

Mimicking Repurchases

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Abstract

We study a hitherto unexplored dimension of share repurchases: the tendency of firms to mimic the repurchase announcements of their industry counterparts. We argue that a firm, by repurchasing its shares, sends a positive signal about itself and a negative one about its competitors. This induces the competing firms to mimic the behavior of the repurchasing firm by repurchasing themselves. By using a broad sample of U.S. firms for the period 1984 to 2002, we show that in concentrated industries, a repurchase announcement lowers the stock price of the other firms in the same industry. The other firms then retaliate by repurchasing themselves in order to undo these negative effects. When repurchases do occur, they are chosen mostly as a strategic reaction to other firms' initiating repurchases and are not motivated by the desire to time the market, i.e. to take advantage of a significantly undervalued stock price. We show that repurchasing firms in more concentrated industries, therefore, experience a lower increase in value in comparison to their less concentrated counterparts in the post-announcement era. Alternative methodologies used to estimate long-term performance confirm that it is only the low concentration firms that outperform the market, their non-repurchasing peers and their more concentrated counterparts by amounts that are economically and statistically significant.

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Introduction

Repurchases have been an intensely studied topic in finance. On average, stock prices of firms that announce an open market repurchase program increase significantly in the short run (e.g., Dann (1981), Vermaelen (1981)) and in the long run (e.g., Ikenberry, Lakonishok and Vermaelen (1995)). The most common explanation for the short-term abnormal returns is that the repurchase announcement is a positive information signal or that it reflects the benefits from a reduction in agency costs of free cash flow. The long-run excess returns are consistent with the *market timing hypothesis*, i.e., the idea that managers can benefit long-term shareholders (including themselves) by buying back stocks when these are undervalued. Note that as the effective repurchase occurs after the buyback authorisation announcement, such a timing strategy only works if the market underreacts to the announcement.

However, the literature has always focused on the impact of the repurchase on the stock price of the repurchasing firm, without considering its implications for the other firms with which the repurchasing firm is competing. In fact, a share repurchase may provide information not only about the repurchasing firm, but also about its competitors. This paper seeks to provide some initial evidence on this unexplored dimension of repurchases by analysing its implications for both the firm's decision to repurchase and the firm's stock price in the post-announcement period.

Previous research has documented the ability of the market to infer something about the firm's rivals based on the action of the firm (Ecbko, 1983, Rajan, 1994, Lang and Stulz, 1992, Acharya and Yorulmazer, 2004, Servaes and Tamayo, 2004). We extend the same line of reasoning to the area of share repurchases. We argue that a stock repurchase affects positively the stock price of the repurchasing firm but affects negatively the price of the other competing firms in the same industry. Indeed, as a firm repurchases, it generates expectations that the other firms within the same industry will also repurchase. If they do not, the market will interpret this negatively, attributing it to worse economic prospects or higher agency costs. This induces the other firms in the industry to repurchase, not because they want to take advantage of a significantly undervalued stock price (as predicted by the market timing hypothesis), but simply to correct the negative market perception by mimicking the behavior of their competitors. As a result, repurchases acquire a hitherto unexplored *mimicking* dimension. This mimicking dimension is related to the degree of strategic interaction within the industry: the higher the interaction, the stronger the effect. If we proxy for the degree of strategic interaction with the degree of concentration in the product market, we expect firms to be more likely to initiate repurchases as a reaction to the repurchases of the other firms in the same industry, the more concentrated the industry is.

If repurchases are chosen mostly as a reaction to other firms' repurchase decisions, firms that repurchase shares for mimicking reasons will experience on average lower increases in value in the post-repurchase announcement period. In a concentrated industry, a repurchase initiated as a reaction to the repurchases of other firms may have no direct link with the degree of undervaluation of the firm, other than the undervaluation resulting from the repurchase announcement by a competitor. In a competitive industry, instead, a repurchase would more likely be initiated if the firm sees a large gap between its current stock price and its perceived true value. Therefore, repurchasing firms in more concentrated industries should, in the long run, experience a lower increase in value than that experienced by repurchasing firms in less concentrated industries.

These hypotheses are tested against the null hypothesis of no impact of the degree of product market competition on share repurchases. We carry out tests by using a broad sample of U.S. firms for the period 1984 to 2002. As our measure of concentration, we use the Herfindhal index constructed at the 3 digit-SIC classification level. We first document the negative impact that the share repurchase of a firm has on the other firms operating in the same industry. While in the unconcentrated industries, a repurchase of a firm does not significantly affect the other firms, in the concentrated ones, the impact is significant and negative. For the concentrated industries, in the three days surrounding the announcement, this externality amounts to approximately -0.4% for the non-repurchasing competing firms. After a month, the effect on these firms is as big as -3.64% , which is both economically and statistically significant.

More importantly, the decision to repurchase is directly affected by the repurchases of other firms in the same industry. The more concentrated the industry, the more likely it is that a firm repurchases shares if other firms are repurchasing shares. In particular, an average ten percent increase in the ratio of repurchase to total payout by other firms in the same industry increases the likelihood of another firm repurchasing by *7% more* if the firm is located in the high concentration sector.

The absence of a link between repurchases and the degree of undervaluation implies that repurchases in concentrated industries generate less long-run value. We test this by conditioning on the degree of market competition and focusing on the long-term abnormal return. We use alternative methodologies: market-adjusted returns, buy-hold strategies, returns across time and securities (RATS), and the calendar-time portfolio regressions (CTPR) to capture the long-run performance of repurchasing firms. In the process, we control for the market, the 3 and 4 Fama and French Factors (augmented with the Carhart (1997) momentum factor in case of the 4 factor model) and comparable firms. The results are consistent across all the methodologies and robust to the alternative controls.

Stocks of high concentration firms initiating a repurchase do not experience any significant long run abnormal returns (over the 36 months following the announcements). This contrasts with repurchases in competitive industries that deliver an average long run abnormal return equivalent to 25% over the 36 months following the announcement.

In summary, all the findings support the intuition that strategic interaction affects the incentive to initiate repurchases and their economic value. They show that long-run abnormal returns emerge only in those cases in which repurchases are not chosen as a reaction to other firms' repurchases, i.e. cases of low product market competition. These findings are robust to controls for the quality of corporate governance, the extent of institutional ownership and the level of information asymmetry. Controlling for these potential confounding effects allows us to rule out other channels that could provide alternative explanations for our results.

The sizable post-announcement price drifts of repurchasing firms suggest that it takes time for the market to assess the value of the repurchase. We condition on the level of information conveyed by the repurchase, by using the number of analysts following a firm. We find that the price drift is higher in the case where less information is available (firms with fewer analysts) and the industry is less concentrated. In the case of more concentrated industries we find no significant difference between firms with high and low analyst following. This is consistent with our working hypothesis. Indeed, market timing should only matter in the case of firms operating in less concentrated industries, as in more concentrated industries the mimicking dimension swamps the market timing one.

Our results are relevant along many dimensions. First, they provide a first bridge between the corporate finance of payout policies and the industrial organization structure in which the firm operates. We provide a first evidence of the circumstances in which firms choose their payout policy as a reaction to the policy of their competitors.

Second, our results also provide some insights into the reason why firms tend to cluster their repurchases and why we observe repurchases happening in waves. In concentrated industries, waves are the results of a signal mimicking strategy in which repurchasing is the optimal strategy if other firms in the same industry repurchase. In the less concentrated industries, instead, waves are due to firms optimally choosing to repurchase because (financial) market conditions induce them to exploit the window of opportunity. The post-announcements drifts in the two groups clearly show the economic implications of such behavior.

Third, our results also help us to understand better the factors which could be responsible for the post-announcement drift of the repurchasing stocks. According to Ikenberry, Lakonishok and Vermaelen (1995), this drift is pronounced only for low market to book (or value) stocks. Our findings, on the other hand, attribute a highly significant post-announcement drift to the stocks of unconcentrated repurchasing firms *even when* the unconcentrated and concentrated stocks have been matched with each other on the dimension of market to book and size. Hence, the degree of strategic interaction plays a key role in the determination of the post-announcement drift, something which had been overlooked till now.

Fourth, we also shed some light on the puzzle of decreasing dividends. The dramatic increase in repurchases and decrease in dividends as a preferred form of distribution of cash flows may be related to the change in the degree of market competition. Indeed, over the last decades the US market has experienced an increase in product market competition. One aspect of this has been the increase in idiosyncratic volatility as documented by Campbell *et al.* (2001). The other aspect is the reduction in the firm's incentive to use dividends to distribute cash flows. As competition rises, the mimicking dimension decreases, changing firms' incentives and inducing a reallocation of preferences for repurchases.

Finally, our results also suggest an explanation for the strong cyclicalities of repurchases. We know that changes in the firms' strategic interaction depend on the overall economic conditions. For example, Rotemberg and Saloner (1986) and Chevalier and Scharfstein (1996) argue that collusion is more difficult in booms when the incentive to cheat is greatest and that collusion is easier in recessions. In contrast, Bagwell and Staiger (1997) argue that collusion is easier in booms than during a recession. To the extent that the negative externalities created by repurchase announcements in high concentration industries are interpreted by rivals as *aggressive* behavior on the part of the repurchasing firms, these announcements would be seen as detrimental to the possibility of collusion. And given that the firms' ability to collude varies over the business cycle, the use of repurchases by firms in this *mimicking* manner would also vary over the business cycle. This would contribute to explain the strong cyclicalities in repurchases.

The remainder of the paper is structured as follows. In the next section, we consider our hypotheses and lay out the testable restrictions. In section 3, we describe the data. In section 4, we provide evidence of the impact of a repurchase on the other firms in the same industry. In section 5, we use tobit and probit regressions to study the relation between the degree of product market competition and the likelihood that firms will make repurchases. In Section 6, we analyze how the degree of concentration affects the long-run value of a repurchase. A brief conclusion follows.

2. Testable hypotheses

We argue that the repurchase of a firm sends a signal about the other firms that operate in the same industry. In particular, it helps the market to discriminate between the repurchasing firm and the other firms competing in the same industry. This discrimination can be based on either the firms' economic prospects and competitive position or their agency costs. For example, let us consider the case of an industry comprising two firms: A and B. If firm A repurchases, investors will use the signal sent by the repurchase of firm A to make inferences about firm B. One possibility is that the repurchase of A shows that A is in a strong competitive position, for instance that it has lower marginal costs than its competitors. In this case, if firm B does not repurchase, the market will infer that the competitive position of B is weak in comparison to that of A and will react by bidding up the price of firm A and pushing down the price of B.

Alternatively, let us assume that both firms A and B are located in a mature industry that the market knows to have low growth prospects and excess cash. In this case, if firm A repurchases and B does not, the market may interpret this as a sign of higher agency costs of firm B. In this case, firm B's stock would decline as this would show that firm B is less concerned about shareholder value than the repurchasing firm. The only way to change this perception for firm B is to repurchase stocks, in order to confirm that it cares about shareholder value.

If the market thinks that the absence of a repurchase announcement is a sign of weakness of the non-repurchasing firms, the repurchase of a firm will *negatively* affect the stock price of the other non-repurchasing firms within the same industry. That is, if the market interprets the repurchase of firm A and the lack of repurchase by firm B as a negative signal about firm B's economic outlook or agency costs, *the repurchase of firm A will negatively affect the price of firm B.*

We expect that the higher the degree of strategic interaction within the industry, the more the market will interpret the lack of a repurchase as a sign of weakness of the non-repurchasing firm. We proxy for the degree of strategic interaction by using the degree of concentration in the product market. The more concentrated the industry is, the more the economic outlook of a firm is inextricably tied to that of the industry and it is more likely that the firms within the industry share the same economic prospects. Moreover, the more concentrated the industry is, the more the activity of a firm has direct implications for the other firms. For example, Lang and Stulz (1992) show that, when the industry is concentrated, the bankruptcy of a bank may have positive effects on its competitors.

This is due to an inter-industry wealth transfer in which the competitors benefit from the difficulties of the bankrupt firms.

