firms would reduce their net debt more aggressively than large firms.

Finally, higher rated firms have greater financial flexibility and enjoy better accesses to the debt and equity market than do lower rated firms, as suggested by the findings of Kisgen (2006), Tang (2009), Badoer and James (2016), and our evidence documented in Table 1. Therefore, when credit ratings of peer firms are downgraded, we expect that investment-grade firms will be able to reduce their net debt more easily than speculative firms. In addition, investment-grade firms are relatively more exposed to counter-party risks than speculative-grade firms (see, e.g., Jorion and Zhang (2009) and (2010)), which aggravates the effect of a peer-firm downgrade. The above discussions lead to our last hypothesis.

Hypothesis 4 (H4): *The effect of credit rating downgrades of peer firms on debt reduction is more pronounced for firms in concentrated industries, investment-grade firms, and small firms.*

Our study is also related to the literature of capital structure. The implicit assumption of the traditional theories, to a large extent, has been that a firm's leverage is based on the considerations of its own financing policy, firm characteristics, industry characteristics (e.g., Titman (1984); MacKay and Phillips (2005)) and market frictions. The trade-off theory of capital structure argues that a firm's optimal leverage ratio is determined by trading off between the benefits and costs of debt.[2] Earlier research considers corporate taxes (Modigliani and Miller (1963)), costs of financial distress (Jensen and Meckling (1976); Myers (1977)), agency costs and benefits in relation to conflicts of interest between shareholders and managers (Harris and Raviv (1990); Stulz (1990)), and between equity holders and debtholders (e.g., Jensen (1986)). Other studies analyze information asymmetry between managers and outside investors and posit the signaling effect of debt (Ross (1977); Leland and Pyle (1977); Noe (1988)), or propose the pecking-order theory (Myers (1984); Myers and Majluf (1984); Leary and Roberts (2010)). Kisgen (2006; 2009) investigates the effect of a firm's own credit rating on its capital structure.

In the traditional theories, the role of peer firms' characteristics and actions is either unimportant or works through some firm-level factors or is captured by market frictions surrounding the sources of capital. For example, Leary and Roberts (2005) demonstrate that adjustment costs dictate the speed at which the corporate capital structure responds to leverage shocks. Lemmon, Roberts, and Zender (2008) show that a firm's capital structure is persistent. Baker and Wurgler (2002) posit that firms time the market when issuing equity. Dittmar and Thakor (2007) assert that the issuance decision is driven by what the manager thinks his firm is worth. Other research relates product market strategies and industry characteristics to the capital structure. These studies, however, do not consider the between-firm effect within the same industry. For example, Brander and Lewis (1986) show that, due to the limited liability of equity

[2] Korteweg (2010) tests the net benefits of debt.

holders, firms choose positive debt levels to pursue aggressive output strategies. Maksimovic (1988) derives debt capacity as a function of industry and firm characteristics.

3. Sample and Methodology

3.1 Sample construction

Our sample covers all firms with a credit rating in Compustat at the beginning of a year over the period from 1985, when ratings data first became available in Compustat, to 2014. From the Compustat Ratings File, we collect annual data on firm credit ratings issued by Standard and Poor's (S&P) for all rated firms, as in Baghai, Servaes, and Tamayo (2014) and Kisgen (2006). Kedia, Rajgopal, and Zhou (2016) show that, relative to Moody's, S&P's ratings are less subject to conflicts of interest related to the ownership of stable large shareholders. We use the S&P long-term domestic *issuer* credit ratings (Compustat data item SPLTICRM), which reflect the opinion of an issuer's overall creditworthiness. To construct our peer rating dummy variables, we use the ratings at the start of a fiscal year.

S&P issues 22 alphanumeric ratings from the highest creditworthiness category to the lowest: AAA, AA+, AA, AA−, A+, A, A−, BBB+, BBB, BBB−, BB+, BB, BB−, B+, B, B−, CCC+, CCC, CCC−, CC, C, and D and SD (Selective Default). Firms rated BBB− and above are typically considered as investment grade, and those rated below BBB− as speculative grade. For the purpose of estimating our regression models, we transform the S&P alphanumeric rating codes into ordinal numerical codes (e.g., Baghai, Servaes, and Tamayo (2014); Dimitrov, Palia, and Tang (2015)). Our numerical transformation assigns 22 to AAA, 21 to AA+, 20 to AA, …, and 1 to D and SD.

We match the ratings data with firm-level annual financial statement data obtained from Compustat to arrive at one observation per firm-year. As is common in the prior literature on capital structure, we exclude from the sample utility firms as they are highly regulated, and financial firms because regulations impose specific restrictions, such as the minimum capital requirement for banks and investor insurance for insurance firms, on their asset and liability structures. Following Kisgen (2006), we repeat our analyses by including utility firms and our results, not shown for brevity reasons, remain robust. We exclude firm-years that have missing observations for calculating variables for the empirical analyses. The final sample consists of 3,135 firms with 26,588 firm-year observations, among which 11,584 are classified as investment grade and 15,004 as speculative grade. In this study, we refer to investment-grade ratings as all ratings equal to or above BBB- and speculative-grade ratings as all ratings equal to or below BB+. As detailed in Appendix Table 1, our sample consists of a total of 5,709 events of credit rating changes, of which 3,277 are downgrades and 2,432 are upgrades.

3.2 Variables used in the firm-level regression

Our hypotheses predict future capital structure changes of a firm when peer firms experience credit rating changes. We estimate a model of a firm's financing decision following rating changes of peer firms. The measures of a firm's financing activities are computed for the subsequent 12 months following the peer credit rating changes. The main dependent variable, net debt issuance (*NDI*), in the regressions measures net debt minus net equity issued each year (e.g., Kisgen (2006)) and is defined as:

$$NDI_{i,t} = \Delta Debt_{i,t} - \Delta Equity_{i,t}.$$

where $\Delta Debt_{i,t}$ is long-term debt issuance (Compustat data item DLTISY) minus long-term debt reduction (Compustat data item DLTRY) plus changes in current debt (Compustat data item DLCCHY) for firm *i* from year *t*–1 to *t*, scaled by total assets in the previous year (Compustat item AT). The last letter 'Y' in Compustat data items indicates that the variable is year-to-date. $\Delta Equity_{i,t}$ is sales of common and preferred stocks (Compustat data item SSTKY) minus purchases of common and preferred stocks (data item PRSTKCY) for firm *i* from year *t*–1 to *t*, scaled by total assets in the previous year.

We further separately examine the effects on short-term and long-term debt.

$\Delta STD_{i,t}$ = the ratio of the change in short-term debt (Compustat data item DLCCHY) to total assets in the previous year.

$\Delta LTD_{i,t}$ = the difference in long-term debt issuance and long-term debt reduction (Compustat data item DLTISY minus data item DLTRY), scaled by total assets in the previous year.

We construct two dummy variables pertaining to credit rating changes of peer firms, peer rating upgrade ($UG^{P}_{i,k,t-1}$) and peer rating downgrade ($DG^{P}_{i,k,t-1}$), for each firm at the beginning of each fiscal year *t*. Specifically, the peer upgrade dummy of firm *i* within industry *k* in year *t*–1 takes the value of one (i.e., $UG^{P}_{i,k,t-1} = 1$) if the firm is not upgraded or downgraded in year *t*–1 from year *t*–2 and there is one or more same-industry peer firms (indexed by *j*), with whom firm *i* shared the same credit rating (*CR*) in year *t*–2, are upgraded in year *t*–1. Mathematically, we have

$$UG^{P}_{i,k,t-1} = 1, if\ CR_{i,k,t-2} = CR_{j,k,t-2}, CR_{i,k,t-1} = CR_{i,k,t-2},$$
$$and\ CR_{j,k,t-1} > CR_{j,k,t-2}\ for\ j \neq i\ and\ j \in (1,2,\dots,l|l \geq 1);$$
$$= 0, otherwise.$$

Likewise, DG^P takes the value of one if the firm shares the same credit rating with one or more peer firms within a particular industry in a specific year and these firms are downgraded in the subsequent year, and zero otherwise. In the following discussions, we suppress subscripts *i*, *j*, *k* and *t* in the two dummy variables for notational convenience.

We illustrate our definition of a peer firm credit rating upgrade with an example. Suppose that there are three firms in the telecom industry, A, B, and C with an identical credit rating of AA in year 2000 (fiscal year). If firms B and C are upgraded in the subsequent year 2001 but firm A maintains the same rating from years 2000 to 2001, then the UG^P dummy for firm A takes the value of 1 in year 2001. In contrast, UG^P takes the value of 0 for firms B and C as these firms are themselves upgraded, despite having the other firm being upgraded.

