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Does the timing of dividend reductions signal value? Empirical evidence ☆

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ABSTRACT

This paper examines a firm's dividend reduction timing relative to other dividend reductions in the same industry. It tests if the timing of dividend cuts is informative in firm valuation. The findings suggest that during periods of less accessible external financing, such as recessions, firms with greater investment opportunities are among the first firms to make necessary dividend reductions to take advantage of such opportunities. When external financing is more accessible, firms with superior investment opportunities are able to access capital markets in lieu of dividend-reducing internal financing, indicating higher firm values for earlier dividend reductions during periods of costly external financing and significantly lower firm values for early reductions when financing is more easily obtained. A series of empirical tests show that, in periods of less accessible external financing or during a recession, early dividend-reducing firms significantly outperform late reducers in announcement day and contraction cycle cumulative abnormal returns. The results also show that, outside of a recession, early dividend-reducing firms have significantly lower industry contraction cycle returns than late dividend reducers. Additionally, this study compares early dividend reductions that occur during periods of costly external financing (or during a recession) against early reductions that occur when external financing is more available (or outside of a recession) and finds the former to have significantly higher announcement day and contraction cycle cumulative abnormal returns.

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1. Introduction

Studies often consider dividend policy as a way for insiders to signal their beliefs about their company's future prospects.[1] Generally, the literature assumes that outside investors have less information than firm insiders and any information that could indicate a firm's future prospects will benefit outside investors' valuation decisions. Charest (1978) and Michaely et al. (1995), show that dividend decreases, in particular, incur larger market reactions than comparable dividend increases. For this reason managers are very reluctant to reduce dividends and typically do so only under extreme circumstances.[2] Such managerial reluctance suggests that dividend decreases, in particular, release more private information than dividend increases. Although many studies explore the signaling power of dividend reductions, none examine the timing of dividend reductions as a possible indicator of firm value.[3] Since dividend reductions occur in

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[1] See Modigliani and Miller (1961), Pettit (1972), Bhattacharya (1979), Aharony and Swary (1980), Asquith and Mullins (1983), Dielman and Oppenheimer (1984). Healy and Palepu (1988), and Jensen et al. (2010).

[2] Brav et al. (2005), DeAngelo and DeAngelo (1990), and Daniel et al. (2008) show managerial reluctance to reduce dividends. The literature shows that various extreme circumstances cause dividend reductions, such as financial distress (DeAngelo and DeAngelo, 1990) and loan covenant violations (Bulan and Hull, 2013). Other reasons for dividend reductions include increased financial flexibility (Bulan, 2010; Stepanyan, 2009), low investor preference toward dividends (Baker and Wurgler, 2004; Li and Lie, 2006), and the ability to substitute dividends with share repurchases (Grullon and Michaely, 2002).

[3] Allen et al. (2000), John and Williams (1985), and Miller and Rock (1985) explore dividend signaling models.

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waves or clusters, often related to an industry downturn, this raises the question of whether one can consider the timing of a dividend reduction relative to other firms within the same industry as a meaningful signal to outside investors. If dividend reduction timing does convey information, several other interesting questions are raised: first, is reducing dividends relatively early or late a dominant strategy? Alternatively, are some firms better off committing necessary dividend reductions sooner while others may optimally do so later? Lastly, is the optimal firm response sensitive to not only industry-specific conditions but also market-wide conditions? I address these dividend reduction timing questions using empirical evidence.

Utilizing dividend reductions from 1970 to 2010, I find that dividend reduction timing provides important and meaningful information that influences a firm's announcement and long-term returns. Additionally, I find that a firm's returns are particularly sensitive to whether dividends are reduced during a recession (period of costly external financing) or outside of a recession (a period of more accessible external financing). The results show that during a recession or periods of costly external financing early dividend reducers have 3.7% significantly higher announcement cumulative abnormal returns (CARs) than late dividend reducers and, if one compares returns over the entire recession period, early reducers have 14.5% significantly higher CARs than late dividend reducers. However, if dividend reduction timing is observed outside a recession, early and late dividend reducers do not have significantly different announcement returns and, over a contemporaneous industry contraction time period, late reducers outperform early reducers with 18.5% significantly higher CARs. Lastly, the results provide evidence that early dividend reducers during recessions have higher CARs compared to early reducers outside of a recession.

This is the first paper in the literature to empirically test the ability of dividend reduction timing to signal value.[4] Here, I propose dividend timing as an additional signaling channel.[5] This additional signaling channel helps explain why dividend reductions have not previously been a strong indicator of a firm's future performance, a common puzzle in the literature.[6] The empirical findings suggest that a dividend reduction by itself is a noisy signal, which can be further deciphered by taking into account not only the size or the scope of the dividend reduction but also the timing of the reduction relative to its own industry.

The paper proceeds as follows: Section 2 develops testable hypotheses, Section 3 addresses the data and the model's empirical results, and Section 4 concludes the paper.

2. Hypothesis development

This study uses a simple model to motivate the empirical investigation and the development of testable hypotheses.[7] Consider a manager of a firm in an industry that has experienced a negative shock. The shock results in several firms in the industry losing their revenue-generating assets and some firms also losing their cash reserves. The manager must now rationally decide whether to commit to a dividend reduction and, if so, when. The manager can delay the release of the information that the firm has suffered a loss, but only by using the last cash reserves to continue the regular dividend policy. The manager can also attempt to restore the revenue-generating assets by making an investment that has some firm-specific probability of investment success. Also key to the manager's decision is he only can either make the investment or pay the usual dividend distribution, but cannot do both. Managers care about the firm's value in both the short and long run. Lastly, the manager can access external financing if, first, the firm has a sufficiently high probability of investment success, verifiable by financers, and, second, external financing is available.

In this setup, a firm with meager investment opportunities will find it beneficial to maintain their dividend policy to delay the release of the negative information, as investment has a low probability of success. Firms with strong investment opportunities will pursue these opportunities. Due to managerial reluctance to reduce dividends, all firms will prefer external over internal financing, as this allows restoring firm profitability to be pursued without releasing negative news. When external financing is unavailable or costly, as it can be during a recession, firms with high investment success probabilities will find it worthwhile to internally finance investments by making dividend reductions.[8] Lastly, the subset of firms that lost all their cash reserves are forced to stop dividend payments immediately.

This basic model suggests that when external financing is costly, early dividend reductions will be the result of firms pursuing investment opportunities, while late reductions will be the result of firms not making investments but, instead, delaying the release of negative information. However, when external financing is accessible, all investing firms will utilize external financing and will therefore not need to reduce dividends. This model entails that when external financing is accessible, dividend reductions transmit only negative information.

If periods of costly or inaccessible external financing can be proxied for by the National Bureau of Economic Research (NBER) recessions, then a number of empirically testable predictions can be made for dividend reductions during as well as outside of a recession.

[4] In regard to dividend timing, Kalay and Loewenstein (1986) find low returns associated with dividend announcements that are made later than the expected announcement date and Benmelech et al. (2010) study chief executive officer stock-based compensation and also provide implications that suggest the importance of dividend reduction timing.

[5] Brennan and Kraus (1987) and Constantinides and Grundy (1989) document signaling channels other than dividend payments, such as debt, investment levels, and share repurchases.

[6] Contrary to the theory of the information content of dividends, Benartzi et al. (1997) find that dividend-reducing firms experience improvements in post-announcement operating performance. Other studies also find evidence that appears to conflict with the information content of dividend theory, such as the work of Watts (1973) and Healy and Palepu (1988).

[7] The model is based on the theoretical work of Hull (2013).

[8] Covas and Den Haan (2011) document the procyclicality of debt and equity issuance for most firm types.

