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Do Peer Firms Truly Affect Corporate Repurchase Decision?

기업의 자사주 매입 결정과 동료 효과에 대한 연구

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Abstract

Do Peer Firms Truly Affect Corporate Repurchase Decision?

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This paper examines whether peer firms' repurchase activity truly affects other firms' decisions to repurchase as shown in a previous study. I find that the probability of a firm to repurchase goes up as the intensity of its peer firms' repurchase activity increases in the reduced-form regressions. However, the significant influence of peer firms on other firms' repurchase decisions disappears in the second stage when the intensity of peer firms' repurchase activity is instrumented by a firm-specific instrumental variable, peer firm average idiosyncratic risk. On the other hand, when I instrument the intensity of peer firms' repurchase activity by peer firm average systematic risk, the instrumented variable shows its positive and significant relation with the probability of the firm in question to repurchase. These findings suggest that the previous finding, a significant influence of peer firms on other firms' decisions to repurchase, is possibly not caused by peer effects, but by common shocks on the same industry.

Keywords: Share repurchases, Peer effects, Two-stage regressions
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Table of Contents

List of Tables

1. Introduction

Peer effects have been enthusiastically investigated in the fields of economics and finance. Accordingly, such keen attention on peer effects has birthed many interesting papers with regard to peer effects in various corporate financial activities. Bizjak, Lemmon, and Naveen (2008) find that 96% of firms use peer groups as benchmarking when deciding CEO compensation. Bouwman (2011) finds that firms with common directors have similar governance practices. Shue (2013) finds that firms tend to have significantly more similar executive compensation and acquisition strategy if their CEOs are graduates from the same MBA section. Leary and Roberts (2014) show that peer firms play a crucial role in determining corporate capital structure and financial policy. Kaustia and Rantala (2015) find that firms are more likely to split their stock if their peer firms have recently split their stocks.

There are two papers closely related to peer effects on share repurchases. Brav, Graham, Harvey, and Michaely (2005) surveyed 384 financial executives and conducted in-depth interviews with an additional 23 to figure out what factors drive firms to pay dividends and repurchase their stock. In the middle of their study, they find that firms' share repurchase policies affect other firms' decisions to repurchase[1]. Then, Massa, Rehman, and Vermaelen (2007) show that firms mimic the repurchase announcements of their industry

[1] According to Table 10, 31% of firms answer that the share repurchase policies of competitors are a crucial consideration when deciding whether to repurchase shares in the future.

competitors. They argue that since a firm sends a positive signal about itself and a negative one about its competitors by repurchasing its shares, this leads the competitors to follow the repurchasing firm. Specifically, in concentrated industries, a repurchase announcement lowers the stock price of the other firms in the same industry. Even though Massa, Rehman, and Vermaelen (2007) do not directly define this as phenomenon caused by peer effects on share repurchases, the study shows that competitors' repurchase activity affects other firms' repurchase decisions. The three-digit SIC classification used in the paper to define who the competitors of a firms are is also the other studies' standard way to define the peers of a firm (e.g., Faulkender and Yang (2010)).

Unfortunately, this study misses an important consideration that needs to be reflected. In the study, the total number of repurchase announcements (excluding those of the firm in question) that take place in the same three-digit SIC code over the preceding six months, also known as the *Repurchase Wave*, is used as a proxy for the intensity of repurchase activity in the same industry. However, peer effects are difficult to identify due to common shocks. Thus, without addressing this possible endogeneity, the previous finding, a significant influence of peer firms on a firm's decision to repurchase, can possibly be interpreted as being driven by common shocks on the same industry, which lead peer firms to repurchase around the same time. Therefore, using the *Repurchase Wave* is not enough to identify peer effects on share repurchases.

To overcome this identification problem, I utilize an identification strategy that can address it using an instrumental variable. Following Leary and Roberts (2014), I extract idiosyncratic monthly returns from realized monthly returns using an augmented market model. Using the derived idiosyncratic monthly returns during a specific period, I compute their variance for each firm to quantify a firm's specific risk during the period. The idea of using variance as a measure of risk follows the volatility decomposition in Campbell et al. (2001). Then, I average the variances of firms in the same industry except the one for the firm in question, which is the instrumental variable to predict peer firms' repurchase activity caused by their specific risk. This instrument is called peer firm average idiosyncratic risk. The rationale for using peer firm average idiosyncratic risk as an instrument is based on Hoberg and Prabhala (2009), which finds that idiosyncratic risk is a significant determinant of a firm's propensity to pay dividends. When a firm's idiosyncratic risk decreases, the reduced uncertainty leads the firm to save less precautionary cash, and instead pay out more to shareholders. Since Grullon and Michaely (2002) shows that firms have gradually substituted share repurchases for dividends, idiosyncratic risk is also applicable to firms' propensity to repurchase their stock. Idiosyncratic risk is extracted through the process of ruling out market risk and industry risk, which are common shocks on the same industry. Since other firms' idiosyncratic risk cannot affect a firm's own decision to repurchase, with this

instrument, we can properly examine whether peer effects truly exist on corporate share repurchases in the second stage.

First, I find that the probability of a firm's decision to repurchase is positively and significantly related to its peer firms' past two-quarter repurchase activity from the reduced-form logit regressions. This result is consistent with Massa et al. (2007) except that the previous study uses tobit regressions. The reason that I use logit regressions instead of tobit regressions is to clearly reflect firms' decisions to repurchase. On the other hand, when I instrument the intensity of repurchase activity in the same industry using peer firm average idiosyncratic risk, peer firms' repurchase activity during the past two quarters loses its significant influence on other firms' decisions to repurchase. This indicates that firms may not react to their competitors' share repurchases driven by the competitors' specific risk.

Moreover, when I instrument the intensity of peer firms' repurchase activity, which is percentage of peer repurchasers in this paper, with their average systematic risk, the variable retrieves a positive and significant coefficient, just as the one in the reduced-form regressions. This can be interpreted as firms' share repurchases being likely to follow their peer firms' past share repurchases, driven by common shocks on the market and industry. This result directly supports the possibility of common shocks, which leads firms in the same industry to do share repurchases around the same time.