In order to control for possible industry-wide credit rating shocks, if any, we introduce a continuous variable, $INDCR_{diff}$, which captures the magnitude and direction of those shocks, be it large or moderate, positive or negative, or no shocks, as defined below:

$INDCR_{diff, t-1}$ is the change in the level of average credit ratings of an industry, excluding own firm's observation, from *t*–2 to *t*–1.

We address the possibility that, after the credit rating change in year *t*–1, firms follow the financing pattern of downgraded and upgraded firms from year *t*–1 to *t*. To this end, in all our regression analyses, we include two variables $UGNDI_{ind, t}$ and $DGNDI_{ind, t}$ as defined below. By construction, these two variables $UGNDI_{ind, t}$ and $DGNDI_{ind, t}$ do not include own firm's observation.

$UGNDI_{ind, t}$ is the average net debt issuance of the upgraded peer firms in an industry from year *t*–1 to *t*.

$DGNDI_{ind,\,t}$ is the average net debt issuance of the downgraded peer firms in an industry from year t–1 to t.

We also include in our regression specification a set of conventional explanatory variables (all lagged by one year), for both firm-level and industry-level, as controls as they have been analyzed in many tests and have conventional interpretations.[3] These variables include *Leverage*, *Size*, *Liquidity*, *Profitability*, *Dividends*, *REarnings* (retained earnings), *Tobin's Q* (growth opportunities), *Tangibility*, and non-debt tax shields (*NDTS*), which are defined below. For robustness checks, we have also used these control variables in year t–2 and our results remain quantitatively similar (available upon request).

$Leverage_{i,t-1}$ is the ratio of the sum of short-term debt (Compustat data item DLC) and long-term debt (Compustat data item DLTT) scaled by the sum of short-term debt, long-term debt and stockholders' equity (Compustat data item LSE minus data item LT) for firm i in year t–1.

$Size_{i,t-1}$ is the logarithm of sales (Compustat data item SALE) for firm i in year t–1.

$Liquidity_{i,t-1}$ is the ratio of cash and cash equivalent (Compustat data item CHE) to total assets (Compustat data item AT) for firm i in year t–1.

$Profitability_{i,t-1}$ is the ratio of earnings before interest, taxation, depreciation and amortization (Compustat data item EBITDA) to total assets (Compustat data item AT) for firm i in year t–1.

[3] Kisgen (2006) shows a significant negative relation between leverage and debt financing. Titman and Wessels (1988) show that firm size is one of the crucial determinants of the capital structure. Myers (2001) and Fama and French (2002) demonstrate that profitability is an important factor affecting the capital structure. Growth options (defined as Tobin's Q in our study) and tangibility are variables affecting the leverage ratio in Rajan and Signals (1995). Dividend policy and earnings relate to the increase in debt and equity sales (Titman and Wessels (1988)). We include liquidity (see Kim, Mauer, and Sherman (1998)) to control for possible impacts on leverage from firms' cash positions and non-debt tax shields (DeAngelo and Masulis (1980); Bradley, Jarrell, and Kim (1984)). Welch (2004) and MacKay and Phillips (2005) show that industry average leverage ratio is an economically important determinant of capital structure.

Dividends$_{i,t-1}$ is the ratio of dividends (Compustat data item DV) to total assets (Compustat data item AT) for firm *i* in year *t*–1.

REarnings$_{i,t-1}$ is the ratio of retained earnings (Compustat data item RE) to total assets (Compustat data item AT) for firm *i* in year *t*–1.

Tobin's Q$_{i,t-1}$ is growth options and is defined as the ratio of the total book value of debt plus market value of equity (Compustat data item CSHO × data item PRCC) to total assets (Compustat data item AT)) for firm *i* in year *t*–1.

Tangibility$_{i,t-1}$ is the ratio of property, plant, and equipment (Compustat data item PPENT) to total assets (Compustat data item AT) for firm *i* in year *t*–1.

NDTS$_{i,t-1}$ is the non-debt tax shields and is defined as the ratio of deferred taxes and investment tax credit (Compustat data item TXDITC) to total assets (Compustat data item AT) for firm *i* in year *t*–1.

4. Summary Statistics and Main Regression Results

4.1. Summary statistics

Table 1 shows firms' net debt issuance (*NDI*) patterns across credit rating categories. Over time, high credit-quality firms issue more debt than equity, while low-rated firms reduce leverage, on average. These patterns suggest that high credit-quality firms are more able to access the debt market than low credit-quality firms. This has important implications for our study as we want to examine whether or not firms, especially investment-grade firms, reduce their net debt issuance when peer firms experience credit rating upgrades or downgrades.

[Insert Table 1 here]

Table 2 shows the year-by-year percentages of firms in our sample that have experienced credit rating upgrades and downgrades of their industry peers, respectively. The results demonstrate the importance of the peer rating effects: the percentage of firms that are affected by peer rating upgrades stands at a minimum of 23% of total sample firms in 1986 and goes as high as 53% in 2013; the percentage of firms that are affected by peer rating downgrades ranges between 29% in 1992 and 56% in 2001. Note that our analyses require one year for observing a change in the credit rating to a peer firm. Thus, Table 2 reports results up to year 2013.

On the other hand, the proportion of firms experienced peer firm rating downgrades is generally higher than the proportion of peer firm rating upgrades. This pattern starts from 1985 and continues until 2009, when it exhibits an interesting reversal in 2010 whereby peer firm upgrades outweigh peer firm downgrades. The overall pattern coincides with what we report in Appendix Table 1 that the number of firms being upgraded turns higher than the number of firms being downgraded since 2010, which may reflect the recovery in the economy after the financial crisis.

[Insert Table 2 here]

Table 3 presents summary statistics of variables in this study. Panel A shows summary statistics for the whole sample, while Panel B separates the sample into two parts with one sub-sample containing investment-grade firms and the other containing speculative-grade firms. On the financing activities, Panel A shows that rated firms issue more debt than equity, on average. The average change in debt ($\Delta Debt$) is 2.4% and the average change in equity ($\Delta Equity$) is 0%, suggesting that firms, on average, issue 2.4% more debt than equity (i.e., $NDI = (\Delta Debt - \Delta Equity)$) relative to total assets in the previous year. In addition, cross-sectional variation in $\Delta Debt$ is higher than variation in $\Delta Equity$. Firms also tend to have more net increases in long-

term debt (ΔLTD) than net increases in short-term debt (ΔSTD) (2.3% versus 0.10%). Overall, firms adjust their capital structure via using the debt market than going through the equity market.

[Insert Table 3 here]

On average, firms finance 56% of total assets by debt (*Leverage*) and are generally profitable with a mean profitability of 13.5% and paying dividends equivalent to 1.5% of their total assets. In contrast to studies that use samples consisting of all firms collected from Coumpustat, our sample focuses on rated firms that tend to have high leverage (see Faulkender, Michael, and Petersen (2006), and Kisgen (2006)). A significant 34% of firms' assets are fixed. Standard deviations of most variables, however, show considerable cross-sectional variations, which illustrate the differences in firm leverage. It is therefore necessary to control for firm characteristics when examining the relative importance of credit ratings changes of peer firms on capital structure. The difference in the level of average industry credit rating, $INDCR_{diff}$, ranges from -0.72 to 0.45, indicating swings in industry-wide credit rating changes.

The mean values of both variables $UGNDI_{ind}$ and $DGNDI_{ind}$ are positive, which shows that the average net debt issuance of the both the upgraded and downgraded industry peers *increase* net debt issuance in the year following their own rating changes. This is important because our findings reported in later sections show that the firm that observed peer firms being downgraded actually *reduces* its net debt issuance, which is in the opposite direction to those peer firms that were downgraded.

Panel B of Table 3 shows that investment-grade firms are larger in size than speculative-grade firms and have lower leverage, higher profitability, higher retained earnings, higher dividends, higher growth options as proxied by Tobin's *Q*, and higher net debt issuance. These

differences suggest that lowly rated firms may have less flexibility than highly rated firms in adjusting their debt financing when the ratings of peer firms are changed. In an unreported test, we find that firms with a B+ rating or below are more financially constrained than other speculative-grade firms. The evidence presented here echoes our finding reported in Table 1 that high credit-quality firms tend to have better access to the debt market than low credit-quality firms.