1. *Recession period: Early* versus *late dividend reducers*: Early and late reductions during a recession should be met with negative market reactions; these reactions should be more negative for late reducers, since early reducers are engaging in investment opportunities. Therefore, early reductions should have a relatively more positive announcement returns, as well as recession duration or contemporaneous time period long-term returns. This is hypothesis $\mathbf{H}_1$.
2. *Non-recession period: Early* versus *late dividend reducers*: Early and late reductions outside of a recession should incur negative market reactions. Announcement returns between early and late reducers are expected to be roughly the same at the time of the announcement, since the same bad news is communicated, that the firm has exhausted cash reserves and has suffered from an industry shock. Returns compared over a long-term contemporaneous time period are expected to be roughly the same or greater for later dividend reductions (greater if the ability to maintain a dividend policy for longer is associated with a stronger firm type). Therefore, hypothesis $\mathbf{H}_{2a}$ is that early and late dividend reducers should not have significantly different announcement returns outside of a recession. Hypothesis $\mathbf{H}_{2b}$ is that late dividend reducers will have significantly higher contemporaneous time period long-term returns and hypothesis $\mathbf{H}_{2c}$ is that they will not.
3. *Effect of early reductions within a recession* versus *outside of a recession*: Since early dividend reductions during a recession will be made in pursuit of investment opportunities and early reductions outside of a recession only indicate the lack of cash reserves, early reductions within a recession will have significantly higher announcement and contemporaneous time period long-term returns. This is hypothesis $\mathbf{H}_3$.

3. Empirical evidence

3.1. Data

I gather a sample of dividend-reducing firms from the Center of Research in Security Prices (CRSP) database. Each observation meets the following criteria: (1) The firm's data are available in the CRSP and COMPUSTAT databases, (2) the dividend distribution is a quarterly cash dividend, (3) the cash dividend reduction is larger than 12.5% to ensure that the focus is on economically significant dividend reductions, (4) the dividend does not come from either a financial institution or regulated utility company, (5) the firm is a publicly traded firm, and (6) the firm makes no additional dividend reductions one year after the current dividend reduction.[9] The last criterion ensures that the effect of each reduction can be adequately differentiated. One additional criterion is that each observation must come from an industry (defined by two-digit Standard Industrial Classification, or SIC, codes) with at least 10 other quarterly dividend-paying firms, to ensure that the firm has a large enough set of firms in the same industry for comparison purposes. To ensure that this analysis does not capture the effects of stock splits, special dividends, or mergers, I drop all dividend reduction observations surrounding these events from the sample.

Additionally, this study uses data from COMPUSTAT to calculate control variables such as a firm's total assets, debt-to-cash flow ratio, cash-to-total assets ratio, market-to-book ratio, and earnings per share. I downloaded the Fama–French factors from Kenneth French's website to calculate the CARs. I then use the CARs with a variety of different windows around the dividend reduction date for announcement returns, as well as for a longer period, referred to as a cycle. A cycle is an industry contraction or recession-specific period in which dividend reductions are classified as either early or late. Cycle CARs are monthly abnormal returns, accumulated for all firms from the time of the cycle's first dividend reduction to its last. These returns allow all firms to be compared over the same period of time. Contemporaneous comparisons are useful, since both past and prior dividend reductions of other same industry firms can cause investors to update beliefs about a firm's prospects. Such updates will result in additional price changes that may also be related to the timing of dividend reductions but not captured in the price change at the dividend reduction announcement.

One can think of the start of a recession or industry contraction as a shock that influences all industries slightly differently. Dividend reductions that occur soon after the shock are quick movers, or early dividend reducers, while firms that make later reductions are late dividend reducers. Early and late dividend reducers are defined according to the shock they follow, whether a recession or an industry contraction.

3.1.1. Recession dividend reductions

This study defines recession periods as the month of the recession peak to one month after the trough, utilizing NBER recession data. Within a recession, I use a firm's industry to classify dividend reductions as early or late. For a particular industry I classify the first dividend reduction and any reduction over the next two quarters, as measured from the end of the quarter of the first dividend reduction, as early dividend reducers. All remaining dividend reductions within the recession period I categorize as late. Since some firms meet to revise dividend policy only quarterly and some dividend changes can be announced more than 100 days before the dividend reduction, a large window of time ensures that the analysis does not incorrectly categorize any early dividend reducers as being late. Since it is difficult to definitively state an appropriate dichotomous break, the study utilizes another variable, called *quarters after 1st industry reduction*, a count variable totaling the number of quarters since the first dividend reduction. These two variables, the early dummy and *quarters after 1st industry reduction*, are the main variables of interest for all recession regressions. The CRSP and COMPUSTAT data are from 1970 to 2010, a period that features six NBER recessions, starting in 1973, 1980, 1981, 1990, 2001, and 2007.[10]

[9] Chemmanur and Tian (2007) use nearly identical criteria. These criteria are standard in the literature.

[10] The NBER recession of 1980 was only seven months long and, as such, the above early reduction definition does not categorize any dividend reductions during this recession as late. For this reason, I repeat all tests excluding observations from the recession of 1980 and find qualitatively similar results. In addition, any potential problem related to the dichotomous break of early versus late reductions will not be present when utilizing the *quarters after 1st industry reduction* variable in regressions.

The final recession shock sample comprises 436 dividend reductions, 275 categorized as early reductions and 161 as late. Table 1 provides summary statistics for the sample, with simple tests of equality of means between the early and late dividend-reducing firms. Before I directly control for any differences between the early and late groups, it is striking that the early group has a 4.9% higher announcement day CAR and a 14.7% higher recession cycle CAR, both significant at the 1% level, supporting hypothesis $\mathbf{H}_1$. Another notable difference between the samples is that the early group is significantly smaller in terms of total assets and sales, but only at the 10% level.

3.1.2. Dividend reductions outside of recessions

Although dividend reductions are not hard to observe, outside of a recession it is difficult to pinpoint a noteworthy industry shock that is not, by definition, part of a macroeconomic shock. Most changes in a firm's profitability, assets, or sales appear to be the result of an industry downturn rather than the shock that causes such a downturn. Typically, one cannot consider deregulation and/or regulation changes as an appropriate shock, since they can be both beneficial and negative to different firms within the same industry code.[11] Following a similar methodology as that of Mitchell and Mulherin (1996), I proxy for industry shocks by large changes in industry-specific sales levels. First, the analysis identifies a significant drop in two consecutive quarters of industry sales.[12] This drop in sales tends to be highly correlated with recession period troughs. Assuming that this drop in sales can proxy for industry troughs, whether in or outside of a recession, then the analysis can calibrate industry shocks out of a recession with the recession observation data. This study uses the above-mentioned data from the CRSP and COMPUSTAT from 1970 to 2010 to identify relevant industry contraction cycles. This study defines an industry contraction cycle (comparable to a recession, measured from peak to trough) as six quarters prior to two quarters after the sales low point.[13] Within the industry contraction cycle, dividend reductions that are three quarters prior to the low point in sales and earlier are categorized as early.[14] This new method of defining early and late dividend reducers creates a sample of dividend reductions that can be separated into industry cycles which occur inside and outside of a recession.

The final sample ranges from 1975 to 2009, with a total of 498 dividend reducers, 184 of which are categorized as early and 314 as late. Of the sample of 498, 278 observations are dividend reductions performed outside of a recession, with 220 reductions made in a recession. Table 2 provides summary statistics and tests of equality between the early and late dividend-reducing groups' variable means. Panel A features the entire sample, panel B examines reductions outside of a recession, and panel C examines reductions inside of a recession.[15] Panel A (combined sample) does not show any strong differences between early and late dividend reducers, other than early reducers having weakly significantly higher announcement day returns. Panel B (non-recession sample) shows that late dividend reducers do not have significantly different announcement day returns but do significantly outperform early reducers over the industry contraction cycle, supporting hypotheses $\mathbf{H}_{2a}$ and $\mathbf{H}_{2b}$. Panel C (recession sample) supports the preliminary results shown in Table 1, also supporting hypothesis $\mathbf{H}_1$, with early reducers having significantly higher announcement returns and industry contraction cycle returns than late reducers. Panel C also suggests that early reducers make smaller dividend reductions and have more cash on hand.