To check the robustness of the findings, I use another proxy for share repurchases. This is because there is no variable in CRSP or Compustat that

clearly represents share repurchases. According to Stephens and Weisbach (1998), share repurchases cannot be directly measured. Thus, they use four alternative proxies including the *Purchase of Common and Preferred Stock* from Compustat, which I use for the main results. However, the variable can overstate stock repurchases because it includes not only purchases of treasury stock but also (1) conversion of class A, class B, and special stock into common stock; (2) conversions of preferred stock into common stock; (3) retirement or redemption of common stock; (4) retirement of preferred stock; and (5) retirement or redemption of redeemable preferred stock. Thus, I use a different proxy for share repurchases using the number of shares outstanding reported on Compustat. If a firm's number of shares outstanding decreases during a specific period, I recognize that the firm has repurchased its stock during the period. Using this different proxy, I still find consistent results. There is no significant peer influence on a firm's own decision to repurchase after ruling out common shocks.

In conclusion, I argue that the previous finding in Massa et al. (2007) is possibly caused by common shocks on the same industry. In other words, firms may not mimic their competitors' repurchase announcements if they are driven by their specific risk. Rather, common shocks on industries can cause the firms to repurchase around the same time.

The paper is organized as follows. Section 2 describes the data. Section 3 discusses the empirical strategy. Section 4 presents the results. Section 5 reports the robustness check. Section 6 concludes this paper.

2. Data

The primary data come from the merged Center for Research in Security Prices (CRSP)-Compustat database. The sample consists of all US-based firms (CRSP share code 10 or 11) and covers the period from 1988 to 2015 with nonmissing data for all explanatory variables. I choose 1988 as the start year because of the October 1987 crash. I exclude financial firms (SIC codes between 6000 and 6999), utilities (SIC codes between 4900 and 4999), and government entities (SIC codes greater than or equal to 9000). Stock returns for the sample firms come from the CRSP monthly stock file. Identifying the actual share repurchases is not straightforward, as share repurchases can neither be observed at the time the reacquisition occurs nor directly measured afterward[2]. Thus, I utilize two of the four alternative proxies used in Stephens and Weisbach (1998), which are the *Purchase of Common and Preferred Stock* and the *Common Shares Outstanding* from Compustat for the main results in Section 4 and the robustness check in Section 5, respectively.

All variable definitions are summarized in Table 1.

Table 2 presents summary statistics for the final sample of 54,598 firm-year observations. Following previous studies, I define peer groups based on three-digit SIC classification[3]. Accounting variables and other controls are decided with reference to previous studies, mostly following Massa et al.

[2] Stephens and Weisbach (1998), p. 318
[3] Faulkender and Yang (2010); Leary and Roberts (2014)

(2007). I Winsorize all variables at the 1st and 99th percentiles except the variables repurchase and percentage of peer repurchasers, which are a dummy variable and bounded between zero and one, respectively. Table 2 also presents summary statistics of additional variables, which are used in Section 5 where the robustness check is conducted with a different proxy for share repurchases.

3. Empirical Strategy

Corporate payout policy is highly affected by various incentives, such as (1) excess debt capacity incentive; and (2) free-cash-flow incentive (Mitchell and Dharmawan (2007))[4]. Those incentives of firms in the same industry are easily exposed to common shocks, which are market shock and industry shock. For example, if an industry is booming, the firms in the industry will subsequently experience a high inflow of cash. Since firms tend to repurchase their stock to distribute excess capital (Dittmar (2000)), the firms exposed to the positive common shocks would buy their stock back around the same time. Therefore, when arguing the existence of peer effects on share repurchases, common shocks have to be seriously considered and thus, an identification strategy is essential to reflect this consideration.

[4] Besides those incentives, Mitchell and Dharmawan (2007) report (1) dividend substitution incentive; (2) information signaling incentive; and (3) insider interest and agency costs incentives.

Massa et al. (2007) identify competitors' influence (peer effects) on other firms' share repurchases using the number of repurchase announcements that occur in the same three-digit SIC code industry for all other firms during the previous six months. However, if common shocks are continuous and thus, last for more than a year, the force which has led peer firms to repurchase would drive other firms to repurchase too. In this case, we cannot conclude that peer firms' share repurchases cause other firms to mimic them. That is why I suggest the necessity of using an instrumental variable that can rule out common shocks from firms' incentives to repurchase.

3.1 Instrumental Variables

In order to minimize the influence of common shocks on peer firms' incentives to repurchase, peer firms' repurchase activity needs to be instrumented by an appropriate instrumental variable. Fortunately, Leary and Roberts (2014) show how to overcome this similar identification problem. In the paper, which examines peer effects on capital structure, they begin with a known determinant of capital structure, stock returns. Then, they extract the idiosyncratic component in stock returns using a traditional asset pricing model that also incorporates an industry factor. Thus, I follow their method and decompose each firm's realized monthly return into idiosyncratic return and expected return using the following market model including an industry factor:

$$r_{ijt} = \alpha_{ijt} + \beta_{ijt}^{M}(rm_t - rf_t) + \beta_{ijt}^{IND}\left(\bar{r}_{-ijt} - rf_t\right) + \eta_{ijt}, \qquad (1)$$

where r_{ijt} refers to the realized return for firm *i* in industry *j* over month *t*, $(rm_t - rf_t)$ is the excess market return, and $\left(\bar{r}_{-ijt} - rf_t\right)$ is the excess return on an equal-weighted industry portfolio excluding firm *i*'s return[5]. Industry portfolios are constructed based on three-digit SIC codes as the peer groups are defined. According to Leary and Roberts (2014), the industry factor is included to remove common variation across firms in the same peer group.