4.2. The relation between credit rating changes of peer firms and net debt issuance: Baseline results

Our hypotheses predict an insignificant relation between debt financing and UG^P and a significant negative relationship between debt financing and DG^P. To examine the impacts of peer rating upgrades and downgrades on firm financing, we estimate the following model:

$$NDI_{i,t} = \beta_0 + \beta_1 UG^P_{i,t-1} + \beta_2 DG^P_{i,t-1} + \beta_3 X_{i,t-1} + \varepsilon_{i,t-1}, \quad (1)$$

where $NDI_{i,t,}$ is the net debt issuance of firm *i* in year *t*. The peer rating upgrade UG^P takes place in year *t*-1 and takes the value of 1 if one or more peer firms experienced upgrades between year *t*-2 and year *t*-1, while the firm itself was not upgraded. Likewise, the peer rating downgrade DG^P takes place in year *t*-1 and takes the value of 1 if one or more peer firms experienced downgrades between year *t*-2 and year *t*-1, while the firm itself was not downgraded. We classify the sample firms into 17 industries based on the industry classification of Kenneth French. Excluding utility and financial firms, we are left with 15 industries. It is important to note that the number of industries eligible for analyses is dictated by our identification of industry peers. To be included for analysis, an industry must have a group of firms that share an identical credit rating in a year and satisfy the condition that one or more of the firms in the group are either

upgraded or downgraded in the next year, while others' rating remains unchanged.[4] In our sample, the maximum number of firms being downgraded in a peer group is 28, and the maximum number of firms being upgraded in a peer group is 14.

In the above regression specification, $X_{i,t-1}$ is a set of control variables including firm-level and industry characteristics that are observable at the end of year *t*-1. The regression equation tests whether net issuance of debt for a particular firm-year is affected by changes in credit ratings of peer firms in the previous firm-year. The slope coefficients β_1 and β_2 capture the effects of adjustments in net debt issuance due to peer rating upgrades and downgrades, respectively. Standard errors in all regressions are clustered for firms and years.

The main results for the effect of credit rating downgrades of peer firms (DG^P) reported in Columns 1 through to 3 of Table 4 are significant, both economically and statistically, and are robust to the controls of industry characteristics. Column 1 reports that credit rating downgrades of peer firms (DG^P) has a significant and negative impact on firm financing, having controlled for the change in average credit ratings in the industry ($INDCR_{diff}$) and the effect of net debt issuance ($UGNDI_{ind}$ and $DGNDI_{ind}$) of those upgraded and downgraded peer firms. Further controlling for firm-level characteristics, Column 2 reveals that firms witnessing peer rating downgrades reduce more debt than equity, of approximately 1.40% (*t*-stat = −4.95) to total assets. This finding supports our first hypothesis. In line with the prediction of our second hypothesis, we do not find

[4] We also used the classification of 30 industries. The relevant coefficient estimates show lower magnitudes due to the fewer number of firms available and eligible for analysis within an industry, but the overall results remain qualitatively similar and do not change our conclusions. Although adopting broader rating categories, instead of using an identical rating, would have more firms in an industry peer group while allowing for more detailed industry classification, the peer effects we intend to analyze are not precisely addressed. For example, the competition consideration among three firms with respective ratings of A-, A and A+ is not straightforward when the firm with an A+ rating is downgraded to A. Also, as Kisgen (2006) points out, a rating of A+ is considered differently from a rating of A in terms of discrete costs and benefits of ratings. In addition, we used the text-based industry classification based on the fitted Herfindahl index of Hoberg and Phillips (2016) to closely identify product market peers. However, this approach often reclassifies a firm's industry from year to year, and hence some of the same-rating peers in one year are moved to a different industry next year, which makes our analyses unfeasible. Thus, the classification of industries in our setting is a necessary tradeoff between the feasibility of implementing the analysis and the refinement in the identification of industry peers.

credit rating upgrades of peer firms (UG^P) to have any significant impact on firm financing, even after controlling for firm-level and industry characteristics. Since the regression coefficients on UG^P are all insignificant in the remaining tests, we mainly discuss the results for DG^P.

[Insert Table 4 here]

We find in Column 2 that the net debt issuance of downgraded peer firms $DGNDI_{ind}$ is significantly and positively associated with the firm's own net debt issuance (coeff. = 3.86; *t*-stat = 3.17). This result is consistent with the finding of Leary and Roberts (2014) that a firm's own financing policy is affected by peer firms' financial policy. In Column 3 of Table 4, in addition to firm-level controls as in Column 2, we further control for other industry-level characteristics: industry averages of leverage, size, liquidity, profitability, dividends, growth options, tangibility, and *NDTS* (non-debt tax shields), where industry averages are calculated for each fiscal year (lagged by one year, which is the year when peer firms' ratings were changed) for each variable. We find that the effect of peer firm downgrades on leverage becomes even stronger (coeff. = –1.53; *t*-stat = –5.46). Overall, the results reported in Table 4 are consistent with both Hypotheses 1 and 2.

4.3. The relation between credit rating changes of peer firms and adjustments in debt and equity

We take a closer look at the financing adjustments by evaluating the decisions to increase (or reduce) debt and equity in the subsequent year following credit rating upgrades and downgrades of peer firms. Table 5 presents the results. Coefficient estimates for the firm-level and industry-level controls in Tables 5 to Table 12 are not reported for brevity, but are available upon request. We find that, following credit rating downgrades of peer firms, firms are more likely to deleverage. The results in Column 1 show that, when witnessing rating downgrades of

peer firms, net debt shows a negative change (Δ*Debt*) of −1.38% (*t*-stat = −5.42) to total assets after controlling for firm-level and industry-level characteristics, indicating a debt reduction. Column 2 shows that firms do not make significant changes in equity when peer firms are downgraded. The changes in debt and equity components as shown in Column 3 through to Column 6 suggest that the coefficient on DG^P observed in Column 1 is mainly attributable to the reduction in debt issuance (-1.61% with a *t*-stat = −3.73 in Column 3) following rating downgrades of peer firms.

[Insert Table 5 here]

4.4. The relation between credit rating changes of peer firms and debt maturity: Short-term vs. long-term debt

We further consider the heterogeneity in the debt maturity by decomposing changes in debt into changes in short-term debt ($\Delta STD_{i,t}$) and changes in long-term debt ($\Delta LTD_{i,t}$) as defined earlier, and then separately estimate the regression model below:

$$\Delta STD_{i,t}\ (or\ \Delta LTD_{i,t}) = \beta_0 + \beta_1 UG^P_{i,t-1} + \beta_2 DG^P_{i,t-1} + \beta_3 X_{i,t-1} + \varepsilon_{i,t-1}, \quad (2)$$

Table 6 reports the regression results. As shown in Columns 1 and 2, we find that credit rating downgrades of peer firms mainly affect the change in long-term debt. In Column 2, the coefficient estimate on DG^P is −1.35 (*t*-stat = −5.48), which shows that, when peer firms' credit ratings were downgraded, firms reduce their long-term debt by 1.35% to total assets. Although firms also reduce their short-term debt, the reduction is small (0.06%) and statistically insignificant. As expected, we also find that the net debt issuance of downgraded peer firms, $DGNDI_{ind}$, exerts a strong effect on the changes in long-term debt: the coefficient is significantly positive (coeff. = 2.81; *t*-stat = 3.74). Our finding that firms mainly reduce their long-term debt

rather than short-term debt following rating downgrades of peer firms implies that reducing long-term debt is likely to be a more effective strategy for maintaining good credit ratings. This firm behavior is consistent with the rating evaluation practices of rating agencies. In sum, the results in Table 6 are consistent with Hypothesis 3.

[Insert Table 6 here]

5. Cross-firm Variation in the Peer Firm Effect

5.1. The relation between credit rating changes of peer firms and net debt issuance: Investment-grade firms versus speculative-grade firms

In this section we examine whether investment-grade and speculative-grade firms respond differently to credit rating changes of peer firms. To this end, we first introduce two explanatory variables into the regressions: the credit rating level (*Rating*) and the investment grade status (*IG*). Specifically, the variable *Rating* is the numerical value of credit rating (22 for AAA, 21 for AA+…, etc.) of a firm in the previous year. The dummy variable *IG* is equal to one if a firm's credit rating is an investment grade in the previous year, and is equal to zero otherwise.