3.2. Recession empirical tests and results

This section tests hypothesis $\mathbf{H}_1$, which states that early reductions should have relatively more positive announcement returns, as well as recession duration or contemporaneous time period long-term returns. Table 3 presents ordinary least squares (OLS) regressions predicting the announcement effect and recession duration returns of early versus late dividend reducers. The announcement returns are calculated as daily CARs from three days before to three days after the dividend reduction announcement. The recession duration returns are the monthly CARs from the first to the last dividend reduction within a particular industry. All CARs are an accumulation of abnormal returns using the Fama–French factor model, including a momentum factor.[16] The regression specification is

$$CAR_T = Early + Div\Delta + Controls, \tag{1}$$

where CAR_T stands for CARs for the different time horizons, *Early* is a dummy variable that equals one if the reduction follows a quarter of no other dividend reductions and zero otherwise, and $Div\Delta$ is the percentage change in the dividend.[17] Here, *Controls* represents the control variables of the log of total assets, the cash-to-assets ratio, the debt-to-assets ratio, the market-to-book ratio,

[11] In addition to the noted disadvantage, an attempt to construct a sample of dividend reductions that were likely the result of particularly negative regulatory changes would lead to several large potential selection issues, as well as yield a sample too small for meaningful analysis. A further complication to utilizing deregulation is the endogenous nature of deregulation (Ovtchinnikov, 2013).

[12] This significant drop is a fifth percentile return on two quarters of industry sales growth over the one-year moving average.

[13] The largest recession in the sample spans eight quarters, with the average recession spanning five quarters. Although six quarters before to two quarters after may be a larger industry contraction cycle window than necessary, it ensures that no potentially long industry contraction cycles are arbitrarily cut short. In addition, the use of smaller windows yields qualitatively similar results.

[14] Other cutoffs between early and late reducers can be used, with qualitatively similar results.

[15] Panels B and C of Table 2 include summary statistics for only a subset of the variables shown in panel A. The subset consists of variables with statistical difference between the two groups at the 10% level in at least one of the panels.

[16] Results are qualitatively similar if CARs are generated using the standard Fama–French factor model (excluding the momentum factor).

[17] Using dividend change scaled by price in lieu of the dividend percentage change, as suggested by Denis et al. (1994), also yields qualitatively similar results.

Table 1
Recession cycle summary statistics. This table reports summary statistics for early and late dividend reducers and simple tests of equality for the two group's means. The timing within a recession period, measured from an NBER recession's peak to one month after the trough, determines early and late reducers. On a per-industry basis, the first dividend reduction in a recession period and any reduction over the next two quarters, as measured from the end of the quarter of the first dividend reduction, are jointly classified as early dividend reductions. The variables of interest are as follows: *Quarters after 1st industry reduction*, a variable counting the number of quarters since the first dividend reduction in a particular industry's cycle period; *Dividend % change*, the percentage of the dividend decrease, all values being negative; *Beta*, the beta coefficient on the market return when daily returns are regressed on the Fama–French factors, the regressions performed for windows from 360 to 30 days prior to the date of interest; *CAR −3:3*, the CARs for three days before to three days after the dividend reduction announcement; and *Recession cycle CAR*, the CARs from the first to the last dividend reduction within a particular industry's cycle period. All the other variables are standard variables as defined in the literature and are measured a quarter before the dividend reduction. The superscripts ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Recession sample	Early	Late	Difference
Quarters after 1st industry reduction	0.58	3.72	−3.13***
Dividend % change	−0.475	−0.487	0.012
Total assets	3557.28	10577.04	−7019.77*
Cash-to-total assets ratio	0.067	0.072	−0.005
Debt-to-assets ratio	0.217	0.206	0.011
Market-to-book ratio	1.732	1.606	0.127
Earnings per share	0.466	0.167	−0.298
Sales	769.48	1384.48	−615.00*
Beta	0.983	1.008	−0.040
CAR −3:3	−0.020	−0.069	0.049***
Recession cycle CAR	0.033	−0.114	0.147***
Observations	275	161	

and earnings per share, and all measured the quarter prior to the dividend reduction date. These controls are important because they control for firm characteristics as well as other potential firm signaling methods (Brennan and Kraus, 1987; Constantinides and Grundy, 1989). Lastly, I add a constant term as well as industry and recession fixed effects to control for industry- and time-specific factors, respectively.[18]

Table 3 shows that in a recession early reducers generally outperform late reducers. Columns 1 and 2 of Table 3 feature the announcement return results and columns 3 and 4 feature the recession duration return results. The early dummy coefficient for column 1 roughly suggests an economically meaningful 4% higher announcement return associated with early versus late dividend reductions.[19] Similarly, the results in column 2 show that each additional quarter after the first dividend reduction is connected with a 70-basis-point drop in firm valuation.[20] The table shows similar results for the recession duration returns (columns 3 and 4). Column 3 shows that being an early dividend reducer is associated with a 14.5% positive and significantly higher return than being a late dividend reducer, while column 4 shows that each additional quarter after the first industry dividend reduction is associated with a significantly lower 4% return over the recession period.

For all columns the dividend percentage change is statistically significant and unsurprisingly suggests that the larger the dividend reduction, the greater the drop in CARs. For columns 1 and 2, the total assets variable has a positive significant coefficient, suggesting that the larger a firm is, the less negative a dividend reduction announcement would be. For columns 3 and 4, the market-to-book variable has a positive significant coefficient, suggesting that dividend-reducing growth firms outperform dividend-reducing value firms, perhaps suggesting greater surprise when value firms reduce dividends.

I additionally ask the following questions related to hypothesis $\mathbf{H}_1$: first, at what point in time does a significant difference appear between early and late dividend reducers? Second, given that the size of the dividend reduction is one of the strongest predictors of CARs, what is the relationship between early and late dividend reductions and the percentage decrease of the dividend? I address both questions by conducting regression variations to the tests performed in the first two columns of Table 3. Comparing different announcement return windows, I find that the effect of being an early versus late dividend reducer shows no significant difference in terms of CARs until a few days after the dividend reduction announcement.[21] To address the second question, I create a new variable, the absolute value of the dividend percentage change. I interact this variable separately with both the early reducer dummy and the *quarters after 1st industry reduction* variable. The results, shown in Table 4, suggest that for announcement returns the less negative effect of being a relatively early dividend reducer is significantly related to the size of the dividend reduction. More specifically, both early and late dividend reducers have negative CARs that are proportional to the size of their dividend reductions, but the dividend reduction size effect on CARs is twice as negative for late dividend reducers as for early dividend reducers.

Overall, Tables 3 and 4 support $\mathbf{H}_1$, with the results showing that during a recession early dividend reductions outperform late reducers in terms of both announcement and recession duration returns.

[18] All regressions are clustered by two-digit SIC code.
[19] Unreported tests show that these results are insensitive to the inclusion or exclusion of any of the control variables and fixed effects.
[20] In columns 2 and 4 the variable of interest is the *quarters after 1st industry reduction*. Not being a dummy variable, it has the advantage of, first, not being subject to an arbitrarily chosen break and, second, being able to similarly indicate how relatively late a particular dividend reduction might be.
[21] For brevity, the results are not reported here but are available upon request.