I estimate equation (1) for each firm on a rolling annual basis using historical monthly returns. At least 24 historical monthly returns are required and up to 60 months of data are used in the estimation. The estimated coefficients are used to compute the expected and idiosyncratic returns of the following year as follows:

$$\text{Expected Return}_{ijt} \equiv \hat{r}_{ijt} = \hat{\alpha}_{ijt} + \hat{\beta}_{ijt}^{M}(rm_t - rf_t) + \hat{\beta}_{ijt}^{IND}\left(\bar{r}_{-ijt} - rf_t\right)$$

$$\text{Idiosyncratic Return}_{ijt} \equiv \hat{\eta}_{ijt} = r_{ijt} - \hat{r}_{ijt}$$

Table 3 reports summary statistics for the estimation of the augmented market model. On average, 52 monthly returns are used to estimate each rolling regression, and 60 months are used for the majority of rolling regressions. The adjusted R^2 is 18% on average. The average expected and idiosyncratic return are 1.6% and -0.2%, respectively.

[5] The process of estimating equation (1) and deriving idiosyncratic returns perfectly follows Leary and Roberts (2014).

After computing each firm's idiosyncratic monthly return, I compute their variance. Hoberg and Prabhala (2009) find that a firm's idiosyncratic risk is relevant to its dividend policy. Thus, I substitute the variance of the idiosyncratic monthly returns in place of a firm's idiosyncratic risk. The idea of using a firm's variance of the idiosyncratic returns as a risk measure is consistent with the volatility decomposition in Campbell et al. (2001).

Massa et al. (2007) investigate the number of repurchase announcements made by peer firms during the previous six months before year *t* as a proxy for the intensity of repurchase activity in the industry. In this paper, I investigate the percentage of peer repurchasers during the previous two quarters before year *t* as a proxy for the intensity. I construct an instrumental variable by averaging peer firms' variances of the idiosyncratic monthly returns for the preceding six months before the two quarters prior to year *t*, which is peer firm average idiosyncratic risk. This instrumental variable is used in the first stage to predict the percentage of peer repurchasers driven by their specific risk. In addition, I construct another instrumental variable by averaging peer firms' variances of their expected monthly returns, which is peer firm average systematic risk. This instrument intends to predict peer firms' share repurchases driven by common shocks, in other words, systematic risk in the market and industry. If firms do not react to peer firms' share repurchases led by their idiosyncratic uncertainty, but instead, if other firms' repurchase announcements follow their peer firms' share repurchases driven by systematic uncertainty, then we can conclude that what appear to

be peer effects on share repurchases are possibly caused by common shocks, and the previous study (Massa et al. (2007)) could somewhat lead one to misinterpret the phenomenon.

3.2. Empirical Model

I conduct a two-stage regression approach. The first stage estimates the following linear model:

$$\text{Peer Repurchasers } \%_{-ijt-1} = a_0 + a_1 \overline{\text{Idio Risk}}_{-ijt-1} + \varphi_t, \quad (2)$$

where $\text{Peer Repurchasers } \%_{-ijt-1}$ is percentage of peer repurchasers calculated based on the net dollars spent on repurchases or retirements. If the net dollars spent on repurchases or retirements by a firm is positive, then the firm is defined as a repurchaser. In this way, I compute the percentage of peer repurchasers during the previous two quarters before year *t*. $\overline{\text{Idio Risk}}_{-ijt-1}$ denotes peer firm average idiosyncratic risk excluding the one of firm *i*. The coefficient a_1 is expected to be negative considering the relation between idiosyncratic risk and dividend policy shown in Hoberg and Prabhala (2009).

The second stage estimates the effect of peer firms' repurchases on other firms' decisions to repurchase using logit regressions:

$$\text{Rep}_{ijt} = b_0 + b_1 \widehat{\text{Peer Repurchasers}} \%_{-ijt-1} + b_2 \text{Controls}_{ijt-1} + \varepsilon_t, \quad (3)$$

where Rep_{ijt} is a dummy variable indicating whether the firm has repurchased its stock in year *t* and $\widehat{\text{Peer Repurchasers}} \%_{-ijt-1}$ is the predicted value from regression (2). Control variables are decided to include

known determinants of share repurchases as much as possible (e.g., Stephens and Weisbach (1998); Dittmar (2000)). If peer effects truly exist on share repurchases, b_1 must be positive and significant in the second stage. Additionally, I conduct the same two-stage regression approach using another instrument, peer firm average systematic risk, to examine how systematic risk on the same industry affects the firms' repurchase decisions. Industry fixed effects and year fixed effects are included in all specifications to remove all between-industry variation and capture all common time-varying shocks affecting the perceived desirability of repurchase. Standard errors in all specifications are clustered at the firm level to control for within-firm correlation of the error term (Peterson (2009)).

4. Results

4.1 Reduced-Form Results

I construct logit regressions to examine whether peer firms' past repurchase activity affects other firms' decisions to repurchase. I estimate equation (3) with the actual percentage of peer repurchasers. In this study, repurchase activity in an industry is measured by the proportion of repurchasers excluding the firm in question. The proportion of peer repurchasers are measured during the two quarters prior to year *t*, and the dependent variable is a dummy variable indicating whether the firm in question has repurchased its stock in year *t*.

Table 4 presents the results of the reduced-form logit regressions. As shown in Massa et al. (2007), peer firms' past repurchase activity significantly increases the probability of a firm's decision to repurchase in year *t*. From the results, peer firms' share repurchases seemingly lead other firms to repurchase their stock and thus, peer effects exist on share repurchases.

Other known determinants show the consistent relation with share repurchases as previous studies find (e.g., Dittmar (2000); Mitchell and Dharmawan (2007)) except market-to-book ratio and return. Dittmar (2000) finds that firms repurchase stock when they are potentially undervalued, and the negative and significant coefficient on market-to-book ratio in her paper supports this. However, market-to-book ratio has positive and significant coefficient in Table 4. Additionally, insignificant coefficients on prior year stock return and idiosyncratic return also differ from Stephens and Weisbach (1998), which find that firms repurchase stock after a period of negative stock performance. These results tell us that firms cannot time the market to take advantage of an undervalued stock price and reject the *Undervaluation Hypothesis*. These opposite results are consistently found in Tables 6 and 7. This inconsistency will be reexamined in Section 5 to see whether the opposite results still hold true in other specifications using a different proxy for share repurchases.