Therefore, the repurchase of firm A adds pressure on firm B to repurchase and to convince the market that its stock price decline resulting from firm A's repurchase is unjustified. If it does not repurchase, its stock price falls. If it repurchases, it can show that it is at least as good – either in terms of its economic prospects or in terms of its agency costs – as its direct competitor who has already repurchased. By repurchasing, firm B is just trying to “mimic the signal” generated by the repurchase of firm A. This mimicking dimension is directly related to the degree of concentration in the product market. These considerations allow us to formulate:

H1: The higher the degree of concentration of the industry, the more the decision to repurchase is induced by the repurchase of other firms within the same industry.

What are the implications for the firm's value? Given that in a concentrated industry most of the repurchases are initiated as a mimicking reaction to the repurchases of other firms, they are less driven by the market timing hypothesis. To make this more clear, let us assume that currently firm A and firm B trade at \$ 10 per share. Firm A announces a repurchase because it believes it has better economic prospects than its competitors, or because it wants to reduce agency costs of free cash flow. As a result its stock price rises to \$ 11 and firm B's stock price falls to \$ 9 because now the market believes that firm B is a weaker player in the industry. If firm B believes that this market reaction is unjustified, it has an incentive to mimic the repurchase signal of firm A. The repurchase will increase firm B's stock price around the repurchase announcement, but not necessarily above \$ 10. So, as firm B's repurchase decision is not driven by the market timing hypothesis - i.e. the belief that there exists a significant gap between its \$ 10 stock price and its true value - we don't expect to observe significant long-run abnormal returns after the repurchase announcement. Thus, in concentrated industries the standard market timing dimension of the repurchase would get swamped by the mimicking dimension.

This allows us to posit:

H2: Repurchasing firms in more concentrated industries experience lower long-run abnormal returns than that experienced by repurchasing firms in less concentrated industries.

These hypotheses can be tested against the null of no effect of strategic interaction on repurchases. We now proceed to test the hypotheses. First we describe the data.

3. Data

3.1 The Sample

The data for this study has been extracted from three main sources: the CRSP-COMPUSTAT Merged Industrial Database for the total payout dollar amounts by year for each firm, the Securities Data Corporation (SDC) Database for open market repurchase program announcements¹ and CRSP Monthly Stocks for dividend announcements. The time period of our study ranges from 1984 to 2002. The choice of this period for the purposes of our study is motivated by the fact that open market stock repurchases increased dramatically in the US after 1982 following the adoption by the SEC of rule 10b-18 which greatly reduced the ambiguity associated with this activity. Furthermore, since 1984, firms have been required to report the value of their repurchases in their cash flow statements and this item can be found in the CRSP-Compustat Merged database as data item number 115.

Following Grinstein and Michaely (2004), we use data item 115 from CRSP Compustat Merged as our measure of repurchase activity of the firm for our Tobit regressions. Although this measure has the drawback of including also preferred stocks in addition to common stocks, this additional repurchase activity represents only a minute fraction of the firm's overall repurchases.² For probit regressions as well as the analysis of post-announcement performance of firms, we use repurchase announcements from SDC only. Following Guay and Harford (2000), if a firm makes more than one open market repurchase announcement within any given year, we only consider the first one.

The CRSP-COMPUSTAT Merged Industrial Database is the source for all the accounting variables which have been used as controls. We give a detailed description of the construction of all variables used in this study in the Appendix. In addition we use CRSP Monthly Stocks to calculate the stock's liquidity and CRSP Daily Stocks to calculate its standard deviation of returns.

¹ For comparability purposes we follow Jagannathan et al. (2000) and Guay and Harford (2000) in focusing on open market repurchases.

² See also Stephens and Weisbach (1998) and Grullon and Michaely (2002).

Institutional holdings for each firm are derived from the data on CDA/Spectrum and the data on the prior year market return, which has been obtained from the website of Kenneth French, is the compounded monthly value-weighted return on all NYSE, AMEX, and NASDAQ stocks.

We also use information on managers derived from the Standard & Poor's Executive Compensation database. In particular, we construct a measure of managerial holdings ("*Managerial Holdings*") defined as the percentage of shares held by the top five executive officers of the firm in the previous year. We also construct a variable which proxies for the more high-powered incentives provided by the holdings of stock options (Datta *et al*, 2000). This variable ("*Equity Based Compensation*") is calculated as the percentage of new stock options awarded in the year in terms of total compensation. Fenn and Liang (2001) and Kahle (2002) argue that stock options may affect dividend policy. Indeed, since executive stock options may not be dividend protected, managers may be induced not to distribute dividends. The downside of the inclusion of these additional controls for our paper is that S&P's Executive Compensation database contains information only for the S&P-500, S&P Midcap-400 and S&P SmallCap-600 firms and starts only from 1992. Hence, the use of these variables reduces our sample considerably.

Following Ikenberry, Lakonishok and Vermaelen (1995), Grullon and Michaely (2002) and others, we exclude the year 1987 for firm year observations and the last quarter of 1987 for announcement data, due to the October '87 crash. Also, we exclude financial firms and regulated utilities and focus exclusively on US listed common stocks (CRSP share codes 10 and 11) thereby excluding ADR's closed-end funds, etc. We consider firms with positive payouts only.³ Finally, we require that, for each firm-year, data be available and non-missing for all the main explanatory variables. The resulting sample comprises 28,636 firm-years. We report descriptive statistics of our sample in Table 1 and these are comparable to the summary statistics reported in Jagannathan *et al* (2000).

3.2 Measures of Product Market Concentration, Strategic Interaction and Corporate Governance

Our measure of product market concentration ("*Concentration*") is based on the Herfindahl index of concentration. It is measured as the sum of the squares of market shares of all the firms in a particular industry for a particular year. The higher the degree of monopoly power in the industry, the closer would this index tend to the value of one, which is its maximum value, and the higher the

³ By a positive payout, we mean a positive repurchase, a dividend or both.

degree of competition, the closer the value of this index to zero. We choose the herfindahl index as our measure of concentration since this index has the advantage of taking into account all the firms in a particular industry while computing the degree of competition/monopoly power, unlike the other popular measures of concentration such as the C4 Index or the Lerner Index. Following Hou and Robinson (2003), we define the industry by using the 3-digit SIC classification. The SIC codes themselves have been obtained from CRSP Monthly Stocks.

As a measure of strategic interaction among repurchasing firms in the same industry, we compute what we refer to as the “*Repurchase Wave*”. This measure is the average ratio of repurchase to total payout for all the *other* firms in the same 3-digit SIC classification for years -1 and -2. In other words, it quantifies the payouts that took the form of repurchases in the same industry considering all the other firms in the industry apart from the firm in question. Every year and for each firm, we calculate the average ratio of repurchases over total payout for all the other firms in the same industry in the previous 2 years. We also construct a variable (“*Conc/Comp Interaction*”) equal to the product between our measure of product market concentration and a dummy equal to 1 if the value of the *Repurchase Wave* for the firm is above the median value, given the values for all the other firms in that particular year, and 0 otherwise.⁴

Our measure of governance (“*Governance Index*”) is the governance index developed by Gompers, Ishii and Metrick (2003). The index is calculated by giving one point to each provision that restricts shareholder rights, from a set of 24 corporate-governance provisions compiled by the Investor Responsibility Research Center (IRRC) and then simply calculating a sum to represent the total number of such provisions. The higher the value of the index, the weaker the shareholder rights are and the poorer the quality of corporate governance. The provisions used to construct the index are of two types: takeover defenses – e.g., bylaws to delay hostile bids, submission to specific state takeover laws, general defense tactics – and power-sharing arrangements between management and shareholders – e.g., amount of protection given to officers and directors, the effective voting rights of shareholders and so on. Given that the Index covers mostly large-capitalization firms - i.e., S&P500 firms and the largest corporation lists of Fortune, Forbes and BusinessWeek – and given that is available only starting in 1990, the use of this variable drastically shrinks the sample, but this is something we also experience when we resort to the use of Executive Compensation data from Compustat.

⁴ The need to multiply the concentration measure with the dummy variable arose for the reason of minimizing possible problems arising from multicollinearity between the interaction term and the principal variables.

As in the case of *Repurchase Wave*, we also construct a variable (“*Conc/Gov Interaction*”) equal to the product between our measure of *Concentration* and a dummy that takes the value of 1 if the value of the *Governance Index* is above the median given the value of the index for all the firms in the same year, and 0 otherwise.⁵

4. The Effect of a Repurchase on the Other Firms within the Same Industry.

We start by providing some evidence on the impact of a share repurchase announcement on the value of the other firms within the same industry. We first estimate the reaction on the returns of the rival firms of the repurchasing firms. We break down the sample into high and low concentration industries. “High” and “low” concentration repurchasing firms are defined as those firms that belong to the top and bottom quintiles of repurchasing firms, sorted on the concentration variable within each year, respectively. The rival firms are identified as those firms which belong to the same industry as the high and low concentration repurchasing firms and which have not made a repurchase announcement in the three years prior to the announcement or in the month following the repurchase announcement. These rival firms are then matched with the repurchasing firm on the basis of market to book ratio and size and the closest 10, 5 or 3 firms are selected. For the purposes of the calculation of abnormal returns, the value-weighted market index is used as the market benchmark. The estimation period of the market model ends 90 days prior to the announcement with a maximum of 255 days and minimum of 100 days required for the estimation. Average compounded abnormal returns are measured starting from one day before the announcement and going up till 30 days after the announcement.⁶

The results are reported in Table 2, Panel A. They show a significant negative abnormal return for the competing firms in the concentrated industry. While in the unconcentrated industry the abnormal return is not significant, in the concentrated one, the average buy and hold abnormal return is approximately equal to -0.40% in the three-day window surrounding the repurchase announcement which grows up to -3.64% within 30 days. These abnormal returns are sizable if we compare them to the abnormal returns experienced by the repurchasing firms themselves, which are of the order of 2.7% to 3% in the three-day window surrounding the repurchase announcement. Also, these findings are consistent with the results documented by Erwin and Miller (1998) who show that rival firms in

⁵ Once again, avoidance of multicollinearity problems motivates us to use the product of the governance index dummy and the concentration variable.

⁶ In particular, we consider the following periods: (-1,+1), (-1,+9), (-1,+15), (-1,+21) and (-1,+30) days, with zero representing the announcement date.

the same industry experience significant negative stock price reactions due to a firm's repurchase announcements and this effect is more pronounced in industries with more strategic interaction.

These results, however, could also be due to spurious correlation. It is indeed possible that all the non-repurchasing firms in the high concentration sector are simply experiencing negative abnormal returns and it just so happens that a firm in the concentrated industry announces a repurchase at this time. If this is the case, and if this effect is not so pronounced in the less concentrated sector, then the results which we have documented above would simply arise due to the poor performance of the non-repurchasing firms *before* the announcement rather than *due* to the repurchase announcement itself. Indeed, the market model used to calculate abnormal returns ignores momentum, as well as other factors such as book-to-market and size.

To address this issue, we perform cross-sectional regressions of cumulative abnormal returns (still defined over 9, 15, 21 and 30 days using the market model) of non-repurchasing firms (operating in the same industry as the repurchasing firm) on the size of the payout of the repurchasing firm and the interaction of this payout size with a concentration dummy, which takes a value of 0 for the low concentration sector and a value of 1 otherwise. In the process, we control for the abnormal return of the non-repurchasing firms in the pre-announcement month to adjust for momentum, as well as for size and market to book.