Table 2
Industry contraction cycle summary statistics. This table reports summary statistics for early and late dividend reducers and simple tests of equality for the two group's means. Early and late reductions are classified according to their timing in an industry contraction cycle. An industry contraction cycle (comparable to a recession, measured from peak to a shortly after the trough) is defined as six quarters prior to two quarters after a sales low point (defined as a fifth percentile return on two quarters of industry sales growth over the one-year moving average). Dividend reductions that are three or more quarters prior to the industry's low point in sales are categorized as early dividend reducers. Panel A provides an overview of the dividend reductions that occur within an industry's cycle period. Panel B focuses on dividend reductions during industry contraction cycles outside of a recession and Panel C on reductions within a recession. The variables of interest are as follows: *Quarters after 1st industry reduction*, a variable counting the number of quarters since the first dividend reduction in a particular industry's cycle period; *Dividend % change*, the percentage of the dividend decrease, with all negative values; *Beta*, the beta coefficient on the market return when daily returns are regressed on the Fama–French factors, with regressions performed for windows from 360 to 30 days prior to the date of interest; *CAR −3:3*, the CARs for three days before to three days after the dividend reduction announcement; and *Industry contraction cycle CAR*, the CARs from the first to the last dividend reduction within a particular industry's cycle period. All the other variables are standard variables as defined in the literature and are measured a quarter before the dividend reduction. The superscripts ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: industry contraction cycle sample			
Recession and outside recession samples	Early	Late	Difference
Quarters after 1st industry reduction	0.891	4.111	−3.220***
Dividend % change	−0.444	−0.471	0.027
Total assets	3142.08	7451.92	−4309.84
Cash-to-total assets ratio	0.073	0.071	0.002
Debt-to-assets ratio	0.197	0.205	−0.008
Market-to-book ratio	2.188	2.351	−0.163
Earnings per share	0.510	0.518	−0.008
Sales	689.34	1175.24	−485.90
Beta	0.989	0.994	−0.005
CAR −3:3	−0.013	−0.034	0.021*
Industry contraction cycle CAR	0.005	0.069	−0.063
Recession dummy	0.408	0.462	−0.054
Observations	184	314	
Panel B: industry contraction cycle sample			
Outside recession sample	Early	Late	Difference
Quarters after 1st industry reduction	0.752	4.12	−3.37***
Dividend % change	−0.439	−0.432	−0.007
Cash-to-total assets ratio	0.067	0.080	−0.013
Market-to-book ratio	2.298	2.772	−0.473*
CAR −3:3	−0.020	−0.017	−0.002
Industry contraction cycle CAR	−0.082	0.125	−0.207***
Observations	109	169	
Panel C: industry contraction cycle sample			
Recession sample	Early	Late	Difference
Quarters after 1st industry reduction	1.093	4.097	−3.073***
Dividend % change	−0.451	−0.516	0.065**
Cash-to-total assets ratio	0.083	0.061	0.022*
Market-to-book ratio	2.028	1.861	0.166
CAR -3:3	−0.004	−0.054	0.050**
Industry contraction cycle CAR	0.133	0.004	0.129**
Observations	75	145	

3.3. Industry contraction cycle empirical tests and results

The tests associated with this section utilize the same methodology outlined in Section 3.2, except that, instead of looking at dividend reductions in a recession cycle, the tests compare them over an industry contraction cycle and apply a different rule for categorizing early versus late dividend reductions.[22] Section 3.3.1 explores dividend reduction timing outside of recessions, while Section 3.3.2 directly compares dividend reduction timing in a recession versus outside of a recession. Since these tests are not strictly limited to a recession sample, the analysis uses two-year dummies to control for time-varying fixed affects.[23]

3.3.1. Non-recession industry contraction cycle CARs of early versus late dividend reducers

This section tests hypotheses $\mathbf{H}_{2a}$, $\mathbf{H}_{2b}$, and $\mathbf{H}_{2c}$. Hypothesis $\mathbf{H}_{2a}$ suggests that outside of a recession early dividend reducers will have announcement returns similar to those of late reducers. Hypothesis $\mathbf{H}_{2b}$ suggests that outside of a recession early dividend reducers will have significantly worse industry contraction cycle CARs than late dividend reducers, while $\mathbf{H}_{2c}$ suggests that

[22] See Section 3.1.2 for a detailed explanation of an industry contraction cycle and the categorization of early and late dividend reductions.
[23] Since most early or late dividend reductions occur within the same year, using year fixed effects will largely subsume the true effect of the early dummy. A two-year fixed effect avoids this problem while still controlling for time variations in payout policy. Unique recession and between-recession specific fixed effects can also be used to control for time fixed effects and provide identical results.

Table 3
Relation between the recession timing of dividend reductions and returns. This table reports the results of several OLS regressions with CARs from three days before to three days after a firm's dividend reduction announcement (columns 1 and 2) and monthly CARs measured from the first dividend reduction to the last in a particular recession period (columns 3 and 4). The CARs are calculated using the Fama–French factors, including a momentum factor. The independent variables are *Early dummy*, a dummy variable that equals one if this particular dividend reduction occurred within two quarters of the first same industry dividend reduction, as measured from the end of the quarter of the first dividend reduction, and zero otherwise; *Quarters after 1st industry reduction*, a variable counting the number of quarters since the first dividend reduction in a particular industry's cycle period; *Dividend % change*, the percentage of the dividend decrease, with all negative values; and *Total assets*, the log of total assets. All the other variables are taken the quarter before the dividend reduction. Fixed effects are included for the (two-digit SIC code) industry and recession of the dividend reduction. Heteroskedasticity-corrected robust standard errors, clustered by two-digit SIC code, are in brackets. The regression is estimated with an intercept term. The superscripts ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) CAR −3:3	(2) CAR −3:3	(3) Recession cycle CAR	(4) Recession cycle CAR
Early dummy	0.037**		0.145**	
	[0.015]		[0.062]	
Quarters after 1st industry reduction		−0.007*		−0.040**
		[0.004]		[0.018]
Dividend % change	0.163***	0.163***	0.417***	0.403***
	[0.037]	[0.037]	[0.117]	[0.114]
Total assets	0.007**	0.007**	0.001	0.001
	[0.003]	[0.003]	[0.008]	[0.008]
Cash to assets	0.031	0.031	−0.409	−0.404
	[0.101]	[0.100]	[0.303]	[0.320]
Debt to assets	−0.048	−0.042	−0.229	−0.196
	[0.084]	[0.085]	[0.257]	[0.262]
Market to book	0.003	0.003	0.023***	0.025***
	[0.003]	[0.003]	[0.009]	[0.008]
Earnings per share	0.001	0.002	0.003	0.003
	[0.003]	[0.003]	[0.007]	[0.007]
Observations	436	436	436	436
R-squared	0.168	0.162	0.252	0.252

industry contraction cycle CARs will be similar for both groups. Table 5 reports the regression results, with columns 1 and 2 examining announcement returns and columns 3 and 4 addressing industry contraction cycle returns.

The first two columns of Table 5 show no significant difference between early and late dividend reductions. Columns 3 and 4 show significant negative returns for early reducers compared to late reducers. Column 3 suggests that early reducers underperform relative to late reducers by 18%. Column 4 also supports early reductions having more negative returns than late reductions, suggesting a 3.5% significantly higher return for each quarter farther away from the first reduction. Another interesting result is the lack of significance for the dividend reduction size in the announcement return specifications, which may entail the size of a dividend reduction being less important outside of a recession. The overall results support hypotheses $\mathbf{H}_{2a}$ and $\mathbf{H}_{2b}$, suggesting that an early dividend reduction is a negative signal outside of a recession.

3.3.2. Industry contraction cycle CARs as influenced by the availability of external financing

This section tests hypothesis $\mathbf{H}_3$. Hypothesis $\mathbf{H}_3$ suggests that early dividend reductions during periods of costly external financing (recessions) will have more favorable announcement and long-term returns than early dividend reductions during periods of plentiful external financing (outside recessions). The study tests this hypothesis by using two different proxies for costly external financing.

The first proxy for costly external financing is a recession dummy (Covas and Den Haan, 2011), which suggests procyclical debt and equity issuance for most firm types. I implement this test by creating a recession dummy, which equals one during an NBER recession and zero otherwise. I additionally create interaction variables between the recession dummy and both the early dummy and *quarters after 1st industry reduction* variables. These interactions allow for a direct comparison between early reductions inside and outside of a recession. The second proxy, net financing change, attempts to proxy for the degree of difficulty of obtaining equity or debt financing compared to the previous year. The variable used is the economy's (non-financial dividend-paying firms) year average of net debt plus net equity issuance minus the average the previous year; lastly, this is scaled by the previous year's average firm equity. Since this variable is the change in an aggregate measure, it should be uncorrelated with the likelihood of any single firm receiving financing but should give a general picture of whether the credit markets are tightening or opening up. Fig. 1 shows the relationship between NBER recessions and the average net financing of dividend-paying firms. This figure shows that net financing levels typically fall near or during a recession and that net financing and recessions are correlated but do not move in lockstep. As with the recession dummy, I interact the net financing change variable with the early dummy and *quarters after 1st reduction* variables, allowing a direct comparison between early reductions during periods of high and low available external financing.