Columns 1 and 2 of Table 7 report the results, respectively. In Column 1, the positive coefficient on *Rating* indicates that the higher the rating a firm receives, the more debt a firm issues. In Column 2, the dummy variable *IG* has a highly significant and positive coefficient. This finding indicates that, relative to non-investment-grade firms, investment-grade firms issue 1.44% more net debt. These results are consistent with those reported in Table 1 and Panel B of Table 3. Importantly, in Columns 1 and 2, the coefficients on DG^P are −1.62 (*t*-stat = −5.61) and −1.55 (*t*-stat = −5.53), respectively. Overall, these findings indicate that firms reduce leverage when the credit rating of peer firms were downgraded in the previous year, even after controlling for a firm's credit rating level (*Rating*) or whether a firm is of investment-grade (*IG*).

[Insert Table 7 here]

Furthermore, we separately estimate the regression for investment-grade firms and speculative-grade firms. The coefficients on DG^P in Columns 3 and 4 of Table 7 show that following rating downgrades of peer firms, investment-grade firms reduce net debt issuance to a greater extent (coeff. = −1.59; *t*-stat = −4.39) than do speculative-grade firms (coeff. = −1.47; *t*-stat = −3.04). In general, we find that deleveraging triggered by credit rating downgrades of peer firms is prevalent across both speculative-grade and investment-grade firms. Nevertheless, relative to the effect on speculative-grade firms, investment-grade firms exhibit a stronger debt reduction effect. Our findings suggest that investment-grade firms are more concerned about credit rating downgrades of peer firms than are speculative-grade firms. Overall, these results support our Hypothesis 4.

Consistent with our findings reported earlier, Columns 3 and 4 of Table 7 show that credit rating upgrades of peer firms do not exert any significant effect on a firm's financing, regardless of whether the firm is of investment or speculative grade. These findings are consistent with those reported in Columns 1 and 2, and support our Hypothesis 2.

5.2. Firms close to the boundary between investment grades and speculative-grades

In this section, we look into detailed rating categories to analyze the effect of credit rating changes of peer firms. Table 8 reports the results. As shown in Column 1, firms with a credit rating of A- or above reduce net debt issuance by 2.14% (*t*-stat = −4.54) of total assets when their peer firms were downgraded. These results suggest that top-rated firms, those who typically have less cash flow problems, are those that are most sensitive to the rating changes of their peers. These top-rated firms embark most strongly on debt reductions.

[Insert Table 8 here]

Column 2 reports that firms with credit ratings between BBB+ and BB- reduce more debt than equity by 1.77% (*t*-stat = −3.82). We breakdown these rating categories separately and report the results in Columns 3 and 4. We find that firms that are at the bottom end of investment grade (coefficient of 1.27% on DG^P for firms with credit ratings of BBB+, BBB and BBB- in Column 3) reduce net debt issuance to a lesser extent than firms that are at the top end of speculative grade (coefficient of 2.21% on DG^P for firms with credit ratings of BB+, BB, and BB- in Column 4). This finding suggests that those firms that are at the top end of speculative grade are more concerned about peer firms' rating downgrades than those firms that are at the bottom end of investment grade.

The above findings motivate us to further look into the effect of 'falling peer angels', i.e., when peer firms are downgraded from investment grade to speculative grade. To this end, we further restrict our analysis to those firms with a rating of BBB- (the lowest investment grade) and those firms with a rating of BB+ (the highest speculative grade). Column 5 shows evidence of 'falling-peer-angels effect' and reports that firms exhibit a reduction in net debt issuance by 1.48% when their peer firms' ratings are downgraded.

On the other hand, we do not find any significant effect of 'rising peer stars', i.e., when peer firms' credit rating are upgraded from the highest speculative grade of BB+ to the lowest investment grade of BBB-. Firms with ratings below B+, as reported in Column 6, do not significantly reduce net debt issuance following peer firms' rating downgrades. These firms tend to have cash flow problems and poor profitability (reported in Panel B of Table 3). Such financial constraints may limit the ability of these firms to access financial markets and reduce debt, thereby restricting their flexibility to respond to credit rating changes of peer firms.

For robustness checks, we also test whether the above reported results are influenced by the proximity to rating changes as defined in Kisgen (2006). Our results (available upon request) remain unchanged when we control for firms with their ratings having '+' (proximity to rating upgrade) or '–' (proximity to rating downgrade).

5.3. The relation between credit rating changes of peer firms and net debt issuance: Large vs. small firms

We now turn to the analysis of whether rating changes of peer firms affect large or small firms differently. We classify a firm, each year, as a large (small) firm if its total assets are greater (less) than the median value of total assets of firms in the industry.

Columns 1 and 2 of Table 9 show the results from the full sample. We find that both small and large firms respond strongly and negatively to rating downgrades of peer firms. Small firms reduce net debt issuance by 1.86% (*t*-stat = −3.52), while large firms reduce NDI by 1.30% (*t*-stat = −4.24). The results indicate that small firms reduce net debt issuance to a greater extent than do large firms, consistent with the prediction of Hypothesis 4.

We further classify firm size separately for investment-grade firms and speculative-grade firms. Columns 5 and 6 show that investment-grade firms, regardless of size, tend to reduce leverage significantly in the subsequent year of observing credit rating downgrades of their peers. These results point toward the reputational concerns of investment-grade firms, regardless of firm size. Columns 3 and 4 report that, among speculative-grade firms, only the small ones significantly reduce net debt issuance in the year subsequent to credit rating downgrades of their peers. The results imply that small size firms with speculative-grade ratings, those typically have

greater financial constraints and are subject to relatively costlier external financing, have more serious concerns about credit rating downgrades of their peers.

[Insert Table 9 here]

5.4. The peer firm effect: Firms in competitive vs. concentrated industries

Next, we analyze whether credit rating changes of peer firms affect firms in competitive industries and concentrated industries differently. We use the Herfindahl–Hirschman Index (or HHI) based on sales as a measure of competitiveness in an industry. We classify firms as operating in competitive (concentrated) industries if the HHI index is below (above) the 33rd (67th) percentile of the index value. Table 10 reports the results. Columns 1 and 2 are based on percentiles computed over the entire sample, while Columns 3 and 4 are based on those in individual years.

Overall, the results indicate that firms in concentrated industries reduce their net debt issuance much more aggressively than firms in competitive industries when peer firms experience credit rating downgrades. For example, when the classification of firms operating in competitive versus concentrated industries is based on the entire sample (Column 1), firms operating in competitive industries reduce their net debt issuance by only 0.63%, which is also statistically insignificant. In contrast, the reduction in net debt issuance for firms in concentrated industries (Column 2) is 1.65% and statistically significant (*t*-stat = −3.03).

The pattern of results is also strong when the classification of firms is based on the HHI index value in individual years. The corresponding reductions are, respectively, 1.68% (*t*-stat = −2.73) for firms in concentrated industries (Column 4) and 0.82% (*t*-stat = −1.19) for firms in competitive industries (Column 3). Overall, the results in Table 10 are consistent with the prediction of Hypothesis 4, and support the argument that, because there are relatively smaller

number of firms within a concentrated industry, a rating downgrade of a firm derives benefits to its rivals, in line with the competition channel outlined by Lang and Stulz (1992).

[Insert Table 10 here]

6. Further Analyses

6.1. Industry-average rating, rating changes of peers, and the capital structure

In this section we address the questions of whether and how the average credit rating of an industry affects a firm's financing in relation to credit rating changes of peer firms. To this end, we first compute the average industry rating in each year and then compare this average rating with the firm's credit rating. Next, we construct a dummy variable, (CR<IND), which takes the value of one if the firm's rating is lower than the average credit rating of the industry, and zero otherwise. We then include this dummy variable in our regression analysis.

Table 11 reports the results. Column 1 shows that firms, on average, reduce net debt by 1.96% (*t*-stat = −3.42) if their credit rating in the previous year is lower than the industry average (i.e., the dummy variable (CR<IND) = 1). This finding suggests a 'lower-than-average effect' where the average credit rating of an industry serves as a reference point for a firm. When the firm's credit rating is lower than this reference point, it tends to reduce its net debt issuance.

[Insert Table 11 here]

Moreover, Column 2 of Table 11 shows that when peers firms are downgraded, the firm reduces its net debt issuance by 1.59% (the coefficient on DG^P = −1.59 with *t*-stat = −5.66) after controlling for the lower-than-average credit quality effect. The lower-than-average effect remains strong and statistically significant: the coefficient on (CR<IND) is equal to −1.98 (*t*-stat = −3.48). On the other hand, the effect of credit rating upgrades of peer firms is statistically insignificant. We also consider the interaction terms between the lower-than-average effect and

the peer rating effect. Column 3 of Table 11 shows that these interaction terms are statistically insignificant, suggesting that there is no complementary or substituting effect between the lower-than-average effect and the peer rating effect.