4.2. Two-Stage Results[6]

In this subsection, we are going to investigate whether firms react to peer firms' share repurchases driven by their specific risk. If firms do so, then we can conclusively argue that peer effects exist on share repurchases. I estimate equation (2) and (3) step by step. I use peer firm average idiosyncratic risk as the first-stage instrument, and it shows great explanatory power for predicting peer firms' repurchase activity as we can see its high *t*-statistics of -17.53 in Table 5. As expected, idiosyncratic risk is negatively related to a firm's tendency to carry out share repurchases.

With the predicted value of percentage of peer repurchasers, I estimate equation (3), and Table 5 presents the results. The positive and significant coefficient on the percentage of peer repurchasers in the reduced-form regressions disappears in the second stage. From the results, we can see that firms do not react to their competitors' repurchases led by their own uncertainty. Thus, I suggest that the previous finding, a significant influence of peer firms on other firms' share repurchases is possibly not caused by peer effects, but by common shocks on the industry.

To verify this conjecture, I use another instrumental variable, peer firm average systematic risk to predict common-shock-driven peer firms' repurchase activity. Peer firm average systematic risk denotes the average of peer firms' variances of expected monthly returns of the six months preceding

[6] The results (in terms of the significance of the estimates and the marginal effects of the coefficients) are nearly identical when using linear probability (OLS) regressions in the second stage.

the two quarters prior to year *t*. With this differently predicted intensity of repurchase activity, percentage of peer repurchasers retrieves its positive and significant coefficient. It means that firms' share repurchases follow their peer firms' share repurchases if they are driven by uncertainty in the market and industry. However, this does not indicate that firms mimic their industry counterparts' repurchases because the firms are also exposed to said uncertainty. Rather, we can conclude that common shocks on the market and industry possibly lead firms in the same industry to repurchase their stock around the same time.

Then, why do firms not react to their competitors' repurchase announcements even though they may experience negative abnormal return around the announcement dates (Massa et al. (2007))? Actually, the previous study examines at most (−1, +30) cumulative abnormal returns (CAR) of non-repurchasing firms around announcement dates, and it is too short-term to argue that the temporary negative abnormal returns affect the firms' decisions to repurchase in the next year as a reaction to their repurchasing competitors. Thus, I conjecture that such negative influence of competitors' repurchase announcements on the stock price of the other firms in the same industry is transitory and thus, firms do not consider it when making repurchase decisions the following year.

5. Robustness Check

The way I proxy for corporate repurchase decision using the *Purchase of Common and Preferred Stock* from Compustat follows the previous study, Massa et al. (2007). In the paper, they use this item and define it as the dollar amount of the stock bought back by the firm. However, the item contains other subitems that are not actually related to share repurchases. It includes not only purchases of treasury stock but also (1) conversion of class A, class B, and special stock into common stock; (2) conversions of preferred stock into common stock; (3) retirement or redemption of common stock; (4) retirement of preferred stock; and (5) retirement or redemption of redeemable preferred stock. Thus, I use a different proxy for share repurchases using the number of shares outstanding reported on Compustat. If a firm's number of shares outstanding decreases during a specific period, the firm is recognized as a repurchaser during the period. Additionally, to examine whether the findings in the previous section hold true in more thorough specifications, I include a firm's prior year idiosyncratic risk in columns (3) and (4) of Tables 7, 8, and 9, which is expected to capture a firm's incentive to distribute more cash to shareholders when firm-specific uncertainty is low.

Table 7 presents the results from the reduced-form logit regressions using this different proxy. We can see the positive and significant coefficient on the percentage of peer repurchasers again, and the significance disappears in Table 8 where the instrument, peer firm average idiosyncratic risk is used. Even though the percentage of peer repurchasers in Column (2) shows its

positive and significant relation with other firms' decisions to repurchase, it disappears when a firm's specific risk is considered in Column (4). When percentage of peer repurchasers is instrumented by peer firm average systematic risk in Table 9, the variable retrieves its positive and significant relation on other firms' repurchase decisions. In brief, the main findings of this paper, arguing that what appear to be peer effects on share repurchases are possibly driven by common shocks, are consistent using this different proxy for share repurchases.

Lastly, I find negative and significant coefficients on prior year stock return and idiosyncratic return from Tables 7, 8, and 9, which are different from the results in Section 4. Also, the coefficients on market-to-book ratio become insignificant in Tables 7, 8, and 9, when prior year stock idiosyncratic return is used instead of normal return. With these results, at least, the *Undervaluation Hypothesis* cannot be rejected.

6. Conclusion

Since payout policy has been studied for many years and thus, share repurchases have naturally been the cynosure of finance research. Moreover, if peer effects exist on share repurchases, that would be interesting enough to pique many scholars' curiosity. Living up to this expectation, Massa, Rehman, and Vermaelen (2007) find that repurchases in concentrated industries are motivated mostly to react to other firms' repurchase decisions. However, the

study does not consider the existence of common shocks on the same industry, which can lead firms to cluster their repurchases.

I try to overcome this identification problem by using instrumental variables, which are peer firm average idiosyncratic risk and peer firm average systematic risk. To construct these instruments, I decompose return into expected return and idiosyncratic return with reference to Leary and Roberts (2014). Then, I compute the variance of each side. Using peer firm average idiosyncratic risk as an instrument, I find that firms do not react to peer firms' repurchases if they are driven by their specific volatilities. In contrast, firms' repurchases follow their peer firms' repurchases if they are caused by systematic volatility. Since non-repurchasing firms are also exposed to the systematic risk, we cannot interpret those firms' repurchases as the outcome of peer effects on share repurchases. Instead, systematic risk in an industry possibly induces firms to repurchase their stock around the same time.

This paper is meaningful in that not only does it warn of the difficulty in identifying peer effects due to common shocks, but it also shows how the novel identification strategy devised by Leary and Roberts (2014) can be applied to other corporate financial activities such as share repurchases in this paper.