Since expensive external financing makes it costly for firms to maintain their dividend policy, I expect the interaction of the early dummy variable and the recession dummy to be positive and significant, suggesting that early recession dividend reductions

Table 4
Effect of dividend reduction size on announcement returns for early versus late reductions. This table reports the results of two OLS regressions with CARs from three days before to three days after a firm's dividend reduction announcement. The CARs are calculated using the Fama–French factors, including a momentum factor. The independent variables are *Early dummy*, a dummy variable that equals one if this particular dividend reduction occurred within two quarters of the first same industry dividend reduction, as measured from the end of the quarter of the first dividend reduction, and zero otherwise; *Quarters after 1st industry reduction*, a variable counting the number of quarters since the first dividend reduction in a particular industry's cycle period; *ABV(Dividend % change)*, the absolute value of the percentage of the dividend decrease; and *Total assets*, the log of total assets. All the other variables are taken the quarter before the dividend reduction. Fixed effects are included for the (two-digit SIC code) industry and recession of the dividend reduction. Heteroskedasticity-corrected robust standard errors, clustered by two-digit SIC code, are in brackets. The regression is estimated with an intercept term. The superscripts ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) CAR −3:3	(2) CAR −3:3
Early dummy	−0.023	
	[0.023]	
Early dummy ∗ ABV(Dividend % change)	0.126**	
	[0.048]	
Quarters after 1st industry reduction		0.007
		[0.007]
Quarters after 1st industry reduction ∗ ABV(Dividend % change)		−0.029*
		[0.015]
ABV(Dividend % change)	−0.235***	−0.108*
	[0.045]	[0.055]
Total assets	0.006*	0.006*
	[0.003]	[0.003]
Cash to assets	0.024	0.032
	[0.100]	[0.100]
Debt to assets	−0.044	−0.035
	[0.083]	[0.083]
Market to book	0.003	0.003
	[0.003]	[0.003]
Earnings per share	0.001	0.002
	[0.003]	[0.003]
Observations	436	436
R-Squared	0.175	0.167

have higher returns than early non-recession reductions. In this specification, the early dummy indicates the effect of an early reduction outside of a recession and is expected to be negative for the industry contraction cycle CARs. For the net financing proxy, it is expected that that the interaction of net financing change and the early dummy will be significantly negative, since larger decreases in net financing will be associated with more expensive external financing. There is no expected prediction for just the early dummy, since this variable now merely controls for the general effect of being an early versus late reducer.[24] Table 6 reports the regression results; panel A features the recession proxy and panel B the net financing proxy. In both panels, columns 1 and 2 examine announcement returns, while columns 3 and 4 address industry contraction cycle returns.[25]

In panel A, column 1, the early dummy coefficient is very small and not significant and the interaction of the early dummy and the recession dummy is positive and significant, clearly showing a large difference between early dividend reducers inside and outside of a recession. Column 2 tells the same supportive story shown in column 1. Columns 3 and 4 reconfirm all prior results, where it can be seen that an early dividend reduction outside of a recession leads to lower industry contraction cycle CARs and that an early dividend reduction during a recession leads to significantly higher CARs.

Panel B shows support similar to panel A. The interaction of the early dummy and net financing change is negative and significant in columns 1 and 3, suggesting that tightening capital markets encourage higher-quality firms to reduce dividends. Columns 2 and 4 are similarly supportive. Overall, Table 6 confirms support for hypothesis $\mathbf{H}_3$ and overall support for all the hypotheses.

3.4. Robustness checks

This section further tests the robustness of the above results, specifically addressing some sample selection concerns and an alternative hypothesis development model.

[24] Since the net financing change is a continuous variable, the interaction of early and net financing change simultaneously informs the effect of positive versus negative net financing change amounts, which is not true of the interaction term used in panel A of Table 8, which only shows the additional effect of being an early reducer during a recession.

[25] Although not reported, the regressions of Table 6 include the dividend percentage change and the other previously used control variables. These variables' coefficients are statistically similar to those found in earlier tests.

Table 5
Non-recession timing of dividend reductions and returns. This table reports the results of several OLS regressions. The dependent variable in columns 1 and 2 is the CAR from three days before to three days after a firm's dividend reduction announcement. In columns 3 and 4 the dependent variable is the monthly CAR measured from the first dividend reduction to the last in a particular industry contraction cycle. The CARs are calculated using the Fama–French factors, including a momentum factor. The independent variables are *Early dummy*, a dummy variable that equals one if this particular dividend reduction occurred three quarters or more prior to the industry's trough in sales, as described in Section 3.1.2, and zero otherwise; *Quarters after 1st industry reduction*, a variable counting the number of quarters since the first dividend reduction in a particular industry's cycle period; *Dividend % change*, the percentage of the dividend decrease, with all negative values; and *Total assets*, the log of total assets. All the other variables are taken the quarter before the dividend reduction. Fixed effects are included for the (two-digit SIC code) industry and time of the dividend reduction (two-year dummies). Heteroskedasticity-corrected robust standard errors, clustered by the two-digit SIC code, are in brackets. The regression is estimated with an intercept term. The superscripts ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) CAR −3:3	(2) CAR −3:3	(3) Industry contraction cycle CAR	(4) Industry contraction cycle CAR
Early dummy	−0.010		−0.183**	
	[0.013]		[0.088]	
Quarters after 1st industry reduction		0.003		0.035***
		[0.003]		[0.012]
Dividend % change	0.045	0.046	0.452*	0.492*
	[0.063]	[0.062]	[0.267]	[0.289]
Total assets	0.009***	0.009***	−0.007	−0.005
	[0.003]	[0.003]	[0.016]	[0.016]
Cash to assets	0.045	0.048	−0.188	−0.161
	[0.082]	[0.081]	[0.238]	[0.232]
Debt to assets	0.003	0.003	−0.346**	−0.338**
	[0.043]	[0.042]	[0.129]	[0.128]
Market to book	0.003	0.003	0.016	0.015
	[0.004]	[0.003]	[0.014]	[0.014]
Earnings per share	0.006	0.005	0.043	0.042
	[0.004]	[0.004]	[0.026]	[0.026]
Observations	278	278	278	278
R-Squared	0.254	0.254	0.347	0.339

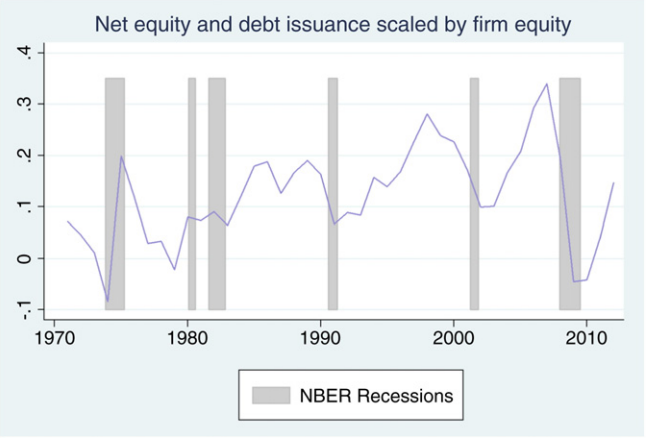

Fig. 1. Aggregate net financing and recessions. This figure plots the yearly firm average of net equity and debt issuance scaled by average firm equity. The sample of firms included in this figure is limited to non-financial, non-utility, dividend-paying firms with data available in the CRSP–COMPUSTAT database. The gray bars represent NBER recession periods, from peak to trough.

3.4.1. Heckman model for selection bias

Since firms enter into the sample only upon dividend reduction, the potential for selection bias exists, in that many firms will not need to reduce dividends and thus never enter the sample. It is not clear what type of bias this could create, but this section's objective is to utilize a Heckman (1979) model to control for any potential selection bias. Similarly, the decision to be an early or late dividend reducer is not completely exogenous, a potential bias explored in Section 3.4.2.