Column 4 shows that, speculative-grade firms take significant actions to reduce net debt issuance when their credit quality is lower than average (coefficient on (CR<IND) = −2.65 with *t*-stat = −3.19) and when peer firms are downgraded (coefficient on DG^P = −1.49 with *t*-stat = −3.06). Investment-grade firms, in Column 5, exhibit a strong reduction in their net debt issuance with a coefficient of −1.57 (*t*-stat = −4.36) on DG^P. However, we find that the effect of lower-than-average credit quality is statistically insignificant for investment-grade firms. This suggests that the downgrades to peer firms bring down the industry average, which lessens this particular industry pressure, while the fact that peer firms are downgraded does prompt the firm to take actions in reducing its net debt issuance.

6.2. Time-series patterns: Sub-period analyses

Finally, we analyze whether in different economic environments, firms react differently to credit rating changes of peer firms, especially during financial crisis periods. Our results presented in Appendix Table 1 suggest that the effect of credit rating changes of peer firms may vary over time due to the occurrences of major events in the history. We conduct analysis for various sub-periods: before 2001, from 2001 to 2007, after 2007, and after 2009. Our results reported in Table 12 remain consistent over these sub-sample periods. In the years before 2001 (Column 1), firms reduce their net debt issuance following rating downgrades of peer firms. This pattern continues to hold for the next three subsample periods, although the coefficient on DG^P becomes insignificant for the sub-sample after 2007. Firms reduced net debt issuance by 1.44%

before 2001 (Column 1), by 1.73% between 2001 and 2007 (Column 2), and by 0.64% after the recent financial crisis starting from 2007 (Column 3), when peer firms are downgraded.[5] The coefficient estimate on DG^P after 2007 is much lower (and is insignificant) than those for the other two sub-periods. This might be attributable to the liquidity drying up in the state of financial markets, hence making deleveraging difficult for firms. This finding is consistent with that of Mclean and Zhao (2014), who show that external financing costs are high during recessions. By excluding the financial crisis period (2008-2009) (i.e., after 2009 in Column 4), again, the coefficient on DG^P becomes significant and negative, which is also consistent with the findings in Mclean and Zhao (2014).

[Insert Table 12 here]

We further verify whether our results are driven by common macroeconomic factors that could potentially affect both market-wide credit rating changes and the cost of external financing, resulting in changes in firm deleveraging. We follow McLean and Zhao (2014) and define a recession year as a year in which six or more months were in recession as classified by the NBER. There are only three years in our sample period 1985-2014, namely 2001, 2008 and 2009, that satisfy the recession criteria. We then conduct tests for periods in recession and expansion separately. As shown in Columns 5 and 6, our main finding that peer firm rating changes exert an externality effect on a firm's financing is much stronger during the expansion years with the coefficient on DG^P of −1.57 (t-stat = −5.58) than during the recession years with the coefficient of −0.61 (t-stat = −0.73).[6] This result indicates that, when the external financing costs are higher or firms experience more difficulty in accessing external capital markets during recession years,

[5] Given our criteria for identifying peer firms' rating changes, the number of observations available does not allow us to analyze the effects separately for investment-grade and speculative-grade firms for each of these subsample periods.

[6] The regression coefficient on DG^P (−0.61) is still large albeit insignificant during the recession period. This is due to the fact that there are only three recession years during our sample period, leading to a less reliable estimate.

the reduction in net debt issuance of firms is less affected by the rating downgrades of their peer firms.

7. Conclusions

In this paper, we show that credit rating changes of industry peers influence firms' financing activities. All our evidence shows that credit rating downgrades of peer firms create strong externalities for firms in the same industry. In particular, firms embark on significant deleveraging, mainly via the reduction in their long-term debt. The findings are consistent with our hypothesis that firms are mindful of each other's misfortune. When their peers are downgraded, which suggests potential contagions or opportunities to gain competitive advantages, firms vigilantly manage financing activities in a precautious manner by reducing net debt.

Further, we show a very strong peer rating effect for investment-grade firms. When peer firms are downgraded, the top-rated firms significantly reduce net debt issuance. In addition, those firms that are at the top end of speculative-grade, hence near the boundary of investment grades, exhibit particularly strong reductions in net debt issuance when their peers were downgraded. We also find a strong evidence of an effect of 'falling peer angels' in which peer firms are downgraded from the lowest investment grade to a speculative grade.

The peer effects we document are ubiquitous among investment-grade and speculative-grade firms, prevalent over time, and are widespread across small and large firms. However, we do observe cross-sectional variation in the peer effect. The peer effect is stronger for investment-grade firms, smaller firms, and firms operating in more concentrated industries, and in times when the economy is in expansion.

Moreover, we also document a distinct and significant lower-than-average credit quality effect. That is, firms reduce leverage substantially when their credit rating is lower than the average credit rating of the industry. Importantly, the peer rating effect remains strong and statistically significant after controlling for the lower-than-average credit quality effect. Our findings highlight the significance of the interactions among firms and how these interactions can play a role in firms' financing activities.

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Table 1. Net debt issuance across credit ratings

Panel A of this table shows the mean value of Net Debt Issuance (NDI) across credit ratings in the sample. The sample of rated firms is from Compustat for 1985-2014 where credit ratings are as of the beginning of each year. Panel B reports the distribution of rating upgrades and downgrades across the sample period. "Investment" denotes investment grade (BBB or above), while "Speculative" denotes speculative grade (BBB- or below) before an upgrade or a downgrade.

	AAA	AA+	AA	AA-	A+	A	A-
No. of Firm-Years	421	148	583	565	1,090	1,715	1,209
Net Debt Issuance (NDI)	3.12%	2.60%	3.61%	4.09%	4.36%	3.95%	4.44%
	BBB+	BBB	BBB-	BB+	BB	BB-	B+
No. of Firm-Years	1,652	2,284	1,917	1,484	2,226	2,991	3,644
Net Debt Issuance (NDI)	4.30%	3.56%	2.65%	2.80%	2.32%	2.67%	1.71%
	B	B-	CCC+	CCC	CCC-	CC &Below	
No. of Firm-Years	2,156	1,086	481	268	124	544	
Net Debt Issuance (NDI)	0.97%	-1.08%	-3.14%	-1.61%	-1.81%	-0.80%	

Table 2. Percentage of firms affected by peer upgrades and downgrades over the sample year

The table shows the percentage of firms affected by peer upgrades and downgrades over the sample period. Peer upgrades and downgrades occur when one or more peer firms (firm or firms with the same rating within the same industry in the same year) are upgraded or downgraded in the next year.

	1986	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Peer Upgrades	22.93%	36.08%	32.15%	40.05%	25.35%	29.55%	28.92%	29.16%	37.12%	39.52%
Peer Downgrades	36.42%	43.64%	49.00%	38.11%	45.35%	39.90%	28.92%	34.54%	30.63%	34.51%
Total Firms	626	887	913	889	868	811	781	809	873	893
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Peer Upgrades	33.12%	44.78%	40.69%	30.16%	39.59%	33.89%	28.53%	39.14%	35.02%	41.33%
Peer Downgrades	34.95%	38.16%	43.07%	51.63%	52.49%	55.93%	47.05%	52.01%	48.66%	48.46%
Total Firms	940	982	1026	1091	1147	1153	1141	1141	1106	1059
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**		
Peer Upgrades	39.84%	41.62%	38.27%	33.15%	45.15%	44.71%	43.78%	53.13%		
Peer Downgrades	44.40%	42.56%	42.81%	44.96%	30.81%	34.68%	42.11%	34.79%		
Total Firms	1031	981	964	950	905	907	918	911		