The results are reported in Table 2, Panel B and they confirm our previous findings. While in the unconcentrated industries a repurchase of a firm does not significantly affect the other firms, in the concentrated ones, the impact is significant and negative. Indeed, the size of the payout variable – i.e., the variable that accounts for the size of the repurchase of the competing firms within the same industry – is not significant on its own, while the interaction between this and the concentration dummy is strongly negatively significant. This suggests that a repurchase affects the other firms in the same industry *only if* the industry is concentrated. For expositional purposes, if we assume that an average firm seeks to buy back 10% of its shares in an average announcement, then at least 0.92% of the abnormal return after 15 days is due to the effect of the repurchase of another firm in the same industry.⁷ This figure grows to 1.5% of the abnormal return after 21 days. Once again, it is clear that this effect is prevalent only amongst the stocks belonging to the high concentration quintile and are not only statistically but also highly economically significant. These findings show that the share repurchase negatively affect the prices of the other firms operating in the same industry and that this

⁷ These figures come from Panel B of Table 2 for the case of 10 non-repurchasing (control) firms.

effect is not arising simply due to the decline in the stock prices of firm located in concentrated industries before the event.⁸

5. The Decision to Repurchase

We now proceed to test how the degree of product market competition affects the firm's choice to repurchase. We start by focusing on the share of repurchases in total payout (defined as the sum of repurchases and dividends) from Compustat data in Section 5.1. Then, we consider repurchase and dividend announcements in Section 5.2.

5.1 The Ratio of Repurchases to Total Payout: Tobit Regressions

We explain the ratio of repurchases to total payout with the degree of product market competition and a set of control variables. We estimate a Tobit model where the dependent variable is the ratio of repurchase to total payout which is bounded between zero and one. We consider different specifications based on an expanding set of control variables. Following Fenn and Liang (2001), we concentrate on firms with positive payouts. We estimate a specification based on the entire sample and one in which we separately consider firms that already have a payout policy in place and are increasing their payouts. Following Jagannathan *et al.* (2000), we define payout increasing firms as those that paid a dividend in at least one of the last two years and during the current year are either increasing their dividends (measured as the increase in dividend per share of at least 0.5% following Amihud and Li, 2003), are initiating a repurchase or are engaged in both simultaneously.

The results are displayed in Table 3, Panel A. In column (1), we report a specification that includes the "standard" control variables (following Jagannathan *et al.*, 2000), and in columns (2), we include three additional control variables which are *Stock Liquidity*, *Stock Return Volatility* and *Prior Year Market Return*. The degree of competition in the product market is measured by *Concentration*. In column (3) we augment this standard specification by adding the measure of governance (*Governance Index*) and the *Repurchase Wave*. In column (4) we add the interactions of *Concentration* with each of these measures and in column (5), we have the full-fledged specification that also accounts for managerial impact including *Equity Based Compensation* and *Managerial*

⁸ Note that in keeping with our observation, the *Previous Month CAR* variable is positive and highly significant in most of the regressions shown in Table 2, Panel B. However, our main variable of interest is still negative and highly significant.

Holdings. Lastly, column (6) contains the results for the full-fledged specification executed only for *payout increasing* firms.

We find that the degree of product market competition affects the repurchase choice. In all the specifications, the coefficient on concentration is always negative and highly significant. That is, an increase in concentration leads firms to prefer dividends to repurchases. This effect is not only statistically strong but also economically very powerful. For example, from the full blown specification of column (5), it can be seen that a one standard deviation increase in *Concentration* would decrease the ratio of repurchases over total payout by about 22%.⁹ Given the number of other control variables we use, this result appears to be remarkably strong.

One explanation for this finding is that firms tend to prefer dividends to repurchases if cash flows are more permanent (Guay and Hartford, 2000). Specifically, because they are more shielded from competition, cash flows distributed in more concentrated industry are more permanent. Also, higher permanency suggests that dividends can be seen as commitment to a permanent payout policy (Kaplan and Reishus, 1990), while repurchases are, by definition, temporary. This would make dividends a better tool in the case of strategic interaction and would explain the preference for dividends in the more concentrated industries. Unreported tests reject this interpretation, as there is no significant difference in cash flow permanency between concentrated and unconcentrated repurchases.¹⁰

More importantly, an in line with our working hypotheses, the payout choice is affected by the behavior of the competitors. *Repurchase Wave* is always positive and significant across the different specifications, and the *Conc/Comp Interaction* is also positive and highly significant as well. Once again, the effects are economically strong. A one standard deviation increase in the *Repurchase Wave* increases the ratio of repurchases over total payout by 7% and a one standard deviation increase in *Conc/Comp Interaction* increases the ratio of repurchases over total payout by another 7%.¹¹ This

⁹ This calculation has been made as follows. The coefficient of Concentration in Table 3, Panel A, column (5) is -0.65 while its standard deviation from Table 1 is 0.18. The mean value of the dependent variable from Table 1 is 0.53. Hence, the impact of one standard deviation change in Concentration changes the dependent variable to $0.53 + (-0.65) \cdot (0.18) = 0.413$. In percentage terms, this would imply a decrease in the dependent variable of $(0.53 - 0.413) / 0.53 = 22\%$.

¹⁰ We test whether there is a difference in cash flow permanency between more and less concentrated industries. We first split the sample into concentrated and unconcentrated groups. Then, we compute the measures of cash flow shock, reversion and permanence (CFP) in identical fashion to Guay and Harford (2000) for the two groups. The results show that both the mean and median cashflow shock is higher for the unconcentrated group but concentrated group displays slightly more permanence using medians. The *t-tests* and the *median tests*, however, show that these differences are not significantly different from zero. These results are available upon request from the authors.

¹¹ These calculations are done in exactly the same way as the ones for the Concentration variable.

clearly suggests that overall, firms are more likely to repurchase if the other firms in the industry are repurchasing. The effect of the strategic interaction with the competitors becomes stronger as the concentration of the industry increases. This is consistent with our *mimicking hypothesis*.

Let us now consider the other variables. The choice of repurchase is negatively related to *Governance Index* and positively related to the *Conc/Gov Interaction*. This result is statistically significant and holds across all the alternative specifications. We recall that the higher the index, the lower the quality of governance. This suggests that there is a positive relation between the quality of governance and the choice to repurchase in general. However, this relationship gets weaker with concentration. The more concentrated the market is, the more firms with poor governance prefer repurchases to dividends as payout.

The results for the other control variables are consistent with the standard literature (e.g., Fenn and Liang, 2001 and Jagannathan *et al.*, 2000) for the standard specifications. Repurchases are preferred by small firms (smaller *Size*), firms with low previous year operating incomes (*Operating Income*), and with greater market-to-book ratio (higher *Market-To-Book*). Moreover, *Institutional Holdings* are positively associated with repurchases, in line with Grinstein and Michaely (2004). Also *Managerial Holdings* and *Equity Based Compensation* are positively related to the choice of repurchase, as predicted by Fenn and Liang (2001) and Kahle (2002). Another interesting result which comes out of our tests is the high positive impact of stock liquidity (*Stock Liquidity*) on the probability of repurchasing shares (see Brav *et al.*, 2004). Lastly, all our principal findings also hold for the subset of firms which are increasing their payouts as can be observed from column (6) of Table 3, Panel A.¹²

It is interesting to note that repurchases are preferred by more volatile firms (higher cash flow volatility – i.e., *Standard Deviation of Operating Income* – and higher stock volatility – i.e., *Stock Return Volatility*). This can be explained if we consider the option value of the repurchase. Ikenberry and Vermaelen (1996) and Oded (2004) show that a repurchase can be considered as an option that gives the firm the possibility to exchange its market value for its true value if in the future prices become lower than the true value. The intuition is that this option allows the firm to exploit its superior information on the true value of the firm. The value of the option is affected by the volatility of the underlying – i.e., cash flows and returns. This suggests that the higher the volatility, the higher

¹² Following Grinstein and Michaely (2004), we also conduct simple OLS regressions with the above specifications (unreported). In this case as well, all three variables of our interest have the desired signs and are significant at the conventional levels. The results are available from the authors upon request.

the option value of the repurchase. Moreover, higher profit volatility implies lower learning uncertainty (Pastor and Veronesi, 2003) and this would further increase the value of the option.

It is also notable that many of these standard variables which are usually used as controls in such regressions do not exhibit very stable signs and significance levels across different specifications. For example, *Market to Book* ratio goes from positive significant to negative significant as we move from column (1) to (6) while *Operating Income* goes from negative significant to positive significant. This may be due to the introduction of the volatility variables, in general rarely used in the literature, and to the usage of a more expanded sets of controls and suggests that the influence of these variables on the probability of repurchase is not clearly defined.

5.2 Repurchase Announcements: Probit Regressions

As an additional test, we focus on distribution announcements. We follow Jagganathan *et al.* (2000) and Kahle (2002) and we study the announcements of payout increase. We use a Probit regression in which the dependent variable takes the value of one if the firm announces an open market repurchase – i.e., if there is a repurchase announcement from SDC – and zero if it increases its cash dividend – i.e., if there is an increase in dividend per share of at least 0.5% (following Amihud and Li, 2003) conditional on a dividend payment in either of the previous two years. The explanatory variables are the same as the ones we used in the Tobit specification. The time period of the analysis is once again from 1984 to 2002. We were able to find 8,403 dividend increase announcements and 5,554 repurchase announcements for which the data on our main controls were non-missing.

We report the results in Table 3, Panel B. As before, we consider alternative specifications. In column (1) we have the standard specification to which we add additional controls in column (2). In column (3), we include the *Repurchase Wave* and *Governance Index* while in column (4), we include the interaction of *Concentration* with each of these variables. Column (5) contains the full specification with the variables on managerial compensation as well.

The results are consistent with those based on the ratio of repurchases over total payout. *Concentration* is always significantly negative. The effect is economically significant as an increase in the degree of concentration by 1 standard deviation decreases the probability of repurchasing stock by approximately 10%.¹³ Also, as before, the payout choice is affected by the behavior of the

¹³ This figure has been calculated using the marginal effects for the Concentration variable from the Probit regressions reported in Table 3, Panel B. The marginal effect of Concentration is -0.23 while its standard deviation is 0.18. Since there are 5,554 repurchase announcements and 8,403 dividend increase announcements, the probability of there being a repurchase announcement is 40%. We can now calculate the impact of a one

competitors. The *Repurchase Wave* variable is positive and significant in column (3) while the *Conc/Comp Interaction* is positive and significant in columns (5) and (6). Moreover, a 1 standard deviation increase in the *Conc/Comp Interaction* increases the probability of a repurchase announcement by 7%.¹⁴ This provides additional evidence in favor of our *mimicking hypothesis*.

The other variables are also related to repurchases in the same way as in the previous specification. That is, in the standard specifications, the probability of a repurchase is negatively related to past operating income and governance and positively related to market to book ratio, volatility of cash flows, and the fraction of institutional investors. Moreover, repurchases are significantly positively related to the liquidity of the stock and equity based compensation. However, once more we see that the signs and significance levels of these standard controls are not very stable across different specifications.

6. Repurchases and Long-Run Abnormal Returns

We now explore the long-run performance of the repurchasing firms, depending on the level of concentration of the industry in which they compete. We conjectured that we should observe a significant difference between the post-announcement performance of repurchasing firms in the concentrated and unconcentrated industries. Our *mimicking hypothesis* suggests that a repurchase in a more concentrated industry is less motivated by market timing than a repurchase initiated by a firm in a less concentrated industry.

In this section, we test this hypothesis. We measure the post-announcement performance of repurchasing firms using the returns across time and securities (RATS) method of Ibbotson (1975) as well as the calendar time portfolio regression (CTPR) approach of Ikenberry, Lakonishok and Vermaelen (2000). In addition, we create a sample of non-repurchasing control firms for each repurchasing firm and we analyze and explore the differences in their post-announcement performance using market adjusted returns, cumulative abnormal returns as well as buy and hold returns. Lastly, we perform a series of robustness checks on our results to verify if any other

standard deviation change in Concentration on the probability of repurchasing as $(0.40 + (-0.23)*(0.18))/0.40 = 10\%$.

¹⁴ This calculation has been made by using a marginal effect for *Conc/Comp Interaction* of 0.16 from the specification reported in column (5) of Table 3, Panel B.

underlying difference between the repurchasing firms is driving our post-announcement results or if it is solely due to our concentration variable. The time period of this analysis is also from 1984 to 2002.