All firms will not have the same propensity to reduce dividends. More specifically, it is expected that firms that are relatively smaller and which have lower cash reserves, higher leverage ratios, or lower ratios of earnings per share will be the most likely firms to make a dividend reduction. As suggested by the model, the availability of external financing will similarly determine if a dividend reduction is necessary. The Heckman model works in two stages, first, predicting the likelihood of making an economically significant dividend reduction and, second, predicting CARs as influenced by dividend reduction timing after controlling for sample selection in the first stage. The first stage has as controls the log of total assets, the cash-to-assets ratio, the debt-to-assets ratio, the market-to-book ratio, and earnings per share, and all measured the quarter prior to the dividend

Table 6
Recession versus non-recession timing of dividend reductions and returns. This table reports the results of several OLS regressions. For both panels the dependent variable in columns 1 and 2 is the CAR from three days before to three days after a firm's dividend reduction announcement. In columns 3 and 4 the dependent variable is the monthly CAR measured from the first dividend reduction to the last in a particular industry contraction cycle. The CARs are calculated using the Fama–French factors, including a momentum factor. Panel A uses the NBER recession dates to proxy for periods of scarce or costly external financing. Panel B uses yearly changes in net debt and equity issuance to proxy for periods of scarce or costly external financing. The independent variables are *Early dummy*, a dummy variable that equals one if this particular dividend reduction occurred three quarters or more prior to the industry's trough in sales, as described in Section 3.1.2, and zero otherwise; *Quarters after 1st industry reduction*, a variable counting the number of quarters since the first dividend reduction in a particular industry's cycle period; *Recession dummy*, a dummy variable that equals one if the observation quarter is within an NBER recession, as measured from the recession peak to one month after the trough, and zero otherwise; *Net financing change*, the entire sample's average yearly change of net debt plus net equity issuance, scaled by last year's average firm equity; *Dividend % change*, the percentage of the dividend decrease, with all negative values; and *Total assets*, the log of total assets. All the other variables are taken the quarter before the dividend reduction. Fixed effects are included for the (two-digit SIC code) industry and time of the dividend reduction (two-year dummies). Heteroskedasticity-corrected robust standard errors, clustered by the two-digit SIC code, are in brackets. The regression is estimated with an intercept term. The superscripts ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) CAR −3:3	(2) CAR −3:3	(3) Industry contraction cycle CAR	(4) Industry contraction cycle CAR
Panel A				
Early dummy	−0.002		−0.198**	
	[0.011]		[0.079]	
Early dummy * Recession dummy	0.055**		0.299**	
	[0.024]		[0.116]	
Quarters after 1st industry reduction		0.001		0.035***
		[0.004]		[0.012]
Quarters after * Recession dummy		−0.018**		−0.066**
		[0.009]		[0.031]
Recession dummy	−0.036	0.006	−0.066	0.110**
	[0.023]	[0.018]	[0.060]	[0.051]
Observations	498	498	498	498
R-Squared	0.184	0.186	0.244	0.234
Panel B				
Early dummy	0.018		−0.052	
	[0.013]		[0.049]	
Early dummy * Net financing change	−0.428***		−1.502**	
	[0.115]		[0.660]	
Quarters after 1st industry reduction		−0.001		0.021*
		[0.003]		[0.010]
Quarters after * Net financing change		0.062**		0.242*
		[0.027]		[0.126]
Net financing change	0.211	0.009	0.201	−0.963
	[0.170]	[0.126]	[0.578]	[0.768]
Observations	496	496	496	496
R-Squared	0.197	0.187	0.240	0.233

reduction date. Other key variables are the recession dummy, net financing change, and the last quarter's cash dividend amount. The net financing change and recession dummy are important variables, since they are expected to be correlated with the overall availability of external financing in the market. Controlling for the current cash dividend amount is also important because the decision to reduce a dividend likely depends on the size of the usual cash payment and so the potential for a foregone dividend payment to finance internal investments.[26] The first stage also includes industry and two-year time fixed effects. The sample for the first stage consists of all CRSP–COMPUSTAT merged firms making quarterly dividend payments from 1970 to 2010 that are not a financial institution or a regulated utility company. The goal of using the Heckman model is to successfully recreate the results of Tables 3 and 6. Panels A to C of Table 7 show the selection-corrected results. Panel A tests the importance of dividend timing as measured from a recession's start (confirming the results of Table 3), while panels B and C both show the same within industry contraction cycles. More specifically, panel B uses NBER recession dates to proxy for periods of scarce or costly external financing (confirming the results of Table 6, panel A), while panel C does so with yearly changes in net debt and equity issuance (confirming the results of Table 6, panel B).[27]

Panels A to C of Table 7 each have four different two-stage tests. The first stage, which predicts the likelihood of a firm reducing dividends, is on the right side of each column. All panels of Table 7 suggest that firms are less likely to reduce dividends the larger their size, the higher cash levels and greater earnings per share they have, and the smaller the usual dividend. These results are exactly as expected, where weaker firms and firms with sizable regular dividend levels are the most likely to reduce dividends. Perhaps the most important finding of the first-stage results is the negative significance of the net financing change and the simultaneous positive significance (in panels B and C) of the recession dummy. This finding suggests that the more easily

[26] Since the sample contains only dividend-paying firms, the last dividend amount for all firms is a positive value and, as such, this variable does not inadvertently capture whether a firm pays dividends or not.
[27] For brevity, panels B and C do not report the regression coefficients for the dividend percentage change or the control variables. These coefficients are similar to those in panel A.

available external financing is, the less likely a firm is to reduce dividends, which directly supports the model's prediction that some dividend reductions will take place due to external funding that is costly or difficult to access. The significance of both variables suggests that both are important and that each controls for a different effect.

The second-stage results, which predict dividend reduction announcement CARs and cycle duration CARs, support all the previous findings. The selection-corrected results of panel A of Table 7 are generally the same or stronger than those in Table 3. The only exception is in column 2 of panel A, where the *quarters after 1st industry reduction* variable has the correct sign but is no longer statistically significant at the 10% level, as it was in column 2 of Table 3. Panel B of Table 7 tells the same story as in Table 6, that dividend reduction timing is a negative signal outside of a recession and a relatively more favorable signal during a recession. Some variables of interest are not as significant as before, but the results still point in the same direction. Similar to panel A, column 2 of panel B shows that the *quarters after 1st reduction* variable has the correct sign but is not statistically significant at the 10% level. It is worth mentioning that, in column 3 of panel B, the most important variable, the interaction of the early dummy and the recession dummy, is statistically significant, but the early dummy by itself, while having the correct negative sign, is no longer statistically significant. Despite this small drop in significance for the announcement return results on the *quarters after 1st industry reduction* variable in panels A and B of Table 7, the results, overall, show that the sample selection of dividend-reducing firms does not create bias in the aforementioned results and that dividend reduction timing does impact firm returns.

Panel C, which uses the interaction of net financing change and the early dummy, has the advantage that net financing change is a continuous variable. A significant coefficient for the interaction term can therefore indicate that early reductions are both a good signal in times of costly financing (negative net financing change values) and a bad signal during times of more open credit markets. The results from panel C strongly support the findings of Table 6, panel B, and generally support all the paper's hypotheses.

3.4.2. Early versus late propensity score matching tests

It is clear that the decision to reduce dividends earlier versus later is not completely exogenous and can depend on firm-specific characteristics. This type of potential bias is best addressed by utilizing not a Heckman model but an analysis better suited to measure treatment effects, such as propensity score matching. The propensity score matching technique, discussed by Lee and Wahal (2004), addresses potential bias by directly comparing appropriately matched treatment and non-treatment groups.[28] In this context our 'treatment' group is the early dividend reducers. This study makes these comparisons for three different samples: the recession sample, the industry contraction cycle sample during a recession, and the industry contraction cycle sample during a non-recession period. Lee and Wahal (2004) match firms using one-to-one nearest-neighbors propensity score matching. This paper implements a similar matching methodology. The first stage runs a probit regression with the dependent variable equal to one for early dividend reducers and zero for late dividend reducers.[29] Each early dividend reducers is then matched with a late reducer.[30] The method determines matches by the closest propensity score observation within the same one-digit SIC code and during the same recession or non-recession period of time.[31] The added restriction that the matched observations come from the same industry and occur in the same recession or non-recession industry contraction cycle ensures greater comparability. This restriction is intended to be a more parsimonious matching technique than standard propensity score matching, but it is worth noting that a standard propensity score matching technique that does not use these additional matching criteria will yield the same results. All matching is conducted with replacement and also yields similar results as no replacement, kernel, or local linear propensity score matching techniques.