Table 3. Summary statistics of variables

This table reports the descriptive statistics of the variables used in regressions. The sample is from Compustat for the period 1985-2014 and excludes financial and utility firms. Δ*Debt* is the change in debt defined as long-term debt issuance minus long-term debt reduction plus the change in current debt scaled by a firm's total assets. Δ*Equity* is sales of common and preferred stock minus purchases of common and preferred stock scaled by a firm's total assets. *NDI* (=Δ*Debt* – Δ*Equity*) is the change in debt minus the change in equity scaled by total assets at the beginning of each year. Δ*STD* is the change in current debt scaled by total assets. Δ*LTD* is long-term debt issuance minus long-term debt reduction scaled by total assets. *Debt Issuance* is long-term debt issuance, *Debt Reduction* is long-term debt reduction, *Equity Issuance* is sales of common and preferred stock, *Equity Reduction* is purchases of common and preferred stock, all normalized by total assets. *Leverage* is the ratio of the sum of short-term debt and long-term debt to the sum of short-term debt, long-term debt, and stockholders' equity. *Size* is the logarithm of sales. *Liquidity* is the ratio of cash and cash equivalent to total assets. *Profitability* is the ratio of earnings before interest, tax, depreciation, and amortization to total assets. *Dividends* are the ratio of dividends to total assets. *REarnings* are the ratio of retained earnings to total assets. *Tobin's Q* is the ratio of the book value of debt plus the market value of equity to total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *NDTS i*s the ratio of deferred taxes and investment tax credit to total assets. Panel A shows summary statistics, while Panel B shows the mean values of the variables used in the regressions classifying firms as investment grade or speculate grade in the previous year. **, **, and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A: Summary statistics of variables

Variable	Mean	Std. Dev.	5th %tile	95th %tile
NDI	0.024	0.193	-0.157	0.264
ΔDebt	0.024	0.172	-0.120	0.228
ΔEquity	0.000	0.094	-0.083	0.079
Debt Issuance	0.162	0.335	0.000	0.702
Debt Reduction	0.135	0.271	0.000	0.559
Equity Issuance	0.020	0.081	0.000	0.096
Equity Reduction	0.021	0.064	0.000	0.104
ΔSTD	0.001	0.070	-0.069	0.071
ΔLTD	0.023	0.166	-0.114	0.220
Leverage	0.560	2.185	0.117	1.258
Size	7.430	1.569	4.931	10.027
Liquidity	0.083	0.110	0.003	0.297
Profitability	0.135	0.094	0.019	0.265
Dividends	0.015	0.052	0.000	0.053
REarnings	0.085	0.636	-0.589	0.595
Tobin's Q	1.347	1.759	0.535	2.946
Tangibility	0.340	0.228	0.044	0.789
NDTS	0.033	0.041	0.000	0.119
$INDCR_{diff}$	-0.080	0.433	-0.724	0.452
$UGNDI_{ind}$	0.006	0.125	-0.122	0.144
$DGNDI_{ind}$	0.031	0.161	-0.052	0.223

Table 3 – Continued

Panel B: Investment-grade firms versus speculative-grade firms: Mean difference

Variable	Speculative grade	Investment grade	Difference (Speculative – Investment)
NDI	0.009	0.044	-0.035***
ΔDebt	0.023	0.025	-0.003
ΔEquity	0.014	-0.019	0.033***
Debt Issuance	0.210	0.099	0.110***
Debt Reduction	0.182	0.073	0.109***
Equity Issuance	0.026	0.012	0.014***
Equity Reduction	0.013	0.032	-0.019***
ΔSTD	0.001	0.001	-0.001
ΔLTD	0.022	0.024	-0.002
Leverage	0.676	0.406	0.270***
Size	6.690	8.407	-1.716***
Liquidity	0.088	0.077	0.083***
Profitability	0.115	0.160	-0.045***
Dividends	0.011	0.022	-0.011***
REarnings	-0.100	0.328	-0.428***
Tobin's Q	1.161	1.553	-0.391***
Tangibility	0.338	0.342	-0.004
NDTS	0.027	0.041	-0.014***

Table 4. Relation between rating changes of peer firms and net debt issuance: Baseline results

This table shows the coefficient estimates from the regression on net debt issuance (in %) with *t*-statistics in the parentheses. UG^P and DG^P are binary variables which take the value 1 if there are one or more peer upgrades or downgrades, (i.e., one or more firms with the same rating within the same industry in the same year that are upgraded or downgraded in the next year). $INDCR_{diff}$ is the change in the level of average credit ratings of an industry, excluding own firm's observation. $UGNDI_{ind}$ and $DGNDI_{ind}$ are the yearly average Net Debt Issuance (*NDI*) of the upgraded and downgraded peer firms, respectively. The detailed definitions of other control variables are described in Table 3. Standard errors are two-way clustered for firms and years. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

	1	2	3
Intercept	2.50***	0.13	-10.30*
	(4.97)	(0.08)	(-1.76)
UG^P	0.16	0.40	0.26
	(0.57)	(1.35)	(0.80)
DG^P	-0.78***	-1.40***	-1.53***
	(-2.58)	(-4.95)	(-5.46)
$INDCR_{diff}$	-0.93	-0.95	-0.79
	(-1.59)	(-1.55)	(-1.39)
$UGNDI_{ind}$	2.30	2.01	1.09
	(0.93)	(0.72)	(0.40)
$DGNDI_{ind}$	3.99**	3.86***	3.39***
	(2.24)	(3.17)	(3.21)
Leverage		-0.03	-0.03
		(-0.42)	(-0.44)
Size		-0.24	-0.31*
		(-1.25)	(-1.69)
Liquidity		4.48**	4.04*
		(2.08)	(1.91)
Profitability		24.61***	23.75***
		(6.63)	(6.56)
Dividends		0.63	1.58
		(0.16)	(0.41)
Earnings		2.63***	2.80***
		(4.87)	(4.83)
Tobin's Q		0.39	0.33
		(1.25)	(1.24)
Tangibility		-0.22	-0.21
		(-0.24)	(-0.21)
NDTS		7.72**	3.58
		(2.20)	(0.95)
Industry characteristics	No	No	Yes
Adj. R^2	0.009	0.029	0.033
N	20,074	20,074	20,074

Table 5. Relation between rating changes of peer firms and the components of corporate financing

This table shows the regression coefficients and *t*-statistics in the parentheses on the change in debt (Column 1), the change in equity (Column 2), debt issuance (Column 3), debt reduction (Column 4), equity issuance (Column 5), and equity reduction (Column 6), with all variables measured in %. UG^P and DG^P are binary variables which take the value 1 if there are one or more peer upgrades or downgrades, (i.e., one or more firms with the same rating within the same industry in the same year that are upgraded or downgraded in the next year). $INDCR_{diff}$ is the change in the level of average credit ratings of an industry, excluding own firm's observation. $UGNDI_{ind}$ and $DGNDI_{ind}$ are the yearly average Net Debt Issuance (*NDI*) of the upgraded and downgraded peer firms, respectively. The detailed definitions of other control variables are described in Table 3. Standard errors are two-way clustered for firms and years. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

	1	2	3	4	5	6
	ΔDebt	ΔEquity	Debt Issuance	Debt reduction	Equity issuance	Equity reduction
Intercept	1.44	11.78***	-3.90	-4.11	5.04**	-6.90***
	(0.33)	(3.94)	(-0.43)	(-0.53)	(2.44)	(-2.69)
UG^P	0.19	-0.09	1.41**	1.18**	-0.09	0.02
	(0.56)	(-0.41)	(1.99)	(2.07)	(-0.44)	(0.27)
DG^P	-1.38***	0.15	-1.61***	-0.36	0.02	-0.16
	(-5.42)	(0.88)	(-3.73)	(-1.01)	(0.12)	(-1.50)
$INDCR_{diff}$	-1.27***	-0.49**	-1.35*	0.08	-0.54**	0.00
	(-2.61)	(-2.30)	(-1.90)	(0.21)	(-2.42)	(0.02)
$UGNDI_{ind}$	2.45	1.35	4.36	1.78	1.89	0.52
	(1.39)	(0.88)	(1.60)	(0.96)	(1.14)	(1.51)
$DGNDI_{ind}$	2.92***	-0.49	3.53**	0.79	0.15	0.70
	(3.74)	(-0.77)	(2.20)	(0.69)	(0.32)	(1.61)
Firm-level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.029	0.061	0.050	0.055	0.033	0.093
N	19,915	19,905	19,194	19,485	19,259	18,869

Table 6. Relation between rating changes of peer firms and short-term versus long-term debt

This table shows the coefficient estimates from the regression on changes in short-term dent (Δ*STD*) and changes in long-term debt (Δ*LTD*) for the full sample and for investment-grade and speculative-grade firms separately. Both Δ*LTD and* Δ*STD* are measured in %. UG^P and DG^P are binary variables which take the value 1 if there are one or more peer upgrades or downgrades, (i.e., one or more firms with the same rating within the same industry in the same year that are upgraded or downgraded in the next year). $INDCR_{diff}$ is the change in the level of average credit ratings of an industry, excluding own firm's observation. $UGNDI_{ind}$ and $DGNDI_{ind}$ are the yearly average Net Debt Issuance (*NDI*) of the upgraded and downgraded peer firms, respectively. The detailed definitions of other control variables are described in Table 3. Standard errors are two-way clustered for firms and years. The *t*-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