6.1 Returns Across Time and Securities (RATS) Analysis

The returns across time and security method (RATS) developed by Ibbotson (1975) allows us to estimate the long-run abnormal returns without imposing the constancy of the factor loadings (i.e., betas). Each month t , we run the following cross-sectional and time-series estimation:

$$R_{i,t} - R_{f,t} = \alpha + \beta_1 (R_{m,t} - R_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_{i,t},$$

where $R_{m,t}$, SMB_t , and HML_t are the 3 Fama and French factors, $R_{f,t}$ is the riskless rate and $R_{i,t}$ is the return on the i th stock. We separately consider firms belonging to industries with high (low) degree of product market concentration. In particular, we select the repurchase firms from SDC announcements and sort these into high and low concentration quintiles based on the annual concentration ranking of firms from the entire universe of CRSP stocks. The value of the herfindahl index which is used to rank the stocks is the moving average of the herfindahl value for the industry for the past three years. We select the top and bottom quintiles as the most and least concentrated firms. We find 1,471 repurchase announcements for the concentrated industry and 1,383 announcements for the unconcentrated industry. To control for spurious correlation and other confounding effects, the announcing firms in the low and high concentration industries are also matched on the basis of time of announcement, market to book and size (*matched firms*).¹⁵ Applying these criteria, we are left with 688 repurchase announcements for each of the concentrated and unconcentrated industries.

In Table 4 we also check whether there is any significant difference between the size and the market to book ratio of high and low concentration groups after this matching procedure has been performed. The table reports the median size and market to book ratios for quintiles, quartiles, terciles and halves of *matched* high and low concentration repurchasing stocks as well as non-parametric tests for significance of difference between the medians. As can be seen, after the matching procedure, we cannot reject the null hypothesis of no difference between the medians for any of the groups.

We display the results of the RATS regressions for both matching and non-matching firms in Table 5. The analysis shows that repurchasing firms in highly competitive industries (low concentration) outperform their counterparts in high concentration industries (in both groups) by

¹⁵ Matching repurchasing firms on the basis of market to book and size allows us to control for the effects uncovered by Ikenberry, Lakonishok and Vermaelen (1995) who showed that value stocks (i.e. low market to book stocks) exhibit high post-announcement drift while glamour stocks do not.

highly significant amounts over 12, 24 and 36 months. For example, 36 months after the announcement, unconcentrated stocks give a highly significant average monthly cumulative abnormal return of about 25% whereas their concentrated peers manage to provide a statistically insignificant abnormal return of only 2.5%. These results provide clear support for our *signal-mimicking hypothesis*.

6.2 Calendar Time Portfolio Regressions

In this section we look at long run abnormal returns using the calendar-time portfolio regression (CTPR) approach of Ikenberry, Lakonishok and Vermaelen (2000). We construct portfolios made of firms that have just announced an open market repurchase going long in the quintile of unconcentrated repurchasing firms and short in the quintile of concentrated repurchasing firms. These portfolios are rebalanced every month to include in the portfolio stocks that have announced a repurchase program in the previous month and to drop stocks which have reached the end of their holding period of 36 months. We then calculate the abnormal returns both with respect to a 3 factor model (i.e., three Fama and French (1993) factors) and a four factor model, which also includes the Carhart (1997) momentum factor. We proxy for the abnormal return by using the intercept of the time-series regression. In particular, for each portfolio p , we run the following time-series estimation (in case of the three factor model):

$$R_{p,t} = \alpha + \beta_1 (R_{m,t} - R_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_{p,t},$$

where $R_{m,t}$, SMB_t , and HML_t are, the 3 Fama and French factors, $R_{f,t}$ is the riskless rate and $R_{p,t}$ is the return on the portfolio which is long in the unconcentrated stocks and short in the concentrated stocks. We consider both equally weighted and valued-weighted portfolios.

We report the results in Table 6. In Panel A, we consider the three factor model. As it can be seen, in the case of the equal weighted portfolio, stocks of unconcentrated repurchasing firms outperform their concentrated peers by nearly 50 basis points per month, which is significant at the 1 percent level. The value-weighted portfolio similarly yields 52 basis points per month. In Panel B, we report the result for the four factor model. The equal- and value-weighted portfolios in this case yield highly significant abnormal returns of 62.6 and 48.8 bps per month respectively.

The results clearly show that low concentration portfolios deliver significantly higher post-announcement returns than their high concentration counterparts. Therefore, also in this case, the findings are consistent with our *signal-mimicking hypothesis*.¹⁶

6.3 Comparing Repurchasing Firms to Control Firms

One alternative explanation which could be driving our results is that firms in concentrated industries have consistently higher prices than firms in unconcentrated industries. This could be due to the fact that firms in concentrated industries are shielded from competition and are able to deliver higher mark-ups/returns during a recession due to their ability to collude (Chevalier and Scharfstein, 1996). This would imply lower required rate of return and therefore higher prices for concentrated firms (Hou and Robinson, 2003). To control for this possibility, we use a “matching firms” methodology. In particular, for each announcing firm, we identify a control firm which lies in the same 3 digit SIC classification as the repurchasing firm and is the closest to the repurchasing firm in terms of market to book ratio and size. This is achieved by computing the absolute percentage difference for all non-repurchasing firms (that lie in the same 3-digit industry as the repurchasing firm in the year of announcement) in terms of the dimensions of size and market to book. We select the firm with the smallest sum of these absolute percentage differences as our control firm. We then compare the repurchasing firms to their controls. If firms from concentrated industries are bound to have higher and more stable cash flows than firms from unconcentrated industries, this would be picked up by the controls.

Applying this algorithm, we are able to find 688 control firms (one for each) in case of the unconcentrated industry. However, we are able to find only 627 control firms for a total of 688 concentrated repurchasing firms. The reason for this is simply that we require our control firm to lie in the same industry as the repurchasing firm and many of the concentrated repurchasing firms are pure monopolies in their 3 digit SIC classification. Hence, we cannot find suitable controls for these firms. Also, there are a few cases when the control firms do exist but the data required for the matching algorithm are missing in the announcement year. As a result we report our findings separately for the entire concentrated group (comprising 688 announcements), and the group of

¹⁶ Additionally, in unreported results, we also control for the effects uncovered by Hou and Robinson (2003), and employ a factor that proxies for the existence of a “concentration risk”. That is, we include a factor return on the right hand side of the calendar time portfolio regression which is long in the low concentration quintile and is short in high concentration quintile, where the quintiles are constructed from the entire CRSP universe and are rebalanced annually. In this case as well, our initial results are confirmed. The stocks of firms in unconcentrated industries initiating repurchases outperform those of firms in concentrated industries initiating repurchases over and above the concentration risk factor.

concentrated firms for which we could find suitable control firms (comprising 627 announcements). We compute the cumulative market adjusted returns and buy-hold returns using the value- and equal-weighted market indices for each group of firms (i.e. concentrated and unconcentrated repurchasing firms and their respective controls). We also compute cumulative average abnormal returns (CARs) using the 3 Fama-French factor model for each group.

The results are documented in Table 7. It clearly appears that unconcentrated firms tend to outperform their controls by a much greater margin than concentrated firms tend to outperform their controls. For example, using the buy-hold returns computed using the value-weighted market index, we see that unconcentrated firms outperform their controls by 28% over 3 years whereas concentrated firms outperform their controls only by 9%. The picture is consistent no matter which performance measure we use. In figures 1, 2 and 3, we represent the post-announcement performance of each group using the unadjusted raw. All these findings allow us to conclude that the higher long term returns of unconcentrated repurchasing stocks over their concentrated peers is not simply due to the fact that firms in more concentrated industries should have lower expected rates of return because they are less risky

We also observe a pronounced monotonicity in the post-announcement returns along the concentration dimension. In Figure 4, we show the 36-month buy and hold market adjusted returns, using both the value weighted (VW) and equal weighted (EW) market indices, for all the concentration quintiles (unmatched). The compounded market adjusted returns decline steadily with the degree of concentration. The same result is also evident if we consider the buy-hold returns for portfolios of matched repurchasing firms situated at the opposite ends of the concentration spectrum.¹⁷ This can be seen in Table 8. Table 8 contains the figures for long term compounded abnormal returns for 36 months after the announcement, starting from the end of the first month after the announcement. We report results for concentrated quintiles (the top 20% of the firms ranked in terms of concentration), quartiles (top 25%), ‘tredeciles’ (top 33%) and halves (top 50%). We follow the same procedure for the unconcentrated firms. As can be seen, there is a clear monotonicity in the compounded abnormal returns as we move from portfolios containing extremely concentrated stocks to portfolios containing extremely competitive stocks using both value- and equal-weighted market indices. Again, as with the previous tests, the findings are consistent with our *signal-mimicking hypothesis*. We now consider some robustness checks that control for alternative explanations.

¹⁷ Since the repurchasing concentrated and unconcentrated firms used to construct the results in this table have been matched for the time of announcement, market to book and size, there is a smaller chance of confounding factors influencing our results here.

6.4 Robustness Checks

In this subsection, we perform a variety of robustness checks for our results to rule out other possible alternative explanations. These include controlling for the degree of strategic interaction (as measured by the *Repurchase Wave*), the quality of corporate governance, the type of institutional ownership and the degree of asymmetric information. We address each of the issues in turn.

6.4.1 Strategic Interaction

We study whether there is a difference in the firm's long-run post-announcement performance depending on the intensity of the strategic interaction between firms in the industry. We argued that the higher the interaction the less likely that the repurchase signals a significant undervaluation of the company. In Section 5, we have shown that repurchases are more often initiated under the pressure of other firms in more concentrated industries. We therefore expect that, *if we condition on the degree of product market concentration*, the long run abnormal return after a repurchase be lower in the case of firms initiating the repurchase as a reaction to other firms' repurchases.

To test for this issue, we carry out a RATS analysis, conditioning on both the degree of product market concentration and intensity of strategic interaction. We sort repurchasing firms according to both the degree of concentration and our variable *Repurchase Wave*. In particular, firms are sorted according to two alternative criteria. The first is the degree of concentration of their industry. Here we consider the first and fifth quintile. The second criterion is the amount of repurchase in the same industry. Firms are split into two samples, depending on whether they fall below or above the median value. Firms operating in a concentrated (unconcentrated) industry with a lot of repurchases are identified as those which are in an industry in which the amount of repurchases exceeds the median and belong to the top (bottom) quintile in terms of concentration.¹⁸ The results are reported in Table 9, Panel A. They show that low concentration firms always outperform their high concentration counterparts in each subgroup, regardless of the amount of repurchases going on in the same industry. This confirms our previous results. However, if we condition on the low concentrated firms, we see that the long-run performance decreases with the intensity of interaction – i.e., the higher the competitor's repurchases. This is consistent with the hypothesis we laid out above. For

¹⁸ This way of sorting is analogous to the one of Fama and French (1993). The alternative would be to sort the firms, *within each concentration quintile*, according to cash flow permanency. This alternative procedure does not guarantee that the CFP of the *High Permanence* group in one sample (i.e., high concentration sample) be always higher than that of the *Low Permanence* group in the other sample (i.e., low concentration sample). The drawback of our current procedure, however, is that we do not have the same number of firms for each sample.

concentrated firms, however, we see that both groups, i.e. concentrated firms falling in high and low *Repurchase Wave* categories, tend to perform equally badly, as their cumulative abnormal returns are not significantly different from zero after 36 months.

6.4.2 Quality of Corporate Governance

Yet another characteristic that may create a difference between the concentrated and unconcentrated industries is the quality of corporate governance. Competition increases the quality of corporate governance. There is an extensive literature that links product market competition to agency problems, managerial incentives and quality of corporate governance. Competition improves managerial incentives (Hart (1983), Shleifer and Vishny (1986)). This is so widely accepted that competition and quality of corporate governance are seen as substitutes (Grosfeld and Tressel, 2002). Empirically, this view is supported by Jagannathan and Srinivasan (1999). This may suggest that the fact that firms in less concentrated industries overperform those in more concentrated industries, may be due to differences in the quality of governance. Higher quality governance in less concentrated industries would imply that the repurchases are not value-destroying and more likely to increase long-run performance than in the case of those enacted by firms in more concentrated industries.