The three different samples have the following numbers of early (late) dividend reducers: The recession sample has 275 early (161 late) reducers, the industry contraction cycle sample within a recession has 75 early (145 late) reducers, and the industry contraction cycle sample within a non-recession has 109 early (169 late) reducers. For the different sample announcement and cycle-long CARs, I calculate the mean differences between early and late reducers, as well as standard errors for the purpose of statistical testing.[32] Table 8 reports the mean differences along with their test statistics. Panels A to C, respectively, show the return difference between early and late dividend reducers for the recession sample, the industry contraction cycle sample during a recession, and the industry contraction cycle sample during a non-recession.

Panels A and B both show results supporting the notion that early dividend reductions have more favorable announcement and cycle-long returns during a recession. Panel C, for the non-recession period, also confirms prior results with insignificantly different announcement effect returns and significantly negative long-run returns. Overall, these results indicate that an early dividend reduction is a relatively positive signal in a recession, but a negative one outside of a recession.

[28] Rubin (1974, 1977) and Rosenbaum and Rubin (1983) show that propensity score matching can be used to eliminate treatment biases by linking a treated firm to a non-treated firm that was equally likely to receive the said treatment.

[29] The regression model uses the same independent variables as all the other regressions: the percentage change in the dividend, the log of total assets, the cash-to-assets ratio, the debt-to-assets ratio, the market-to-book ratio, and earnings per share, all measured the quarter prior to the dividend reduction date.

[30] The matching methodology matches early dividend reducers with the closest late dividend reducers, limiting the number of paired matches to the number of early dividend reducers. As an additional check, late reducers were similarly matched to early reducers and both specifications led to similar results. The reported results utilize whichever specification leads to larger numbers of matched observations.

[31] Matching using one-digit SIC codes allows for a greater number of matches. If matching is carried out within two-digit SIC codes, the results are the same but with fewer matches.

[32] Since Abadie and Imbens (2008) show that bootstrapping is not generally valid for matching estimators, I do not bootstrap the standard errors, although bootstrapping the standard errors yields the same results.

Table 7
Timing of dividend reductions and returns, controlling for Heckman selection bias. This table reports the results of several Heckman selection regressions. The first stage predicts the likelihood of a dividend reduction and the second stage predicts CARs from three days before to three days after a firm's dividend reduction announcement (columns 1 and 2) and monthly CARs measured from the first dividend reduction to the last in a particular industry contraction cycle (columns 3 and 4). Panel A utilizes *Early dummy*, a dummy variable that equals one if this particular dividend reduction occurred within two quarters of the first same industry dividend reduction, as measured from the end of the quarter of the first dividend reduction, and zero otherwise; *Quarters after 1st industry reduction* is a variable counting the number of quarters since the first dividend reduction in a particular industry's cycle period. Industry contraction cycles for panel A are NBER recessions as measured from the month of the recession peak to one month after the trough. The Heckman selection sample is limited to recession period observations only for panel A. Panels B and C both utilize *Early dummy*, which is one if this particular dividend reduction occurred three quarters or more prior to the industry's trough in sales and zero otherwise, and *Quarters after 1st industry reduction*, a variable counting the number of quarters since the first dividend reduction in a particular industry's cycle period. Industry contraction cycles for both panels are defined as six quarters prior to two quarters after the industry's trough in sales, as described in Section 3.1.2. Panel B uses NBER recession dates to proxy for periods of scarce or costly external financing, while panel C does so with yearly changes in net debt and equity issuance. For brevity, panels B and C do not report the regression coefficients for dividend percentage change or the control variables, since all the coefficients are similar to those in panel A. Other independent variables are the following: *Net financing change*, the economy's (non-financial dividend-paying firms) year average of net debt plus net equity issuance minus the average the previous year, scaled by last year's average firm equity. This variable is the entire sample's average yearly change of net debt plus net equity issuance, scaled by last year's average firm equity. The variable *Last dividend amount* is the per-share cash dividend amount the quarter prior to the dividend reduction, a positive and non-zero value for all observations. The variable *Recession dummy* is a dummy that equals one if the observation quarter is within an NBER recession, as measured from the recession peak to one month after the trough, and zero otherwise. The variable *Dividend % change* is the percentage of the dividend decrease, with all negative values. The variable *Total assets* is the log of total assets. All the other variables are taken the quarter before the dividend reduction. Fixed effects are included for the (two-digit SIC code) industry and time of the dividend reduction (two-year dummies). Heteroskedasticity-corrected robust standard errors, clustered by the two-digit SIC code, are in brackets. The regression is estimated with an intercept term. The superscripts ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)	
	CAR −3:3	Dividend reduction	CAR −3:3	Dividend reduction	Industry contraction cycle CAR	Dividend reduction	Industry contraction cycle CAR	Dividend reduction
Panel A								
Early dummy	0.028**				0.139***			
	[0.014]				[0.051]			
Quarters after 1st industry reduction			−0.005				−0.030**	
			[0.004]				[0.014]	
Dividend % change	0.130***		0.124***		0.374***		0.338***	
	[0.031]		[0.031]		[0.086]		[0.078]	
Total assets	0.001	−0.090***	0.001	−0.085***	0.007	−0.090***	0.007	−0.084***
	[0.003]	[0.015]	[0.003]	[0.014]	[0.007]	[0.015]	[0.007]	[0.015]
Cash to assets	0.022	−0.700***	0.003	−0.631***	−0.389**	−0.661***	−0.377**	−0.596***
	[0.053]	[0.249]	[0.055]	[0.221]	[0.166]	[0.255]	[0.166]	[0.229]
Debt to assets	−0.021	0.173	−0.025	0.155	−0.206	0.188	−0.187	0.169
	[0.061]	[0.126]	[0.057]	[0.125]	[0.243]	[0.126]	[0.224]	[0.124]
Market to book	−0.000***	0.000	−0.000***	0.000	−0.000***	0.000	−0.000***	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Earnings per share	0.002	−0.078***	0.003	−0.082***	0.029***	−0.078***	0.030***	−0.082***
	[0.003]	[0.018]	[0.003]	[0.019]	[0.009]	[0.019]	[0.009]	[0.020]
Net financing change		−2.088***		−2.214***		−2.109***		−2.226***
		[0.406]		[0.377]		[0.411]		[0.382]
Last dividend amount		0.936***		0.956***		0.942***		0.961***
		[0.107]		[0.101]		[0.110]		[0.104]
Observations	22,500		22,562		22,508		22,570	

Panel B								
Early dummy	0.001				−0.083			
	[0.009]				[0.081]			
Early dummy*Recession dummy	0.050**				0.238**			
	[0.020]				[0.099]			
Quarters after 1st industry reduction			−0.001				0.012**	
			[0.001]				[0.005]	
Quarters after*Recession dummy			−0.007				−0.059**	
			[0.004]				[0.024]	
Recession dummy	−0.032*	0.127***	0.011	0.168***	−0.143**	0.129***	−0.053	0.165***
	[0.018]	[0.048]	[0.011]	[0.043]	[0.060]	[0.048]	[0.059]	[0.043]
Net financing change		−1.102***		−1.188***		−1.118***		−0.934***
		[0.376]		[0.355]		[0.386]		[0.284]
Last dividend amount		0.680***		0.780***		0.687***		0.801***
		[0.084]		[0.075]		[0.085]		[0.094]
Panel C								
Early dummy	0.021*				0.013			
	[0.012]				[0.058]			
Early dummy*Net financing change	−0.422***				−1.442**			
	[0.101]				[0.564]			
Quarters after 1st industry reduction			−0.001**				0.007	
			[0.001]				[0.005]	
Quarters after*Net financing change			0.025**				0.131*	
			[0.010]				[0.076]	
Net financing change	0.137	−1.122***	−0.043	−1.174***	0.497	−1.116***	−1.006	−0.918***
	[0.141]	[0.374]	[0.088]	[0.347]	[0.541]	[0.374]	[0.637]	[0.288]
Recession dummy		0.127***		0.168***		0.129***		0.162***
		[0.048]		[0.042]		[0.048]		[0.044]
Last dividend amount		0.679***		0.780***		0.687***		0.800***
		[0.083]		[0.075]		[0.085]		[0.097]
Observations	143,613		144,256		143,926		144,469	