	1 Changes in short-term debt (ΔSTD)	2 Changes in long-term debt (ΔLTD)
Intercept	2.02	0.33
	(1.08)	(0.08)
UG^P	0.05	0.15
	(0.58)	(0.47)
DG^P	-0.06	-1.35***
	(-0.50)	(-5.48)
$INDCR_{diff}$	0.22	-1.39***
	(1.38)	(-2.99)
$UGNDI_{ind}$	0.15	2.37
	(0.31)	(1.44)
$DGNDI_{ind}$	0.19	2.81***
	(0.71)	(3.74)
Firm-level Controls	Yes	Yes
Industry Characteristics	Yes	Yes
Adj. R^2	0.003	0.030
N	9,367	20,074

Table 7. Relation between rating changes of peer firms and net debt issuance: Investment-grade versus speculative-grade firms

This table shows the coefficient estimates from the regression on net debt issuance (in %) for the full sample and for investment-grade and speculative-grade firms separately. UG^P and DG^P are binary variables which take the value 1 if there are one or more peer upgrades or downgrades, (i.e., one or more firms with the same rating within the same industry in the same year that are upgraded or downgraded in the next year). *Rating* is a numerical bond rating with AAA = 22… and D/SD = 1. *IG* is a dummy variable that equals 1 for investment-grade firms and zero otherwise. $INDCR_{diff}$ is the change in the level of average credit ratings of an industry, excluding own firm's observation. $UGNDI_{ind}$ and $DGNDI_{ind}$ are the yearly average Net Debt Issuance (*NDI*) of the upgraded and downgraded peer firms, respectively. The detailed definitions of other control variables are described in Table 3. Standard errors are two-way clustered for firms and years. The *t*-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

	1	2	3	4
	Net debt issuance (NDI)	Net debt issuance (NDI)	Net debt issuance (NDI): Speculative Grade	Net debt issuance (NDI): Investment Grade
Intercept	-15.69***	-11.43*	-13.05*	-4.19
	(-2.62)	(-1.95)	(-1.88)	(-0.69)
UG^P	0.46	0.37	0.66	-0.06
	(1.42)	(1.13)	(1.32)	(-0.19)
DG^P	-1.62***	-1.55***	-1.47***	-1.59***
	(-5.61)	(-5.53)	(-3.04)	(-4.39)
Rating	0.34***			
	(3.92)			
IG		1.44***		
		(3.00)		
$INDCR_{diff}$	-0.78	-0.79	-1.42**	-0.09
	(-1.37)	(-1.40)	(-2.11)	(-0.21)
$UGNDI_{ind}$	0.94	0.99	-0.47	5.39**
	(0.34)	(0.36)	(-0.15)	(2.55)
$DGNDI_{ind}$	3.47***	3.46***	3.46***	2.16
	(3.11)	(3.21)	(3.06)	(1.14)
Firm-level Controls	Yes	Yes	Yes	Yes
Industry Characteristics	Yes	Yes	Yes	Yes
Adj. R^2	0.035	0.034	0.024	0.073
N	20,074	20,074	10,739	9,335

Table 8. Relation between rating changes of peer firms and net debt issuance: Near investment grade and speculative grade boundaries

This table shows the coefficient estimates from the regression on net debt issuance (in %) for firms near the bottom end of investment grade or the top end of speculative grade. UG^P and DG^P are binary variables which take the value 1 if there are one or more peer upgrades or downgrades, (i.e., one or more firms with the same rating within the same industry in the same year that are upgraded or downgraded in the next year). $INDCR_{diff}$ is the change in the level of average credit ratings of an industry, excluding own firm's observation. $UGNDI_{ind}$ and $DGNDI_{ind}$ are the yearly average Net Debt Issuance (*NDI*) of the upgraded and downgraded peer firms, respectively. The detailed definitions of other control variables are described in Table 3. Standard errors are two-way clustered for firms and years. The *t*-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

	1 AAA thru A-	2 BBB+ thru BB-	3 BBB+,BBB and BBB-	4 BB+, BB and BB-	5 BBB- and BB+	6 B+ thru D
Intercept	1.42	-17.88***	-9.60	-20.09**	-7.99	-3.04
	(0.21)	(-2.67)	(-1.37)	(-2.39)	(-0.97)	(-0.35)
UG^P	-0.51	0.32	0.41	0.30	-0.38	0.99
	(-1.28)	(0.81)	(0.94)	(0.45)	(-0.57)	(1.22)
DG^P	-2.14***	-1.77***	-1.27**	-2.21***	-1.48**	-0.52
	(-4.54)	(-3.82)	(-2.26)	(-3.68)	(-2.05)	(-0.62)
$INDCR_{diff}$	-0.28	-0.58	0.19	-1.29	-0.12	-1.47
	(-0.51)	(-0.88)	(0.36)	(-1.46)	(-0.13)	(-1.52)
$UGNDI_{ind}$	11.74*	2.82	2.98	2.18	0.02	-7.05
	(1.73)	(1.57)	(1.06)	(1.10)	(0.00)	(-0.80)
$DGNDI_{ind}$	-5.61***	5.49***	5.13*	5.18***	9.55	1.57
	(-2.79)	(4.48)	(1.82)	(3.69)	(1.21)	(0.78)
Firm-level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.084	0.042	0.070	0.044	0.060	0.015
N	4,534	10,234	4,801	5,433	2,707	5,306

Table 9. Relation between rating changes of peer firms and net debt issuance: Small versus large firms

This table shows the coefficient estimates from the regression on net debt issuance (in %) partitioned by firm size (using yearly industry median) for the full sample and for firms classified as investment-grade firms and speculative-grade firms by S&P separately. UG^P and DG^P are binary variables which take the value 1 if there are one or more peer upgrades or downgrades, (i.e., one or more firms with the same rating within the same industry in the same year that are upgraded or downgraded in the next year). $INDCR_{diff}$ is the change in the level of average credit ratings of an industry, excluding own firm's observation. $UGNDI_{ind}$ and $DGNDI_{ind}$ are the yearly average Net Debt Issuance (*NDI*) of the upgraded and downgraded peer firms, respectively. The detailed definitions of other control variables are described in Table 3. Standard errors are two-way clustered for firms and years. The *t*-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

	Full sample		Speculative grade		Investment grade	
	1 Less than median	2 Greater than median	3 Less than median	4 Greater than median	5 Less than median	6 Greater than median
Intercept	-13.86*	-6.68	-13.13	-5.40	-20.86*	-2.20
	(-1.79)	(-0.97)	(-1.63)	(-0.46)	(-1.86)	(-0.36)
UG^P	1.30***	-0.51	1.69***	-2.00*	0.04	-0.20
	(3.05)	(-1.07)	(3.54)	(-1.82)	(0.05)	(-0.56)
DG^P	-1.86***	-1.30***	-1.90***	0.06	-1.46*	-1.69***
	(-3.52)	(-4.24)	(-3.13)	(0.06)	(-1.87)	(-4.71)
$INDCR_{diff}$	-1.13*	-0.34	-1.86**	0.11	1.07	-0.36
	(-1.74)	(-0.48)	(-2.20)	(0.07)	(1.46)	(-0.74)
$UGNDI_{ind}$	1.22	-0.50	0.94	-4.43	2.24	5.83**
	(0.62)	(-0.08)	(0.46)	(-0.48)	(0.82)	(2.47)
$DGNDI_{ind}$	2.31*	4.46***	2.67**	4.80***	-4.43	3.33*
	(1.82)	(3.20)	(1.99)	(2.94)	(-1.32)	(1.76)
Firm-level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.029	0.046	0.024	0.049	0.097	0.077
N	9,217	10,857	7,432	3,307	1,785	7,550

Table 10. Relation between rating changes of peer firms and net debt issuance: Competitive v.s. concentrated industries

This table shows the coefficient estimates from the regression on net debt issuance (in %) partitioned by market competition. We use the Herfindahl–Hirschman Index (or HHI) based on sales as our measure of competitiveness in an industry. We classify firms as operating in competitive (concentrated) industries if the HHI index is below (above) the 33rd (67th) percentile. UG^P and DG^P are binary variables which take the value 1 if there are one or more peer upgrades or downgrades, (i.e., one or more firms with the same rating within the same industry in the same year that are upgraded or downgraded in the next year). The detailed definitions of control variables are described in Table 3. Standard errors are two-way clustered for firms and years. The *t*-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