To control for it, we carry out a RATS analysis, conditioning on both degree of product market concentration and quality of corporate governance. We sort firms following a procedure analogous the one described in Section 6.4.1. The results are reported in Table 9, Panel B. They show that, as expected, good governance firms always outperform the poor governance ones in each subgroup. However, low concentration firms always outperform their high concentration counterparts in each subgroup, regardless of the quality of corporate governance. This confirms our previous results and supports our *mimicking hypothesis*. It also shows the quality of corporate governance has a separate and direct effect on the long-term value of the repurchasers. This is consistent with our story and offers a new perspective on repurchases hitherto never considered.

6.4.3 Institutional Ownership

Previous research has shown that the level of institutional ownership is also a key determinant of the fraction of a company's payout which takes the form of repurchases. For instance, Grinstein and Michaely (2004) have provided evidence of a strong positive relationship between the extent of institutional ownership and stock repurchases made by firms. Considering our finding that repurchases are preferred by firms in unconcentrated industries, it may follow that firms in

unconcentrated industries are more held by institutional investors than firms in concentrated industries. If we believe that firms with high institutional ownership are also firms where managers are more monitored and forced to make decisions in the interest of the long-term shareholders, we would predict that these companies should engage more in market timing activities, such as taking advantage of an undervalued stock price. This would explain why repurchases initiated by firms in unconcentrated industries are followed by larger post-announcement returns. However, this would also imply that a repurchasing firm belonging to an unconcentrated industry would not display high long-term excess returns if few of its shareholders were institutional investors

In order to analyze whether institutional ownership is crucial, we further split high and low concentration repurchasing firms into firms having high and low institutional holdings. The procedure employed is analogous to the one described in Section 6.4.1. Repurchasing firms for which the extent of institutional ownership exceeds the median are classified as firms having *High Institutional Holdings*. The rest are classified as firms having *Low Institutional Holdings*. Once again, we carry out a RATS analysis for each of the four sub-groups.

The results are reported in Table 9, Panel C. They show that the post-announcement drift for the low concentration stocks is once more highly positively significant regardless of the level of institutional ownership. For the high concentration group, the post announcement drift is, once more, largely insignificant, which supports the results documented earlier. Hence, we can conclude that our results on post-announcement performance are robust to the degree of institutional ownership as well.

The results also reveal a couple of other interesting things. Firstly, repurchasing firms with high institutional holdings far outnumber the ones with low institutional holdings in each concentration group. This result provides support for the results of Grinstein and Michaely (2004) since firms with high institutional shareholding are more likely to make repurchases than those which have low institutional ownership. Secondly, the results show that the post-announcement drift of the *Low Institutional Holdings* group is significantly higher than that of the *High Institutional Holdings* subgroup for each concentration group. This seems to imply that firms with high institutional ownership might be initiating repurchases to cater to the preferences of institutional investors regardless of their degree of undervaluation while repurchases made by firms with low institutional ownership are more driven by market timing. Although we do not pursue this question any further in this paper, yet it seems to be an interesting area for further research.

6.4.4. Asymmetric Information and Concentration

The ability to take advantage of an undervalued stock price is more important if there is a lot of information asymmetry. We measure the degree of asymmetric information that might exist about a particular firm at any point in time by looking at the number of analysts following a particular stock and the dispersion in their forecasts. We want to test whether the superior post announcement performance of the low concentration stocks is not simply due to poorer analyst following or due to a higher dispersion in their forecasts regarding the firm's earnings.

The data for this analysis is obtained from I/B/E/S. Table 10 reports mean and median statistics for the numbers of analysts following particular stocks and the adjusted standard deviation of their forecasts.¹⁹ The statistics are provided for both matched and unmatched high and low concentration quintiles of repurchasing firms along with tests for the significance of differences between the means and medians. They show that, in most cases, the analyst following of the low concentration group was in fact higher than its high concentration counterpart and there was no significant difference in the adjusted standard deviation of the forecasts between the two groups. This allows us to conclude that the superior post announcement performance of low concentration stocks is not simply due to greater information asymmetry regarding their future prospects.

We can now directly focus on how the level of information asymmetry interacts with the degree of concentration of the industry. In particular, we expect that, if we condition on the level of information asymmetry, the market timing aspect of a repurchase should be clearly identifiable only for the low concentration repurchasing firms. For the high concentration group instead, the mimicking nature of the repurchase should dominate any attempt to time the market.

We therefore divide the announcing firms in each concentration group depending on the analyst following. A stock is said to have 'low following' if the number of analysts tracking the stock in any particular year are fewer than the median. Otherwise, the stock is classified as having 'high following'. We sort firms following a procedure analogous the one described in Section 6.4.1. Then, we carry out the RATS regression. The results are reported in Table 11. They show that, amongst the low concentration stocks, repurchasing firms with low analyst following provide stellar long term performance (39.84%), whereas the performance of their high concentration counterparts is insignificantly different from zero. Among the 'high analyst following' stocks, once again low concentration repurchasing firms provide highly positive and significant post-announcement

¹⁹ The adjusted standard deviation is simply the standard deviation of the estimates standardized by the mean estimate.

performance (20.08%), much in contrast to the negative significant long run performance of their high concentration counterparts.

For highly concentrated firms, instead, the difference between the two sub-categories is not that great and it is also insignificantly different from zero. This is consistent with our working hypothesis. Indeed, we argue that only firms operating in less concentrated industries are trying to take advantage of an undervalued stock price by repurchasing stock. In this case, the information effect is stronger – and the price drift is higher – where less information is available (i.e. firms with low analyst following). Moreover, this also shows that our results documented in Table 5 are not being driven by differences in information asymmetry about the repurchasing firms.

These findings help us to conclude that only repurchasing firms in unconcentrated industries are trying to time the market and they are more successful in doing this if there is more information asymmetry. For the high concentration group, the mimicking nature of their repurchase decision swamps any information-related motivation. These results, once again, support our mimicking hypothesis.

7. Conclusion

This paper studies how the degree of product market competition affects the firm's decision to repurchase shares, using a broad sample of U.S. firms for the period 1984 to 2002. We argue that in the case of strategic interaction between firms, repurchasing shares acquires a mimicking dimension. Indeed, a repurchase announcement sends to the market a positive signal about the repurchasing firm along with a negative one about its competitors which lowers the price of the other firms in the same industry.

We argue that this negative externality on other firms' prices induces the competing firms to repurchase. Given this mimicking dimension, repurchases in a concentrated industry will be chosen mostly as a reaction to other firms' initiating repurchases and will not be driven by market timing, i.e. the desire to take advantage of a significantly undervalued stock price. We provide supporting evidence showing that the decision to buy back shares is heavily affected by the degree of product market competition and that firms are less likely to resort to repurchases in more concentrated industries.

The decoupling of the repurchase decision from the degree of undervaluation of the firm suggests that repurchasing firms in more concentrated industries experience a lower increase in value than that experienced by repurchasing firms in less concentrated industries. We confirm this intuition by showing that repurchasing firms in less concentrated industries outperform the market, their non-repurchasing peers and their more concentrated counterparts by an amount that is both economically and statistically significant. The results are robust to the use of alternative methodologies – market-adjusted returns, buy-hold strategies, returns across time and security method (RATS), calendar-time portfolio regressions (CTPR).

Our results provide a new way of looking at repurchases, from a perspective that blends corporate finance and industrial organization. They also provide some new intuition on why firms tend to cluster their repurchases and why we observe repurchases happening in waves. Moreover, they suggest an explanation for the puzzle of decreasing dividends. Indeed, the recent phenomenon of substitution of dividends with repurchases may be related to the change in the degree of market competition.

Appendix: Variable Definitions

Panel A: Accounting Variables Used in the Tobit and Probit analysis in Tables 2 and 3, respectively.

Repurchases	Dollar amount of the stock bought back by the firm: CRSP Compustat Merged (CCM) data 115.
Dividends	Dollar amount of dividends: CCM data 21.
Total Payout	Sum of repurchases and dividends: data 115 + data 21.
Firm Size	The logarithm of the total assets of the firm: CCM data 6. (Equal weighted moving average over the past three years.)
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: CCM (data 24 * data 25) / data 60. (Equal weighted moving average over the past three years.)
Debt to Equity Ratio	Ratio of long term debt to the total equity of the firm: CCM data 9/data 60. (Equal weighted moving average over the past three years.)
Operating Income	Ratio of operating income to total assets: CCM data 13/ data 6. (Equal weighted moving average over the past three years.)
Non-Operating Income	Ratio of non-operating income to total assets: CCM data 61/ data 6. (Equal weighted moving average over the past three years.)
Standard Deviation of Operating Income	Standard deviation of the ratio of operating income to the total assets measured over the past 5 years (the current year inclusive).
Lagged Dividend Payout Ratio	The ratio of total dividends to the net income available to common shareholders for the previous year : CCM data 21_{t-1} / data 237_{t-1} .
Liquid Assets	Current assets minus current liabilities, divided by the total assets: CCM (data 4 – data 5)/data 6. (Equal weighted moving average over the past three years.)
Price Earnings Ratio	Share price divided by the basic earnings per share: CCM data 24 / data 58. (Equal weighted moving average over the past three years.)
Capital Expenditures	Ratio of capital expenditure to the total assets of the firm: CCM data 128 / data 6. (Equal weighted moving average over the past three years.)
Prior Year Stock Return	Compounded monthly return for the previous year: CRSP Monthly Stocks.
Institutional Holdings	Ratio of firm's shares held by the institutional investors relative to the total shares outstanding: CDA / Spectrum Database.
Stock Liquidity	The logarithm of the sum of the monthly share volume over the previous year divided by the number of shares outstanding at the end of the year: CRSP monthly stocks.
Stock Return Volatility	Computed as the standard deviation of daily stock returns for the previous year. Data obtained from CRSP Daily Stocks.
Prior Year Market Return	Compounded value-weighted monthly market return for the previous year on all NYSE, AMEX, and NASDAQ stocks. Data on the market return is obtained from the data on Fama-French factors available on the website of Kenneth French.

Panel B: Variables capturing product market competition and strategic interaction between firms.

Concentration	Sum of the squared market share of each firm in the same industry during a year. Market share is defined as the total sales of the firm in a given year divided by the total sales of the industry in the year. The <i>industry</i> is defined at the 3 digit SIC code level, where the SIC codes have been obtained from CRSP monthly (SICCD). The sales data comes from CCM: data 12. (Equal weighted moving average over the past three years.)
Repurchase Wave	Calculated as the average ratio of repurchase to total payout for all the <i>other</i> firms in the same 3-digit SIC code industry. An equal weighted moving average is then taken for the year -1 and -2.

Panel C: Additional controls used in augmented specifications in Tables 2 and 3.

Governance Index	Measured on the same principle as Gompers, Ishii and Metrick (2003): sum of the number of provisions restricting shareholder rights. Data obtained from IRRC. (In each case, we take the lagged value of this variable in each regression).
Equity Based Compensation	Options granted to the firm executive divided by the total compensation of the executive: Compustat Executive Compensation Database BLK_VALU / TDC1. (Equal weighted moving average of the top 5 firm executives for the previous year.)
Managerial Holdings	Shares owned (excluding options) by the manager divided by the number of shares outstanding: Compustat Executive Compensation Database SHROWN / SHRSOUT. (Equal weighted moving average of the top 5 firm executives for the previous year.)

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Table 1: Summary Statistics

The summary statistics have been computed for a time period ranging from 1984 to 2002. The number of observations for each variable is given under the condition that the data on all our main control variables, given in Column (1) of Table 2 below, should be non-missing. Detailed variable definitions are provided in the appendix.