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Table 1. Variable Descriptions

Variable Name	Definition	Data Source
Rep	Equal to one if the net dollars spent on repurchases or retirements of the firm's own securities are positive in year *t* ($\text{PRSTKC}_t > 0$) or if the firm's number of shares outstanding decreases between year *t* and *t*-1 ($\text{CSHO}_t - \text{CSHO}_{t-1} < 0$).	Compustat
Percentage of peer repurchasers	The percentage of peer repurchasers in the same industry during the previous two quarters before year *t*.	Compustat
Firm size	The logarithm of the total assets of the firm: ln AT (Equal-weighted moving average over the past three years)	Compustat
Market-to-book ratio	Ratio of the market value of equity, calculated as the price per share multiplied by the number of shares outstanding and divided by the book value of equity: (PRCC_C * CSHO) / CEQ (Equal-weighted moving average over the past three years)	Compustat
Debt-to-equity ratio	Ratio of long-term debt to the total equity of the firm: DLTT / CEQ (Equal-weighted moving average over the past three years)	Compustat
Operating income	Ratio of operating income to total assets: OIBDP / AT (Equal-weighted moving average over the past three years)	Compustat
Non-operating income	Ratio of non-operating income to total assets: NOPI / AT (Equal-weighted moving average over the past three years)	Compustat
Standard deviation of operating income	Standard deviation of the ratio of operating income to the total assets measured over the past five years (the current year inclusive).	Compustat
Lagged dividend payout ratio	The ratio of total dividends to the net income available to common shareholders for the previous year: DVC / IBCOM	Compustat
Liquid assets	Current assets minus current liabilities, divided by the total assets: (ACT-LCT) / AT (Equal-weighted moving average over the past three years)	Compustat
Price earnings ratio	Share price divided by the basic earnings per share: PRCC_C / EPSPX (Equal-weighted moving average over the past three years)	Compustat
Capital expenditures	Ratio of capital expenditure to the total assets of the firm: CAPX / AT (Equal-weighted moving average over the past three years)	Compustat
Prior year stock return	Compounded monthly return for year *t*-1: CRSP monthly return	CRSP
Prior year stock idiosyncratic return	Compounded monthly idiosyncratic return for year *t*-1: CRSP monthly return − Expected monthly return	CRSP
Peer firm average idiosyncratic risk	Equal-weighted average of peer firms' variances of idiosyncratic monthly returns of the preceding six months before the two quarters prior to year *t*	CRSP
Peer firm average systematic risk	Equal-weighted average of peer firms' variances of expected monthly returns of the preceding six months before the two quarters prior to year *t*	CRSP
Prior year idiosyncratic risk	Variance of idiosyncratic monthly returns of the twelve months in year *t*-1	CRSP

Table 2. Summary Statistics

The sample consists of all nonfinancial, nonutility firms in the merged monthly CRSP and the annual Compustat between 1988 and 2015 with nonmissing data for all explanatory variables. Peers are defined as the firms with the same three-digit SIC code. Detailed variable definitions are provided in the Table 1.

Variable type	Variable	Observations	Mean	Median	Standard Deviation
Repurchase variables	Net Dollars spent on Repurchases or Retirements	54,598	86.42	0.00	659.97
	Percentage of Peer Repurchasers	54,598	0.27	0.24	0.14
Accounting variables and other controls	Size	54,598	5.41	5.31	2.11
	M/B Ratio	54,598	2.78	1.97	3.73
	D/E Ratio	54,598	0.52	0.23	1.50
	Operating Income	54,598	0.09	0.12	0.17
	Non-Operating Income	54,598	0.03	0.02	0.04
	Lag Dividend Payout Ratio	54,598	0.13	0.00	0.39
	Liquid Assets	54,598	0.28	0.27	0.22
	Std. of Operating Income	54,598	0.07	0.04	0.09
	Price Earnings Ratio	54,598	14.32	13.96	38.61
	Capital Expenditures	54,598	0.06	0.04	0.05
	Prior Year Stock Return	54,598	0.19	0.07	0.72
	Prior Year Stock Idiosyncratic Return	54,598	0.00	−0.11	0.63
	Peer Firm Average Idiosyncratic Risk	54,598	0.04	0.03	0.05
	Peer Firm Average Systematic Risk	54,598	0.01	0.00	0.01
Additional variables	Yearly Change in Shares Outstanding	64,546	4.20	0.14	69.55
	Prior Year Idiosyncratic Risk	64,546	0.03	0.01	0.04

Table 3. Stock Return Factor Regression Results

The sample consists of monthly returns for all nonfinancial, nonutility firms in the monthly CRSP database between 1988 and 2015. The table presents mean factor loadings and adjusted R^2s from the regression

$$R_{ijt} = \alpha_{ijt} + \beta_{ijt}^{M}(RM_t - RF_t) + \beta_{ijt}^{IND}\left(\bar{R}_{-ijt} - RF_t\right) + \eta_{ijt}$$

where R_{ijt} is the return to firm *i* in industry *j* during month *t*, $(RM_t - RF_t)$ is the excess return on the market, and $\left(\bar{R}_{-ijt} - RF_t\right)$ is the excess return on an equal-weighted industry portfolio excluding firm *i*'s return, where industries are defined based on three-digit SIC codes. The regression is estimated for each firm on a rolling annual basis using historical monthly returns data from the CRSP database. At least 24 historical monthly returns are required and up to 60 months of data are used in the estimation. Expected returns are computed using the estimated factor loadings and realized factor returns 1 year hence. Idiosyncratic returns are computed as the difference between realized and expected returns.

	Mean	Median	Standard Deviation
α_{it}	0.004	0.005	0.027
β_{it}^{M}	0.391	0.452	1.214
β_{it}^{IND}	0.629	0.494	0.811
Obs. Per Regression	52	60	12
Adjusted R^2	0.178	0.143	0.167
Monthly Return	0.014	0.000	0.202
Expected Monthly Return	0.016	0.015	0.091
Idiosyncratic Monthly Return	−0.002	−0.012	0.195

Table 4. Reduced-Form Regressions of Peer Effects on Repurchase Decision

The sample consists of all nonfinancial, nonutility firms in the annual Compustat database between 1988 and 2015 with nonmissing data for all explanatory variables. The table presents the results for the firm's decision to repurchase using logit regressions on firm year observations. The dependent variable is Rep equal to one if the net dollars spent on repurchases or retirements by the firm's own securities are positive in year *t*. All independent variables are lagged one year. All regressions include year dummies and industry dummies at the one-digit SIC level (following Grinstein and Michaely (2005)). *z*-statistics reported in parentheses, are calculated with robust standard errors clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1%, respectively. See Table 1 for detailed definitions of the variables.