	1 Competitive industries: HHI less than 33% (calculated over the sample period)	2 Concentrated industries: HHI greater than 67% (calculated over the sample period)	3 Competitive industries: HHI less than 33% (calculated for individual years)	4 Concentrated industries: HHI greater than 67% (calculated for individual years)
Intercept	7.40	-4.24	2.26	-7.40*
	(0.94)	(-0.89)	(0.37)	(-1.81)
UG^P	-0.56	-0.58	-0.16	0.04
	(-0.92)	(-1.18)	(-0.23)	(0.09)
DG^P	-0.63	-1.65***	-0.82	-1.68***
	(-0.83)	(-3.03)	(-1.19)	(-2.73)
$INDCR_{diff}$	-1.31	-1.90***	-2.15	-1.89**
	(-0.78)	(-2.66)	(-1.61)	(-2.43)
$UGNDI_{ind}$	1.61	3.60	2.53	-0.87
	(0.56)	(1.27)	(1.14)	(-0.19)
$DGNDI_{ind}$	0.41	1.45	1.29	3.97
	(0.16)	(0.64)	(0.47)	(0.93)
Firm-level Controls	Yes	Yes	Yes	Yes
Industry Characteristics	Yes	Yes	Yes	Yes
Adj. R^2	0.060	0.050	0.054	0.065
N	3,376	4,805	3,815	3,787

Table 11. Industry-average credit ratings, peer rating changes, and net debt issuance

This table shows the coefficient estimates from the regression on net debt issuance (in %) for the full sample and for investment-grade and speculative-grade firms separately after controlling for average industry ratings. (CR<IND) is a dummy variable which takes the value 1 if the firm's credit rating is less than the industry average in a particular year. UG^P and DG^P are binary variables which take the value 1 if there are one or more peer upgrades or downgrades, (i.e., one or more firms with the same rating within the same industry in the same year that are upgraded or downgraded in the next year). The detailed definitions of control variables are described in Table 3. Standard errors are two-way clustered for firms and years. The *t*-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

	1	2	3	4	5
	Net debt issuance (NDI)	Net debt issuance (NDI)	Net debt issuance (NDI)	Net debt issuance (NDI) Speculative grade	Net debt issuance (NDI) Investment grade
Intercept	-10.23*	-8.82	-8.86	-8.77	-4.26
	(-1.73)	(-1.49)	(-1.50)	(-1.33)	(-0.70)
(CR<IND)	-1.96***	-1.98***	-2.44***	-2.65***	0.57
	(-3.42)	(-3.48)	(-4.39)	(-3.19)	(0.46)
(CR<IND)×UG^P			0.77		
			(1.52)		
(CR<IND)×DG^P			0.40		
			(0.60)		
UG^P		0.41	-0.01	0.74	-0.06
		(1.29)	(-0.03)	(1.51)	(-0.20)
DG^P		-1.59***	-1.79***	-1.49***	-1.57***
		(-5.66)	(-4.81)	(-3.06)	(-4.36)
$INDCR_{diff}$		-0.82	-0.83	-1.46**	-0.09
		(-1.44)	(-1.45)	(-2.12)	(-0.18)
$UGNDI_{ind}$		0.83	0.89	-0.71	5.43***
		(0.30)	(0.32)	(-0.22)	(2.58)
$DGNDI_{ind}$		3.46***	3.44***	3.46***	2.18
		(3.16)	(3.13)	(2.99)	(1.14)
Firm-level Controls	Yes	Yes	Yes	Yes	Yes
Industry Characteristics	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.033	0.034	0.034	0.026	0.073
N	20,074	20,074	20,074	10,739	9,335

Table 12. Relation between rating changes of peer firms and net debt issuance: Sub-period analysis

This table shows the coefficient estimates from the regression on net debt issuance (in %) for various sub-periods: before year 2001, from 2001 to 2007, after 2007 and 2009 and for expansion and recession periods separately. UG^P and DG^P are binary variables which take the value 1 if there are one or more peer upgrades or downgrades, (i.e., one or more firms with the same rating within the same industry in the same year that are upgraded or downgraded in the next year). The detailed definitions of control variables are described in Table 3. Standard errors are two-way clustered for firms and years. The *t*-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

	1 Before 2001	2 2001 to 2007	3 After 2007	4 After 2009	5 Expansion Period	6 Recession Period
Intercept	10.94	-37.96**	-22.92*	-20.68	-13.41**	27.84***
	(0.77)	(-2.24)	(-1.73)	(-1.54)	(-2.44)	(2.84)
UG^P	-0.16	-0.06	0.47	1.04**	0.07	0.77***
	(-0.28)	(-0.15)	(0.78)	(2.43)	(0.21)	(3.62)
DG^P	-1.45***	-1.73***	-0.64	-1.39**	-1.57***	-0.61
	(-3.69)	(-5.37)	(-1.11)	(-2.45)	(-5.58)	(-0.73)
$INDCR_{diff}$	-1.99**	-0.59	0.20	0.62*	-1.42**	1.96**
	(-2.42)	(-0.65)	(0.32)	(1.65)	(-2.45)	(2.28)
$UGNDI_{ind}$	-2.07	2.82	4.52***	3.93***	0.33	2.91***
	(-0.41)	(1.59)	(6.66)	(7.03)	(0.09)	(4.13)
$DGNDI_{ind}$	3.03**	1.76	4.06*	1.55	2.96***	5.66***
	(2.54)	(0.60)	(1.80)	(0.44)	(3.04)	(2.83)
Firm-level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.030	0.044	0.102	0.106	0.032	0.081
N	10,031	5,649	5,152	3,644	17,735	2,339

Appendix Table 1

In Appendix Table 1 we report the yearly total number of credit rating upgrades and downgrades as well as the distribution of credit rating changes across two categories of firms: investment-grade firms and speculative-grade firms. We observe some interesting patterns. First, the majority of credit rating upgrades and downgrades occur in investment-grade firms. Second, the number of credit rating downgrades surged in 2001 and 2002, and increased sharply in 2008 and 2009, which are likely due to the dot-com bubble burst in the year 2000 and the recent global financial crisis over the period 2007-2009. Third, the proportion of speculative-grade firms that are downgraded varies over time and increases toward the later part of our sample period, with a noticeable jump in 1999 and reaching more than 55% of all downgrades in 2011. Finally, the proportion of investment-grade firms that are upgraded stood at a high of nearly 76% in 1986, but dropped to a historical low of approximately 41% in 2004 and approximately 43% in 2010, which is then followed by a gradual recovery to reach a new high of 80% in 2014.

Distribution of upgrades and downgrades across years

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Upgrades	0	29	68	69	78	55	68	82	92	64
Investment		75.86%	64.71%	63.77%	67.95%	61.82%	61.76%	53.66%	56.52%	76.56%
Speculative		24.14%	35.29%	36.23%	32.05%	38.18%	38.24%	46.34%	43.48%	23.44%
Downgrades	0	117	108	99	80	102	102	64	62	58
Investment		77.78%	75.93%	70.71%	67.50%	63.73%	60.78%	65.63%	79.03%	79.31%
Speculative		22.22%	24.07%	29.29%	32.50%	36.27%	39.22%	34.38%	20.97%	20.69%

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Upgrades	105	82	93	105	52	62	64	58	91	102
Investment	68.57%	68.29%	67.74%	64.76%	63.46%	69.35%	57.81%	50.00%	59.34%	41.18%
Speculative	31.43%	31.71%	32.26%	35.24%	36.54%	30.65%	42.19%	50.00%	40.66%	58.82%
Downgrades	82	83	75	107	158	176	219	217	173	125
Investment	71.95%	69.88%	68.00%	77.57%	62.03%	72.73%	67.12%	61.29%	65.90%	68.00%
Speculative	28.05%	30.12%	32.00%	22.43%	37.97%	27.27%	32.88%	38.71%	34.10%	32.00%

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Upgrades	97	92	106	95	64	175	149	109	116	10
Investment	62.89%	57.61%	48.11%	61.05%	48.44%	42.86%	56.38%	58.72%	61.21%	80.00%
Speculative	37.11%	42.39%	51.89%	38.95%	51.56%	57.14%	43.62%	41.28%	38.79%	20.00%
Downgrades	156	149	131	171	185	64	67	79	65	3
Investment	66.03%	58.39%	71.76%	59.06%	56.22%	68.75%	44.78%	63.29%	52.31%	66.67%
Speculative	33.97%	41.61%	28.24%	40.94%	43.78%	31.25%	55.22%	36.71%	47.69%	33.33%