Table 8
Propensity score matching. This table reports the mean differences in return variables between early and propensity score-matched late dividend reducers. Early and late dividend reducers are first matched on one-digit SIC codes and a recession or non-recession time period-specific dummy. Then propensity score matching is implemented using a one-to-one nearest-neighbors methodology, with common support. All matching is conducted with replacement. Confidence intervals are 95% percent. The superscripts ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	CAR −3:3	Industry contraction cycle CAR	Matched pairs
Panel A: recession sample			
Difference	0.031	0.139	190
Standard errors	0.012	0.038	
z-Statistic	2.68***	3.63***	
Confidence interval	[0.008, 0.054]	[0.064, 0.215]	
Panel B: industry contraction cycle sample			
Recession sample			
Difference	0.124	0.286	85
Standard errors	0.022	0.071	
z-Statistic	5.72***	4.00***	
Confidence interval	[0.081, 0.167]	[0.144, 0.428]	
Panel C: industry contraction cycle sample			
Outside recession sample			
Difference	0.010	−0.125	146
Standard errors	0.012	0.055	
z-Statistic	0.82	−2.27**	
Confidence interval	[−0.014, 0.033]	[−0.234, −0.016]	

3.4.3. Firm segmentation and homogeneous industries

One potential concern is that firms are often multi-segmented firms and thus an industry measure of dividend reduction timing may not adequately classify a firm with several different business segments. These multi-segmented firms can then reduce dividends early relative to one of the industries they operate in and yet still be relatively late in another. An additional related concern is the use of two-digit SIC codes to define an industry and the fact that some industries may contain a very heterogeneous and thus non-comparable group of firms, since firm homogeneity is not equally distributed across SIC groups. Ideally these two issues should be addressed jointly.

I follow the methodology of Nam et al. (2006), collecting multi-segment firm data from COMPUSTAT's Business Information dataset. These data are used to ascertain the number of two-digit SIC codes within which a particular firm operates. Only 195 of the original 436 observations of the recession sample are classified as single-segment firms, in that they operate in only one two-digit SIC code. Similarly, for the industry contraction cycle sample, only 218 of the original sample of 498 operate in only one two-digit SIC code. Looking deeper into the homogeneity of a particular industry, Cairney and Fletcher (2009) provide evidence that an industry is relatively more homogeneous if all firms in the same industry remain in the same industry, whether the industry is grouped by SIC or North American Industry Classification System (NAICS) codes. Using this methodology and the SIC and NAICS code matching technique of Bhojraj et al. (2003), I match two-digit SIC codes to three-digit NAICS codes. I then consider industries homogeneous if all firms fall in the same industry for both SIC and NAICS codes. After this matching process, I classify 243 of the original 436 of the recession sample and 281 of the original 498 for the industry contraction cycle sample as coming from a homogeneous industry. This leaves 127 of the original 436 that are both a single-segment firm and from a more homogeneous industry. Similarly, in the recession sample only 141 of the original 498 from the industry sample conform to both criteria.

A severely reduced sample size is expected to greatly reduce regression power. Therefore I use several different specifications in an attempt to control for industry homogeneity and multi-segment firms. Unreported results show all prior results to be significant and robust when the sample is individually limited to either single-segment firms or firms from homogeneous industries. The OLS regressions containing a dummy variable in the regression specification for whether one or both of these issues affect the firm also provide qualitatively similar results. When the sample is limited to the cross section of these two samples (the drastically reduced subsample), the regression coefficients consistently provide the correct sign for all variables of interest but are not always statistically significant across all tests. For this reason, this paper follows the methodology of Section 3.4.2, utilizing propensity score matching to further test the effect of dividend reduction timing, controlling for firm segmentation and industry heterogeneity.

Once again, this study uses three different samples: the recession sample, the industry contraction cycle sample within a recession, and the industry contraction cycle sample within a non-recession. For the different samples, I calculate the announcement and cycle-long CARs' mean differences between early and late reducers. To better understand the effect of single-segment firms and firms from a homogeneous industry, I subject each of the samples to four different types of propensity score matching.[33] All propensity score matching regressions have the correct sign and are statistically significant, the only

[33] The four different types use the same probit regression specification as outlined in Section 3.4.2, with the following key differences: The first type of propensity score matching adds a control variable counting the number of industry segments and a homogeneous industry dummy variable; the second type limits the sample to firms with only one industry segment; the third limits the sample to only firms from a homogeneous industry; and the fourth limits the sample to firms that both have only one industry segment and come from a homogeneous industry.

exception being for the few specifications with 53 or fewer observations. For brevity, the results are not reported here but they consistently support that early dividend reducers outperform late reducers during a recession and that late reducers outperform early reducers outside of a recession.

Another way to address market segmentation is to consider dividend reduction timing relative to one specific market-wide shock, such as the onset of a recession. This case would entail an additional test, within the sample of recession dividend reductions, where dividend reductions are classified as early or late relative to the recession start date instead of relative to industry peers. This method addresses market segmentation concerns without limiting the sample size, since all industries are subject to the same shock at the same time. For brevity, the results are unreported here, but the results are nearly identical to those in Tables 3 and 6, even if the sample is limited to firms from homogeneous industries.[34]

Overall, it appears that, even after controlling for firm segmentation and industry homogeneity, early dividend reductions send a relatively positive signal during a recession and a more negative one outside of a recession.

3.4.4. High-risk sample selection

This section conducts additional testing to ascertain if early and late dividend reducers have fundamental differences in market exposure or risk, which could be driving the observed results. Along these same lines, this study can use an alternative basic model to predict whether early reducers have superior (or at least less negative) returns than late reducers. This alternative model predicts that early reducers will reduce dividends due to a certain negative return, while late reducers will be higher-variance firms which have the possibility of a positive return and will prefer to wait and see the outcome of their return, before changing dividend policy. Here, high-variance firms only appear in the sample (reducing dividends) only in the event of a negative return. This model suggests that early firms and the observed selection of late firms will have different levels of return variability. This variability may have existed before the dividend reduction or may be a new shift in the riskiness of the firm's returns. This possibility is tested in two ways: first by seeing if a firm's current beta can predict if the firm is an early or late dividend reducer and, second, by seeing if the early dummy can predict future changes in the firm's beta.[35] This alternative model will gain support if the firm's current beta is negatively associated with the probability of the firm being an early reducer or if the early dummy is negatively associated with a percentage change in future betas.

Unreported regression results show that a firm's current beta has no predictive power if a firm is an early or late reducer and, similarly, there is no relationship between being an early or late firm and subsequent future changes in firm beta. It is also worth noting that the inclusion of the current beta as a control variable in any of the prior tests yields qualitatively similar results and the current beta's coefficient is not statistically significant. Overall, these results show no support for the proposed alternative model and, similarly, provide no evidence that being an early or late reducer is driven by fundamental differences in market exposure.

4. Conclusion

This paper examines firm dividend reduction timing relative to other dividend reductions in the same industry, indicating that the timing of dividend reductions is informative for firm valuation. Empirical tests show that during a recession early dividend reducers significantly outperform late reducers in announcement day and recession duration CARs. The results also show that early dividend-reducing firms outside of a recession have significantly lower industry contraction cycle returns than late dividend reducers. Additionally, I show that early dividend reductions during periods of costly external financing have significantly higher announcement day and contraction cycle returns than early dividend reductions outside of a recession. Lastly, all the results are robust to several potential selection issues, further indicating that early dividend reductions are a more positive signal during a recession and a negative one outside of a recession.

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[34] The results in this section are available upon request.
[35] Tests of return variance yield qualitatively similar results.

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