Variable Type	Variable	Database	Obs.	Mean	Median	Std. Dev.
Payout Variables	Dollar Amount of Repurchase	Industrial CRSP/Compustat	20,361	56.50	2.28	284.62
	Dollar Amount of Dividends	Industrial CRSP/Compustat	17,713	57.84	5.54	253.70
	Total Payout	Industrial CRSP/Compustat	28,636	75.95	4.10	379.97
	Share of Repurchase in Total Payout	Industrial CRSP/Compustat	28,636	0.53	0.59	0.44
Accounting Variables and Other Controls	Size	Industrial CRSP/Compustat	28,636	1,394.44	160.03	5,891.77
	M/B Ratio	Industrial CRSP/Compustat	28,636	2.62	1.86	4.21
	D/E Ratio	Industrial CRSP/Compustat	28,636	0.54	0.28	2.22
	Operating Income	Industrial CRSP/Compustat	28,636	0.14	0.15	0.14
	Non-Operating Income	Industrial CRSP/Compustat	28,636	0.01	0.01	0.03
	Std. of Operating Income	Industrial CRSP/Compustat	28,636	0.06	0.04	0.13
	Lag Dividend Payout Ratio	Industrial CRSP/Compustat	28,636	0.43	0.08	9.27
	Liquid Assets	Industrial CRSP/Compustat	28,636	0.28	0.29	0.22
	Price Earnings Ratio	Industrial CRSP/Compustat	28,636	18.49	14.43	68.16
	Capital Expenditures	Industrial CRSP/Compustat	28,636	0.07	0.06	0.06
	Prior Year Stock Return	CRSP Monthly Stocks	28,636	0.23	0.11	0.73
	Stock Liquidity	CRSP Monthly Stocks	28,616	0.95	0.62	1.21
	Equity Based Compensation	Compustat Executive Compensation	8,506	0.32	0.30	0.25
	Managerial Holdings	Compustat Executive Compensation	8,471	0.05	0.01	0.10
	Institutional Holdings	CDA/Spectrum 13f	28,636	0.40	0.38	1.11
Variables Depicting Product Market Competition & Strategic Interaction	Concentration	Calculated from Industrial CRSP/Compustat	28,636	0.24	0.19	0.18
	Repurchase Wave	Calculated from Industrial CRSP/Compustat	28,257	0.20	0.18	0.10
Additional Controls	Stock Return Volatility	CRSP Daily Stocks	28,613	0.03	0.03	0.02
	Governance Index	IRRC	9,549	9.29	9.00	2.83

Table 2: Return Reaction of Repurchase Announcements on Rival Firms

This table reports the results for the reaction on the returns of rival firms of repurchasing firms in both high and low concentration industries. High and low concentration repurchasing firms are identified as the top and bottom quintiles of repurchasing firms sorted on the concentration variable. The rival firms are identified as those firms which belong to the same industry as the high and low concentration repurchasing firms and which have not made a repurchase announcement in the three years prior to the announcement or in the month following the repurchase announcement. These rival firms are then matched with the repurchasing firm on the basis of market to book ratio and size and the closest 10, 5 or 3 firms are selected. The value-weighted market index is used as the market benchmark. The estimation period ends 90 days prior to the announcement with a maximum of 255 days and minimum of 100 days required for the estimation. (-1,+1), (-1,+9), (-1,+15), (-1,+21) and (-1,+30) represent the windows (in days) relative to the announcement event for which the abnormal return is being measured (0 representing the actual announcement day).

Panel A: Average Abnormal Buy-Hold Returns

This panel reports the average abnormal buy and hold returns for rival firms following the announcement for the time period specified. ***, **, * and \$ represent significance levels of 0.1, 1, 5 and 10% respectively using two-tailed tests.

Panel B: Results of Cross Sectional Regressions

This panel reports the results of cross-sectional regressions of Cumulative Abnormal Returns computed over a period following the announcement on payout size, concentration and other controls. The dependent variable is the cumulative abnormal return (CAR) measured over the relevant window and control group (given at the top of the table). The *Payout Size* variable is taken from the actual repurchasing firm (it is the percentage of outstanding shares sought in the repurchase announcement, the data coming from SDC) while all the other variables used in the regression are for the rival firms being analysed. *Concentration Dummy* takes a value of 1 for the high concentration group and a value of 0 for the low concentration group. *Previous Month CAR* is the Cumulative Abnormal Return in the month preceding the announcement measured over (-30,-2) days interval using the same market model and estimation periods as mentioned above. *Size*, *market-to-book* and *debt-to-equity* are as defined in the Appendix. The dependent variable, *payout size* and *Previous Month CAR* are all represented in percentages. ***, **, and * represent significance levels of 1, 5 and 10% respectively using heteroscedasticity robust standard errors with *t*-statistics given in parentheses.

Table 2 – Panel A: Average Abnormal Buy-Hold Returns

	Observations	Controls	(-1,+1)	(-1,+9)	(-1,+15)	(-1,+21)	(-1,+30)
High Concentration	2,825	10	-0.35%**	-1.33%***	-1.99%***	-2.85%***	-3.64%***
	2,349	5	-0.39%**	-1.28%**	-1.91%***	-2.75%***	-3.64%***
	1,657	3	-0.53%**	-1.34%**	-1.85%**	-2.73%***	-3.74%***
Low Concentration	3,990	10	-0.33%	-0.79%	-1.29%\$	-1.55%*	-1.77%**
	3,078	5	-0.22%	-0.65%	-1.11%	-1.21%\$	-1.46%*
	2,001	3	-0.26%	-0.72%	-0.98%	-1.27%	-1.74%*

Table 2 – Panel B: Results of Cross-Sectional Regressions of Cumulative Abnormal Returns on Repurchases of Other Firms within the Same Industry

Variable	10 Controls				5 Controls				3 Controls			
	(-1,+9)	(-1,15)	(-1,21)	(-1,30)	(-1,+9)	(-1,15)	(-1,21)	(-1,30)	(-1,+9)	(-1,15)	(-1,21)	(-1,30)
Return Window												
Payout Size (PS)	0.037 (1.26)	0.041 (1.12)	0.046 (1.09)	0.001 (0.01)	0.038 (1.16)	0.040 (0.99)	0.054 (1.12)	0.028 (0.48)	0.020 (0.49)	0.019 (0.38)	0.014 (0.24)	-0.007 (-0.09)
PS * Concentration Dummy	-0.103*** (-3.23)	-0.092** (-2.37)	-0.150*** (-3.26)	-0.151*** (-2.69)	-0.089** (-2.54)	-0.091** (-2.14)	-0.163*** (-3.20)	-0.183*** (-3.00)	-0.081* (-1.83)	-0.093* (-1.74)	-0.161*** (-2.58)	-0.184** (-2.45)
<i>Control Variables</i>												
Previous Month CAR	0.002 (0.11)	0.029 (1.63)	0.057*** (3.05)	0.089*** (3.89)	0.011 (0.69)	0.042** (2.07)	0.071*** (3.35)	0.095*** (3.75)	0.005 (0.22)	0.024 (0.93)	0.049* (1.82)	0.081*** (2.58)
Size	0.234** (2.37)	0.143 (1.13)	0.133 (0.93)	-0.147 (-0.85)	0.299*** (2.81)	0.168 (1.21)	0.191 (1.24)	-0.002 (-0.01)	0.315** (2.52)	0.274* (1.73)	0.262 (1.46)	0.107 (0.48)
Market to Book	-0.20*** (-2.97)	-0.233** (-2.28)	-0.378*** (-3.85)	-0.563*** (-4.92)	-0.157** (-2.08)	-0.173 (-1.44)	-0.280*** (-2.59)	-0.459*** (-3.87)	-0.209** (-2.12)	-0.229 (-1.48)	-0.376*** (-2.93)	-0.485*** (-3.14)
Debt to Equity	0.018 (0.35)	0.098 (0.78)	0.146 (1.27)	0.268** (2.18)	0.013 (0.22)	0.088 (0.54)	0.137 (0.92)	0.297** (2.04)	-0.0003 (-0.004)	0.130 (0.73)	0.206 (1.31)	0.411*** (3.23)
Intercept	-1.384** (-2.05)	-1.187 (-1.37)	-0.819 (-0.83)	1.309 (1.08)	-1.923*** (-2.62)	-1.435 (-1.47)	-1.365 (-1.26)	0.100 (0.08)	-1.790** (-2.03)	-1.786 (-1.58)	-1.307 (-1.03)	-0.437 (-0.27)
R-Squared	0.007	0.006	0.014	0.020	0.006	0.01	0.013	0.017	0.008	0.006	0.015	0.018
Observations	4,046	4,046	4,046	4,046	3,288	3,288	3,288	3,288	2,236	2,236	2,236	2,236

Table 3

Panel A: Results of Tobit Regressions

This table represents the results for Tobit regressions on firm year observations. The dependent variable is defined as the ratio of repurchase divided by total payout, defined as the sum of dividends plus share repurchases. This variable is left and right censored at 0 and 1 respectively. The time period of the analysis ranges from 1984 to 2002. Column (6) contains the results only for firms which are increasing payout. Following Jagannathan *et al.* (2000) this is defined as firms increasing their dividends, or initiating a repurchase or both. Following Amihud and Li (2003), for a firm to be classified as *dividend increasing*, its dividend per share must increase by at least 0.5% from the previous year. ***, ** and * denote significance levels at 1, 5 and 10% respectively. T-stats are in parentheses. See the appendix for detailed definitions of the variables.

Panel B: Results of Probit Regressions

The dependent variable equals 1 for a repurchase announcement (taken from SDC) and 0 for a dividend increase announcement (taken from CRSP Monthly Stocks) for the period 1984-2002. Following Amihud and Li (2003), we take only those dividend increases where the change in dividend per share amount is at least 0.5%. Given this criterion, in Column (1) we find 8,403 dividend increases and 5,554 repurchase announcements for which we have non-missing data on our main controls. ***, ** and * denote significance levels at 1, 5 and 10% respectively. T-stats given in parentheses are based on robust standard errors. Refer to the appendix for detailed definitions of all the variables.

Table 3 - Panel A
Results of Tobit Regressions

Variables	Standard Specifications		Augmented Specifications			
	All Firms		All Firms			Payout Increasing Firms
	(1)	(2)	(3)	(4)	(5)	(6)
Concentration	-0.694*** (-17.9)	-0.424*** (-11.67)	-0.401*** (-9.02)	-0.639*** (-10.00)	-0.649*** (-9.07)	-0.425*** (-7.46)
Repurchase Wave (RW)			0.504*** (6.9)	0.40*** (4.31)	0.140 (1.4)	0.003 (0.04)
Conc/Comp Interaction				0.131** (2.03)	0.208*** (2.91)	0.117** (2.08)
Governance Index (GI)			-0.022*** (-7.87)	-0.034*** (-9.46)	-0.0399*** (-9.73)	-0.029*** (-8.98)
Conc/Gov Interaction				0.364*** (5.36)	0.393*** (5.24)	0.306*** (5.18)
Size	-0.100*** (-22.03)	-0.077*** (-16.69)	-0.021*** (-3.25)	-0.022*** (-3.29)	-0.039*** (-5.21)	-0.038*** (-6.61)
M/B Ratio	0.028*** (11.90)	0.013*** (6.03)	0.002 (1.02)	0.002 (1.02)	-0.004* (-1.66)	-0.006*** (-3.29)
D/E Ratio	-0.006 (-1.62)	0.002 (0.60)	0.003 (0.58)	0.002 (0.52)	-0.002 (-0.35)	0.014*** (2.92)
Operating Income	-2.098*** (-24.55)	-1.108*** (-14.36)	0.290** (2.55)	0.314*** (2.75)	0.666*** (5.1)	0.023 (0.21)
Non-Operating Income	-2.122*** (-6.26)	-0.411 (-1.30)	3.026*** (5.6)	3.100*** (5.74)	1.695*** (2.74)	0.189 (0.37)
Std. Dev. Of Op. Income	4.859*** (26.03)	1.884*** (12.05)	0.015 (0.06)	-0.023 (-0.09)	-0.258 (-0.85)	1.139*** (4.42)
Lag Dividend Payout ratio	-0.002** (-2.24)	-0.001 (-1.62)	0.001 (0.59)	0.001 (0.5)	0.001 (0.95)	0.001 (0.64)
Liquid Assets	0.015 (0.34)	-0.060 (-1.41)	0.048 (0.88)	0.043 (0.79)	0.101* (1.67)	-0.005 (-0.1)
Prior Year Stock Return	0.045*** (4.02)	-0.026** (-2.38)	0.076*** (4.9)	0.076*** (4.95)	0.045*** (2.74)	0.029** (2.18)
Price Earnings Ratio	-0.001 (-1.42)	-0.001 (-1.30)	-0.001* (-1.64)	-0.001 (-1.56)	-0.001** (-2.09)	-0.001 (-0.47)
Capital Expenditures	-0.289** (-2.02)	-0.470*** (-3.53)	-0.503*** (-2.82)	-0.551*** (-3.09)	-0.640*** (-3.2)	-0.300* (-1.88)
Institutional Holdings	0.001 (0.05)	-0.014 (-1.28)	0.155*** (3.00)	0.149*** (2.89)	0.090 (1.51)	0.163*** (3.45)
Stock Liquidity		0.251*** (30.09)	0.161*** (11.49)	0.159*** (11.39)	0.147*** (8.66)	0.132*** (9.89)
Stock Return Volatility		21.968*** (41.46)	19.46*** (17.66)	19.631*** (17.77)	12.948*** (9.73)	14.957*** (13.6)
Prior Year Market Return		0.134** (2.56)	0.623*** (10.24)	0.629*** (10.19)	0.392*** (5.3)	0.373*** (6.52)
Equity Based Compensation					0.501*** (12.54)	0.318*** (10.24)
Managerial Holdings					0.225** (2.24)	0.140* (1.78)
Intercept	1.516*** (34.52)	0.661*** (8.05)	-0.425*** (-3.32)	-0.297** (-2.25)	0.258 (1.59)	0.359*** (2.84)
No. Obs.	28,636	28,606	9,433	9,433	6,906	5,495
Pseudo R-Squared	0.0925	0.1462	0.1346	0.1363	0.1665	0.2729