	Rep (= 1 if $\text{PRSTKC}_t > 0$)			
	(1)	(2)	(3)	(4)
Percentage of Peer Repurchasers	0.852***	0.854***	0.805***	0.808***
	(7.34)	(7.36)	(7.02)	(7.04)
Prior Year Stock Return	−0.016		−0.019	
	(−1.06)		(−1.24)	
Prior Year Stock Idiosyncratic Return		0.0001		−0.002
		(0.01)		(−0.14)
Size	0.245***	0.246***	0.251***	0.251***
	(21.41)	(21.44)	(20.53)	(20.55)
M/B Ratio	0.035***	0.035***	0.043***	0.043***
	(5.89)	(5.86)	(6.69)	(6.65)
D/E Ratio	−0.090***	−0.090***	−0.091***	−0.091***
	(−6.97)	(−6.97)	(−6.85)	(−6.84)
Operating Income	3.892***	3.888***	3.868***	3.862***
	(22.64)	(22.63)	(19.96)	(19.94)
Non-Operating Income	4.471***	4.472***	4.011***	4.011***
	(10.34)	(10.34)	(9.10)	(9.10)
Lag Dividend Payout Ratio	0.102***	0.102***	0.076**	0.077**
	(2.77)	(2.78)	(2.05)	(2.07)
Liquid Assets			0.628***	0.629***
			(5.97)	(5.98)
Std. of Operating Income			−2.085***	−2.087***
			(−6.46)	(−6.46)
Price Earnings Ratio			−0.0001	−0.0001
			(−0.34)	(−0.35)
Capital Expenditures			−2.490***	−2.483***
			(−6.43)	(−6.41)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	54,598	54,598	54,598	54,598

Table 5. Two-Stage Regressions of Peer Effects on Repurchase Decision

The sample consists of all nonfinancial, nonutility firms in the annual Compustat database between 1988 and 2015 with nonmissing data for all explanatory variables. The table presents results for the firm's decision to repurchase using a two-stage regression approach on firm year observations with logit regressions in the second stage. The instrumented variable is percentage of peer firms that have repurchased their stock during the previous two quarters before year *t*, and the instrument is peer firm average idiosyncratic risk. The dependent variable is Rep equal to one if the net dollars spent on repurchases or retirements by the firm's own securities are positive in year *t*. All independent variables are lagged one year. All regressions include year dummies and industry dummies at the one-digit SIC level (following Grinstein and Michaely (2005)). *z*-statistics reported in parentheses, are calculated with robust standard errors clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1%, respectively. See Table 1 for detailed definitions of the variables.

	Rep (= 1 if $\text{PRSTKC}_t > 0$)			
	(1)	(2)	(3)	(4)
Percentage of Peer Repurchasers (Predicted)	−0.781	−0.764	−0.473	−0.450
	(−0.93)	(−0.90)	(−0.55)	(−0.52)
Prior Year Stock Return	−0.021		−0.024	
	(−1.41)		(−1.58)	
Prior Year Stock Idiosyncratic Return		−0.002		−0.005
		(−0.10)		(−0.30)
Size	0.248***	0.248***	0.251***	0.251***
	(21.60)	(21.64)	(20.56)	(20.58)
M/B Ratio	0.033***	0.033***	0.041***	0.041***
	(5.54)	(5.50)	(6.49)	(6.41)
D/E Ratio	−0.088***	−0.088***	−0.090***	−0.090***
	(−6.81)	(−6.80)	(−6.81)	(−6.80)
Operating Income	3.973***	3.968***	3.946***	3.939***
	(23.18)	(23.16)	(20.35)	(20.33)
Non-Operating Income	4.358***	4.358***	3.949***	3.948***
	(10.03)	(10.03)	(8.93)	(8.93)
Lag Dividend Payout Ratio	0.113***	0.114***	0.085**	0.086**
	(3.08)	(3.10)	(2.32)	(2.35)
Liquid Assets			0.594***	0.595***
			(5.65)	(5.65)
Std. of Operating Income			−2.186***	−2.189***
			(−6.73)	(−6.74)
Price Earnings Ratio			−0.0002	−0.0002
			(−0.44)	(−0.45)
Capital Expenditures			−2.610***	−2.603***
			(−6.73)	(−6.70)
First-Stage Instrument				
Peer Firm Avg. Idiosyncratic Risk	−0.282***	−0.282***	−0.282***	−0.282***
(*t*-statistics)	(−17.53)	(−17.53)	(−17.53)	(−17.53)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	54,598	54,598	54,598	54,598

Table 6. Two-Stage Regressions of Common-Shock Effects on Repurchase Decision

The sample consists of all nonfinancial, nonutility firms in the annual Compustat database between 1988 and 2015 with nonmissing data for all explanatory variables. The table presents results for the firm's decision to repurchase using a two-stage regression approach on firm year observations with logit regressions in the second stage. The instrumented variable is percentage of peer firms that have repurchased their stock during the previous two quarters before year *t*, and the instrument is peer firm average systematic risk. The dependent variable is Rep equal to one if the net dollars spent on repurchases or retirements by the firm's own securities are positive in year *t*. All independent variables are lagged one year. All regressions include year dummies and industry dummies at the one-digit SIC level (following Grinstein and Michaely (2005)). *z*-statistics reported in parentheses, are calculated with robust standard errors clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1%, respectively. See Table 1 for detailed definitions of the variables.

	Rep (= 1 if $\text{PRSTKC}_t > 0$)			
	(1)	(2)	(3)	(4)
Percentage of Peer Repurchasers (Predicted)	1.998***	2.011***	2.013***	2.030***
	(2.65)	(2.66)	(2.63)	(2.66)
Prior Year Stock Return	−0.020		−0.023	
	(−1.34)		(1.51)	
Prior Year Stock Idiosyncratic Return		−0.002		−0.005
		(−0.14)		(−0.31)
Size	0.247***	0.247***	0.252***	0.252***
	(21.58)	(21.62)	(20.60)	(20.63)
M/B Ratio	0.035***	0.034***	0.042***	0.042***
	(5.76)	(5.71)	(6.64)	(6.59)
D/E Ratio	−0.090***	−0.090***	−0.092***	−0.092***
	(−6.96)	(−6.95)	(−6.91)	(−6.90)
Operating Income	3.952***	3.947***	3.931***	3.924***
	(23.09)	(23.07)	(20.30)	(20.28)
Non-Operating Income	4.411***	4.411***	3.981***	3.979***
	(10.17)	(10.17)	(9.02)	(9.02)
Lag Dividend Payout Ratio	0.109***	0.110***	0.082**	0.083**
	(2.98)	(3.00)	(2.24)	(2.26)
Liquid Assets			0.611***	0.612***
			(5.80)	(5.80)
Std. of Operating Income			−2.143***	−2.145***
			(−6.62)	(−6.63)
Price Earnings Ratio			−0.0002	−0.0002
			(−0.44)	(−0.44)
Capital Expenditures			−2.590***	−2.583***
			(−6.68)	(−6.66)
First-Stage Instrument				
Peer Firm Avg. Systematic Risk	−1.413***	−1.413***	−1.413***	−1.413***
(*t*-statistics)	(−26.76)	(−26.76)	(−26.76)	(−26.76)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	54,598	54,598	54,598	54,598

Table 7. Reduced-Form Regressions of Peer Effects on Repurchase Decision: Decrease in Shares Outstanding

The sample consists of all nonfinancial, nonutility firms in the annual Compustat database between 1988 and 2015 with nonmissing data for all explanatory variables. The table presents the results for the firm's decision to repurchase using logit regressions on firm year observations. The dependent variable is Rep equal to one if the firm's number of shares outstanding reported on Compustat decreases between year *t*-1 and year *t*. All independent variables are lagged one year. All regressions include year dummies and industry dummies at the one-digit SIC level (following Grinstein and Michaely (2005)). *z*-statistics reported in parentheses, are calculated with robust standard errors clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1%, respectively. See Table 1 for detailed definitions of the variables.

	Rep (= 1 if $\mathrm{CSHO}_t - \mathrm{CSHO}_{t-1} < 0$)			
	(1)	(2)	(3)	(4)
Percentage of Peer Repurchasers	1.079***	1.153***	1.065***	1.132***
	(10.37)	(11.03)	(10.26)	(10.87)
Prior Year Stock Return	−0.457***		−0.444***	
	(−21.84)		(−20.76)	
Prior Year Stock Idiosyncratic Return		−0.280***		−0.262***
		(−15.17)		(−13.54)
Size	0.165***	0.166***	0.158***	0.156***
	(16.80)	(16.90)	(15.81)	(15.65)
M/B Ratio	0.009**	0.004	0.009**	0.004
	(2.16)	(0.88)	(2.15)	(0.92)
D/E Ratio	−0.074***	−0.067***	−0.074***	−0.067***
	(−6.76)	(−6.19)	(−6.73)	(−6.18)
Operating Income	2.946***	2.772***	2.861***	2.662***
	(19.64)	(18.73)	(19.18)	(18.14)
Non-Operating Income	3.700***	3.642***	3.665***	3.598***
	(9.69)	(9.54)	(9.63)	(9.45)
Lag Dividend Payout Ratio	0.094***	0.109***	0.086***	0.097***
	(3.01)	(3.48)	(2.74)	(3.10)
Liquid Assets	−0.015	−0.047	−0.044***	−0.086
	(−0.17)	(−0.56)	(−0.52)	(−1.00)
Std. of Operating Income	−0.410*	−0.364	−0.260	−0.158
	(−1.66)	(−1.50)	(−1.05)	(−0.65)
Price Earnings Ratio	−0.0001	−0.0002	−0.0002	−0.0003
	(−0.50)	(−0.82)	(−0.55)	(−0.87)
Capital Expenditures	−3.322***	−3.309***	−3.352***	−3.348***
	(−9.70)	(−9.65)	(−9.80)	(−9.77)
Prior Year Idiosyncratic Risk			−2.041***	−2.794***
			(−3.46)	(−4.63)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	64,546	64,546	64,546	64,546

Table 8. Two-Stage Regressions of Peer Effects on Repurchase Decision: Decrease in Shares Outstanding

The sample consists of all nonfinancial, nonutility firms in the annual Compustat database between 1988 and 2015 with nonmissing data for all explanatory variables. The table presents results for the firm's decision to repurchase using a two-stage regression approach on firm year observations with logit regressions in the second stage. The instrumented variable is percentage of peer firms that have repurchased their stock during the previous two quarters before year *t*, and the instrument is peer firm average idiosyncratic risk. The dependent variable is Rep equal to one if the firm's number of shares outstanding reported on Compustat decreases between year *t*-1 and year *t*. All independent variables are lagged one year. All regressions include year dummies and industry dummies at the one-digit SIC level (following Grinstein and Michaely (2005)). *z*-statistics reported in parentheses, are calculated with robust standard errors clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1%, respectively. See Table 1 for detailed definitions of the variables.