Table 3 - Panel B
Results of Probit Regressions

Variables	Standard Specifications		Augmented Specifications		
	All Firms		All Firms		
	(1)	(2)	(3)	(4)	(5)
Concentration	-0.585*** (-9.02)	-0.372*** (-5.73)	-0.388*** (-3.55)	-0.629*** (-4.03)	-0.844*** (-4.44)
Repurchase Wave (RW)			0.421** (2.21)	0.128 (0.52)	-0.070 (-0.24)
Conc/Comp Interaction				0.287* (1.82)	0.410** (2.16)
Governance Index (GI)			-0.022*** (-3.35)	-0.030*** (-3.35)	-0.037*** (-3.43)
Conc/Gov Interaction				0.207 (1.24)	0.325 (1.62)
Size	-0.010 (-1.08)	0.027*** (2.88)	0.018 (1.09)	0.0187 (1.15)	0.007 (0.38)
M/B Ratio	0.027*** (5.29)	0.011*** (2.77)	0.001 (0.13)	-0.002 (-0.27)	-0.006 (-0.89)
D/E Ratio	-0.010 (-1.26)	-0.002 (-0.35)	0.001 (0.12)	0.003 (0.23)	-0.005 (-0.33)
Operating Income	-1.150*** (-6.90)	-0.443*** (-2.83)	0.234 (0.76)	0.322 (1.03)	0.737* (1.94)
Non-Operating Income	-2.261*** (-3.23)	-0.540 (-0.77)	1.999 (1.26)	2.051 (1.29)	0.891 (0.46)
Std. Dev. Of Op. Income	4.433*** (9.26)	1.916*** (4.75)	1.453* (1.89)	1.397* (1.81)	1.492 (1.53)
Lag Dividend Payout ratio	-0.001 (-0.11)	0.001 (0.08)	0.002 (1.48)	0.001 (1.35)	0.002 (1.52)
Liquid Assets	0.236*** (3.16)	0.096 (1.26)	0.163 (1.21)	0.149 (1.11)	0.285* (1.77)
Prior Year Stock Return	0.049** (2.20)	-0.038* (-1.82)	0.265*** (5.72)	0.268*** (5.78)	0.343*** (6.36)
Price Earnings Ratio	0.001 (0.58)	-0.001 (-0.19)	-0.001 (-0.44)	-0.001 (-0.35)	-0.001 (-0.19)
Capital Expenditures	-0.028 (-0.11)	-0.549** (-2.20)	-0.710 (-1.59)	-0.791* (-1.76)	-0.870 (-1.62)
Institutional Holdings	0.697*** (10.93)	0.166** (2.23)	0.009 (0.07)	0.008 (0.06)	-0.161 (-0.98)
Stock Liquidity		0.343*** (19.45)	0.245*** (6.76)	0.242*** (6.68)	0.270*** (5.7)
Stock Return Volatility		14.755*** (12.15)	9.974*** (3.19)	10.693*** (3.39)	0.362 (0.09)
Prior Year Market Return		1.432*** (13.41)	1.103*** (6.74)	1.100*** (6.71)	0.832*** (3.64)
Equity Based Compensation					0.524*** (4.82)
Managerial Holdings					-0.112 (-0.4)
Intercept	-0.373*** (-4.95)	-2.268*** (-13.20)	-1.529*** (-4.64)	-1.415*** (-4.17)	-0.743 (-1.60)
No. Obs.	13,957	13,951	5,298	5,297	3,908
Pseudo R-Squared	0.0488	0.1030	0.0660	0.0667	0.0799

Table 4: Average Size and Market to Book Ratios for ‘Matched’ High and Low Concentration Repurchasing Firms

This table contains the median summary statistics for the size and market to book variables for matched quintiles (20%), quartiles (25%), ‘trecciles’ (33%), and halves (50%) of repurchasing stocks split in the dimension of concentration. The high and low concentration firms have been matched on the basis of time of announcement, size and market to book. The table also contains the results of non-parametric tests for the difference in significance of these medians. ***, ** and * denote significance levels at 1, 5 and 10% respectively. The number of observations for each group appear in parentheses.

Panel A: Size				
	High Concentration	Low Concentration	Two Sample Median Test	Two Sample Wilcoxon Test
Quintiles	219.03 (688)	213.62 (688)	0.32	0.11
Quartiles	248.65 (960)	231.71 (960)	0.64	0.13
Treciles	255.72 (1,346)	241.25 (1,346)	0.82	0.16
Halves	229.52 (2,183)	231.04 (2,183)	0.11	-0.06
Panel B: Market to Book				
	High Concentration	Low Concentration	Two Sample Median Test	Two Sample Wilcoxon Test
Quintiles	2.33 (688)	2.41 (688)	-0.86	-0.59
Quartiles	2.22 (960)	2.30 (960)	-0.91	-0.70
Treciles	2.19 (1,346)	2.25 (1,346)	-0.94	-0.86
Halves	2.13 (2,183)	2.17 (2,183)	0.77	0.64

Table 5: Analysing Post Announcement Performance of High and Low Concentration Quintiles Using Ibbotson's (1975) RATS

This table contains monthly cumulative average abnormal returns for repurchasing firms falling in high and low concentration quintiles situated at opposite ends of the concentration spectrum, conducted using Ibbotson's (1975) RATS method combined with the Fama-French 3 factors model. The results for both the unmatched repurchasing firms as well as firms which have been matched on the basis of time of announcement, size and market to book are reported. The numbers reported are sums of the intercepts of cross-sectional regressions over the relevant time periods expressed in percentage terms. Number of observations for each column are given in parentheses. ***, **, * and \$ denote significance levels of 0.1, 1, 5 and 10% respectively using two-tailed tests.

Results for the Ibbotson's (1975) RATS Procedure				
(Using the Fama-French Three Factor Model)				
	Unmatched		Matched	
	Concentration Quintiles		Concentration Quintiles	
	High Concentration	Low Concentration	High Concentration	Low Concentration
Months	(1471)	(1383)	(688)	(688)
(+1,+1)	0.66%	0.97%*	0.28%	0.36%
(+1,+2)	1.26%\$	1.06%\$	0.91%	0.78%
(+1,+3)	1.28%	2.02%**	1.09%	1.12%
(+1,+4)	1.22%	2.94%**	1.24%	2.19%\$
(+1,+5)	1.20%	3.31%**	1.63%	3.30%*
(+1,+6)	0.32%	3.00%**	0.44%	3.48%*
(+1,+7)	0.32%	3.86%***	-0.09%	3.40%*
(+1,+8)	-0.34%	3.65%**	-0.80%	2.67%
(+1,+9)	0.08%	5.30%***	-0.49%	4.67%**
(+1,+10)	-0.18%	5.15%***	-0.99%	5.40%**
(+1,+11)	-0.70%	5.32%***	-1.74%	5.29%**
(+1,+12)	-0.37%	5.83%***	-1.31%	5.59%**
(+1,+13)	-0.25%	6.36%***	-1.59%	5.60%*
(+1,+14)	-0.16%	6.93%***	-1.51%	6.31%**
(+1,+15)	-0.52%	7.74%***	-2.13%	6.77%**
(+1,+16)	-0.41%	8.46%***	-1.92%	7.55%**
(+1,+17)	-0.48%	8.23%***	-1.68%	6.66%*
(+1,+18)	0.06%	9.20%***	-0.65%	6.95%*
(+1,+19)	0.53%	9.01%***	0.02%	6.55%*
(+1,+20)	0.59%	9.41%***	-0.46%	7.18%*
(+1,+21)	0.48%	10.54%***	0.00%	8.37%**
(+1,+22)	0.16%	11.50%***	-0.95%	9.62%**
(+1,+23)	-0.16%	12.49%***	-1.69%	9.75%**
(+1,+24)	-0.10%	13.40%***	-1.18%	10.73%***
(+1,+25)	-0.19%	14.57%***	-0.94%	12.48%***
(+1,+26)	-0.50%	15.89%***	-0.88%	13.78%***
(+1,+27)	0.51%	17.66%***	-0.22%	15.17%***
(+1,+28)	0.67%	19.06%***	-0.24%	16.56%***
(+1,+29)	0.17%	19.44%***	-0.13%	16.57%***
(+1,+30)	0.38%	20.26%***	-0.02%	17.27%***
(+1,+31)	0.28%	21.96%***	-0.24%	19.38%***
(+1,+32)	1.04%	23.23%***	0.95%	20.68%***
(+1,+33)	1.03%	23.63%***	1.40%	21.84%***
(+1,+34)	1.27%	25.21%***	1.82%	23.97%***
(+1,+35)	1.55%	24.77%***	2.33%	23.63%***
(+1,+36)	2.22%	25.94%***	2.83%	24.41%***

Table 6: Results of Calendar Time Portfolio Regressions for High and Low Concentration Quintiles

This table reports the results for long run abnormal returns using the calendar-time portfolio regression (CTPR) approach of Ikenberry, Lakonishok and Vermaelen (2000) conducted using both equal-weighted and value-weighted portfolios. The dependent variable is the monthly return on a portfolio which goes long in the unconcentrated repurchasing stocks and short in concentrated repurchasing stocks in the month following the repurchase announcement. Each stock is kept in the portfolio for a period of 36 months after which it is dropped. Abnormal performance is measured by the intercept of a time-series regression. There were a total of 1,471 repurchase announcements in the high concentration quintile and 1,383 repurchase announcements in the low concentration quintile. The results for both the three factor model (containing the three Fama-French (1993) factors – Panel A) and the four factor model (which also includes Carhart’s (1997) momentum factor – Panel B) are reported. In addition to the coefficient, the table contains *t*-statistics calculated using heteroskedasticity robust standard errors. ***, ** and * denote significance at the 1, 5 and 10% levels respectively.