	Rep (= 1 if $\mathrm{CSHO}_t - \mathrm{CSHO}_{t-1} < 0$)			
	(1)	(2)	(3)	(4)
Percentage of Peer Repurchasers (Predicted)	1.243	1.943*	0.868	1.344
	(1.22)	(1.80)	(0.87)	(1.29)
Prior Year Stock Return	−0.468***		−0.455***	
	(−22.36)		(−21.23)	
Prior Year Stock Idiosyncratic Return		−0.285***		−0.266***
		(−15.47)		(−13.75)
Size	0.165***	0.165***	0.157***	0.155***
	(16.77)	(16.87)	(15.73)	(15.56)
M/B Ratio	0.007*	0.002	0.007*	0.002
	(1.72)	(0.42)	(1.69)	(0.45)
D/E Ratio	−0.071***	−0.064***	−0.071***	−0.064***
	(−6.59)	(−6.01)	(−6.55)	(−5.98)
Operating Income	3.037***	2.863***	2.946***	2.748***
	(20.24)	(19.34)	(19.74)	(18.70)
Non-Operating Income	3.617***	3.555***	3.579***	3.506***
	(9.46)	(9.30)	(9.39)	(9.21)
Lag Dividend Payout Ratio	0.107***	0.123***	0.098***	0.111***
	(3.45)	(3.95)	(3.17)	(3.55)
Liquid Assets	−0.063	−0.098	−0.095	−0.139
	(−0.75)	(−1.16)	(−1.12)	(−1.63)
Std. of Operating Income	−0.492**	−0.443*	−0.335	−0.229
	(−1.98)	(−1.81)	(−1.35)	(−0.94)
Price Earnings Ratio	−0.0002	−0.0003	−0.0002	−0.0003
	(−0.69)	(−1.02)	(−0.74)	(−1.07)
Capital Expenditures	−3.372***	−3.362***	−3.402***	−3.401***
	(−9.82)	(−9.77)	(−9.91)	(−9.89)
Prior Year Idiosyncratic Risk			−2.175***	−2.939***
			(−3.64)	(−4.80)
First-Stage Instrument				
Peer Firm Avg. Idiosyncratic Risk	−0.270***	−0.270***	−0.270***	−0.270***
(*t*-statistics)	(−19.07)	(−19.07)	(−19.07)	(−19.07)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	64,546	64,546	64,546	64,546

Table 9. Two-Stage Regressions of Common-Shock Effects on Repurchase Decision: Decrease in Shares Outstanding

The sample consists of all nonfinancial, nonutility firms in the annual Compustat database between 1988 and 2015 with nonmissing data for all explanatory variables. The table presents results for the firm's decision to repurchase using a two-stage regression approach on firm year observations with logit regressions in the second stage. The instrumented variable is percentage of peer firms that have repurchased their stock during the previous two quarters before year *t*, and the instrument is peer firm average systematic risk. The dependent variable is Rep equal to one if the firm's number of shares outstanding reported on Compustat decreases between year *t*-1 and year *t*. All independent variables are lagged one year. All regressions include year dummies and industry dummies at the one-digit SIC level (following Grinstein and Michaely (2005)). *z*-statistics reported in parentheses, are calculated with robust standard errors clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1%, respectively. See Table 1 for detailed definitions of the variables.

	Rep (= 1 if $\mathrm{CSHO}_t - \mathrm{CSHO}_{t-1} < 0$)			
	(1)	(2)	(3)	(4)
Percentage of Peer Repurchasers (Predicted)	4.361***	4.612***	3.807***	3.821***
	(4.69)	(5.01)	(4.11)	(4.18)
Prior Year Stock Return	−0.468***		−0.456***	
	(−22.28)		(−21.27)	
Prior Year Stock Idiosyncratic Return		−0.286***		−0.268***
		(−15.43)		(−13.81)
Size	0.166***	0.167***	0.159***	0.158***
	(16.93)	(17.04)	(15.92)	(15.75)
M/B Ratio	0.009**	0.003	0.009**	0.003
	(2.04)	(0.72)	(1.98)	(0.70)
D/E Ratio	−0.074***	−0.066***	−0.073***	−0.066***
	(−6.81)	(−6.22)	(−6.75)	(−6.16)
Operating Income	3.018***	2.844***	2.940***	2.741***
	(20.17)	(19.26)	(19.75)	(18.69)
Non-Operating Income	3.671***	3.609***	3.632***	3.556***
	(9.63)	(9.46)	(9.55)	(9.36)
Lag Dividend Payout Ratio	0.103***	0.119***	0.096***	0.108***
	(3.32)	(3.83)	(3.09)	(3.48)
Liquid Assets	−0.042	−0.078	−0.073	−0.119
	(−0.50)	(−0.92)	(−0.85)	(−1.39)
Std. of Operating Income	−0.442*	−0.398	−0.307	−0.207
	(−1.79)	(−1.63)	(−1.24)	(−0.85)
Price Earnings Ratio	−0.0002	−0.0003	−0.0002	−0.0003
	(−0.64)	(−0.99)	(−0.69)	(−1.05)
Capital Expenditures	−3.337***	−3.325***	−3.370***	−3.369***
	(−9.74)	(−9.69)	(−9.84)	(−9.82)
Prior Year Idiosyncratic Risk			−1.924***	−2.703***
			(−3.24)	(−4.44)
First-Stage Instrument				
Peer Firm Avg. Systematic Risk	−1.130***	−1.130***	−1.130***	−1.130***
(*t*-statistics)	(−31.37)	(−31.37)	(−31.37)	(−31.37)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	64,546	64,546	64,546	64,546

국 문 초 록

기업의 자사주 매입 결정과 동료 효과에 대한 연구

서울대학교 대학원
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동종 산업 내의 경쟁 기업들 간에 자사주 매입을 모방하는 현상이 존재한다는 기존 연구의 결과로부터 더 나아가 본 연구는 같은 산업 내의 기업들이 쉽게 노출되는 공통 충격의 영향을 고려한 후에도 자사주 매입 결정에 동료 효과가 존재하는지를 검증한다. 이를 위해 2가지 서로 다른 도구 변수를 이용한 2단계 회귀 분석을 각각 실시하였다. 분석 결과 동료 그룹의 자사주 매입 활동이 그들의 고유 위험으로부터 야기된 것이라면 같은 그룹 내의 다른 회사들은 이를 모방하지 않는 것으로 나타났다. 반면 체계적 위험으로부터 비롯된 동료 기업들의 자사주 매입 활동은 이후 해당 그룹 내 다른 기업들의 자사주 매입 확률과 양의 상관관계를 가지는 것으로 확인되었다. 그러나 동종 산업 내의 기업들은 같은 체계적 위험에 노출되어 있기 때문에 이를 자사주 매입 활동에 존재하는 동료 효과로 보기 어렵다. 대신에 위와 같은 결과들은 동료 그룹에 미치는 공통 충격의 영향이 기업들로 하여금 비슷한 시기에 자사주를 매입하도록 유도한 것임을 시사한다.

주요어: 자사주 매입, 동료 효과, 2단계 회귀 분석
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