Panel A

	Three Factor Model			
	After 3 years		After 3 years	
	Equally-Weighted Portfolios		Value-Weighted Portfolios	
	Coeff.	T-Stat	Coeff.	T-Stat
α	0.00495	3.02***	0.0052	2.44**
β_{Rm-Rf}	0.039	0.79	-0.15	-2.43**
β_{SmB}	0.081	1.39	-0.33	-3.58***
β_{HmL}	-0.526	-7.1***	-0.55	-5.05***
Adj-R ²	0.39		0.17	
N	239		239	

Panel B

	Four Factor Model			
	After 3 years		After 3 years	
	Equally-Weighted Portfolios		Value-Weighted Portfolios	
	Coeff.	T-Stat	Coeff.	T-Stat
α	0.00626	3.56***	0.00488	2.11**
β_{Rm-Rf}	0.015	0.34	-0.141	-2.34**
β_{SmB}	0.091	1.47	-0.336	-3.69***
β_{HmL}	-0.55	-7.57***	-0.543	-5.13***
β_{Umd}	-0.001	-2.28**	0.0003	0.43
Adj-R ²	0.42		0.17	
N	239		239	

Table 7: Comparing Post-Announcement Performance of Repurchasing Firms (Quintiles) and Their Controls

This table compares the post announcement performance of repurchasing firms falling in high and low concentration quintiles and their controls. The repurchasing firms are first split into high and low concentration quintiles based on the ranking on the basis of concentration for the entire CRSP universe of stocks. Then these firms are matched with each other on the basis of time of announcement, size and market to book ratio. A firm is only selected for each quintile if there exists a matching firm in the opposite quintile. A control firm for each high and low concentration firm is then selected from a pool of non-repurchasing firms. The control firm is chosen as the firm which falls in the same 3-digit SIC classification as the repurchasing firm and that, in addition, has the smallest absolute percentage difference (computed as the sum of the absolute percentage difference for herfindahl, size and market to book) with respect to the repurchasing firm. The number of controls found for high concentration firms are fewer in number because the high concentration firms were either monopolies in their 3-digit SIC code industry in the particular year of announcement or if they were not pure monopolies, control firms had missing data on matching variables. In order to address this problem we include 'High Concentration (*Controlled*)' firms in this table. These are only those concentrated repurchasing firms for which control firms have been found using the criteria described above. The table depicts raw returns, cumulative market adjusted returns (MAR) using both VW and EW market indices as well as buy and hold market adjusted returns. (+1,+12), (+1,+24) and (+1,+36) denote mean cumulative abnormal returns starting from the first month after the announcement to 12, 24 and 36 months following the announcement respectively. ***, **, * and \$ denote significance levels of 0.1, 1, 5 and 10% respectively using two-tailed tests.

Category (No. of Obs.)	Months	Raw Returns	Cumulative Market Adjusted Returns		Buy - Hold Returns	
			MAR - VWI	MAR - EWI	MAR - VWI	MAR - EWI
High Concentration (688)	(+1,+12)	15.69%***	-0.68%	-0.51%	-1.26%	-1.02%
	(+1,+24)	29.52%***	1.25%	-0.97%	-1.22%	-1.90%
	(+1,+36)	44.90%***	9.15%**	2.29%	2.68%	-2.14%
High Concentration (<i>Controlled</i>) (627)	(+1,+12)	15.50%***	-0.79%*	-0.61%	-1.11%*	-0.86%
	(+1,+24)	30.03%***	1.96%	-0.17%	-0.50%	-0.96%
	(+1,+36)	45.33%***	9.98%***	3.10%	3.87%***	-0.89%
High Concentration Controls (627)	(+1,+12)	13.95%***	-2.43%	-2.08%	-4.68%*	-4.25%*
	(+1,+24)	25.65%***	-2.18%	-3.75%\$	-8.97%**	-8.91%***
	(+1,+36)	38.11%***	2.73%	-2.97%	-5.20%\$	-8.84%***
Low Concentration (688)	(+1,+12)	24.77%***	7.88%**	7.74%**	11.11%***	10.97%***
	(+1,+24)	43.35%***	14.72%***	12.18%***	17.03%***	16.00%***
	(+1,+36)	66.06%***	29.26%***	22.42%***	39.44%***	34.78%***
Low Concentration Controls (688)	(+1,+12)	22.28%***	5.38%**	5.48%**	2.92%\$	3.07%\$
	(+1,+24)	38.10%***	9.91%***	7.96%**	4.81%*	4.25%\$
	(+1,+36)	54.94%***	19.01%***	13.50%***	11.50%***	7.99%*

Table 8: Buy – Hold Returns for High and Low Concentration Portfolios of Repurchasing Firms

The table reports buy-hold market adjusted returns for months (+1,+36) relative to the date of the repurchase announcement using both the value-weighted (MAR-VWI) and equal-weighted (MAR-EWI) market indices. The portfolios comprise repurchasing firms situated at the opposite ends of the concentration spectrum. In addition, each portfolio of the repurchasing firms for each concentration group has been matched with the equivalent portfolio of the other group on the basis of time of announcement, size and market to book. I.e. the quintile comprising the most highly concentrated repurchasing stocks has been matched with the quintile of low concentration repurchasing stocks. High concentration quintile represents the top 20% of the most concentrated firms, quartile represents the top 25%, ‘trecile’ represents the top 33% while half represents the top 50%. The same holds true for the low concentration group. ***, **, * and \$ denote significance levels of 0.1, 1, 5 and 10% respectively using two-tailed tests.

Portfolio			No. of Announcements	Buy – Hold Returns (+1,+36)	
				MAR - VWI (%)	MAR - EWI (%)
High Concentration	Quintile	(20%)	688	2.68**	-2.14
	Quartile	(25%)	960	3.58**	-1.47
	Trecile	(33%)	1,346	2.15**	-2.21
	Half	(50%)	2,183	6.22***	2.84*
Low Concentration	Half	(50%)	2,183	26.51***	23.56***
	Trecile	(33%)	1,346	26.11***	22.59***
	Quartile	(25%)	960	32.57***	28.09***
	Quintile	(20%)	688	39.44***	34.78***

Table 9: Post Announcement Performance Robustness Checks for High and Low Concentration Quintiles

This table contains robustness checks for post-announcement drift of repurchasing firms falling in high and low concentration quintiles conducted using Ibbotson's (1975) RATS method combined with the Fama-French 3 factors model. The RATS have been calculated for different samples of firms. Firms have been sorted according to two alternative criteria. The first is the degree of concentration of their industry. Here we consider the first and fifth quintile. The second varies depending upon the panel we are looking at. It can be the degree of cash flow permanency, the repurchase wave, the quality of corporate governance, or the fraction of institutional investors among the shareholders. With this second set of criteria we split the firms into two samples, depending on whether they fall below or above the median value. We then consider the intersection of firms that fall above and below each median and lie in either the top or bottom concentration quintile at the same time. Panel A contains the results for firms which have been split along the dimension of the median Repurchase Wave variable, described in the appendix. Panel B contains the results for firms which have been split along the dimension of corporate governance, using the corporate governance index of Gompers, Ishii and Metrick (2003). Firms falling above the score of 9 have been classified as bad governance firms. In Panel C, the split has been done split along the dimension of the fraction of institutional investors among the shareholders. That is, the ratio of firm's shares held by the institutional investors relative to the total shares outstanding based on the CDA / Spectrum Database. (+1,+12), (+1,+24) and (+1,+36) denote average monthly cumulative abnormal returns starting from the first month after the announcement to 12, 24 and 36 months after the announcement respectively. ***, **, * and \$ denote significance levels of 0.1, 1, 5 and 10% respectively using two-tailed tests.

Panel A

Wave-based Split

	High Wave	Low Wave
High Concentration		
(No. of Obs.)	(679)	(844)
(+1,+12)	0.59%	-1.31%
(+1,+24)	0.84%	-0.83%
(+1,+36)	4.09%	-0.14%
Low Concentration		
(No. of Obs.)	(730)	(648)
(+1,+12)	3.16%\$	9.22%***
(+1,+24)	9.70%***	19.29%***
(+1,+36)	20.27%***	34.65%***

Panel B

Governance-based Split

	Bad Governance	Good Governance
High Concentration		
(No. of Obs.)	(285)	(308)
(+1,+12)	-2.38%	-0.52%
(+1,+24)	-6.33%*	-0.95%
(+1,+36)	-4.35%	-2.35%
Low Concentration		
(No. of Obs.)	(177)	(312)
(+1,+12)	4.79%\$	7.53%**
(+1,+24)	13.01%**	17.65%***
(+1,+36)	14.76%**	28.43%***

Panel C

Institutional Shareholders-based Split

	High Institutional Holdings	Low Institutional Holdings
High Concentration		
(No. of Obs.)	(1146)	(310)
(+1,+12)	-1.61%	2.85%
(+1,+24)	-3.54%*	7.39%
(+1,+36)	-2.09%	14.66%\$
Low Concentration		
(No. of Obs.)	(1064)	(311)
(+1,+12)	5.65%***	6.91%
(+1,+24)	11.70%***	19.89%**
(+1,+36)	21.85%***	43.29%***

Table 10: Analyzing Number of Analysts Tracking the Repurchasing Stocks (Top and Bottom Quintiles of Concentration) and the Dispersion of their Forecasts

In this table we report summary statistics for the average annual *Number of Analysts* following the repurchasing stocks and their dispersion of estimates standardized by the mean estimate (*Adjusted Standard Deviation*) for a one-year fiscal period. Data has been obtained from I/B/E/S for both variables and each variable is lagged by 1 year. The repurchasing firms are the top and bottom quintiles of repurchasing stocks ranked according to industry concentration. We report results for both unmatched and matched repurchasing firms. The matching of repurchasing firms has been done on the dimension of time of announcement, size and market to book. The table also reports *t*-tests for the significance of the difference in the means as well as non-parametric tests for the significance of the difference in the medians. ***, ** and * represent significance levels of 1, 5 and 10% respectively. Number of observations used to compute each statistic are in parentheses.

Panel A: Unmatched Firms			
Variable	High Concentration (mean)	Low Concentration (mean)	T-test
Number of Analysts	7.61 (1,228)	9.98 (1,210)	-6.89***
Adjusted Standard Deviation	0.11 (1,118)	0.13 (1,129)	-1.34
Variable	High Concentration (median)	Low Concentration (median)	Median 2 Sample Test (Z Statistic)
Number of Analysts	5.29 (1,228)	6.04 (1,210)	2.11**
Adjusted Standard Deviation	0.04 (1,118)	0.04 (1,129)	-0.32
Panel B: Matched Firms			
Variable	High Concentration (mean)	Low Concentration (mean)	T-test
Number of Analysts	8.03 (573)	9.90 (614)	-3.78***
Adjusted Standard Deviation	0.11 (521)	0.12 (571)	-0.71
Variable	High Concentration (median)	Low Concentration (median)	Median 2 Sample Test (Z Statistic)
Number of Analysts	5.42 (573)	6.04 (614)	-1.11
Adjusted Standard Deviation	0.04 (521)	0.05 (571)	-2.12**

Table 11: Analysing the Effect of Asymmetric Information on the Post Announcement Performance of High and Low Concentration Repurchasing Stocks (Quintiles)

This table contains robustness checks for post-announcement drift of repurchasing firms falling in high and low concentration quintiles conducted using Ibbotson's (1975) RATS method combined with the Fama-French 3 factors model. The repurchasing firms have been split along the dimensions of 'high' and 'low' analyst following, following a procedure analogous the one described in Section 6.4.1. and in the caption of Table 10. The split uses the NUMEST variable from I/B/E/S. Firms which have an analyst following of greater than the annual median (mean) have been classified as 'High Following'. The others are classified as 'Low Following'. The medians (mean) have been calculated using the entire universe of CRSP-Compustat Merged Industrial Database. (+1,+12), (+1,+24) and (+1,+36) denote average monthly cumulative abnormal returns starting from the first month after the announcement to 12, 24 and 36 months after the announcement respectively. ***, **, * and \$ denote significance levels of 0.1, 1, 5 and 10% respectively using two-tailed tests.

Analyst Following-Based Split		
High Concentration	High Following	Low Following
(No. of Obs.)	(820)	(386)
(+1,+12)	-3.39%*	0.60%
(+1,+24)	-5.95%**	0.92%
(+1,+36)	-5.17%\$	5.73%
Low Concentration	High Following	Low Following
(No. of Obs.)	(841)	(322)
(+1,+12)	4.37%*	10.23%**
(+1,+24)	10.15%***	23.69%***
(+1,+36)	20.08%***	39.84%***

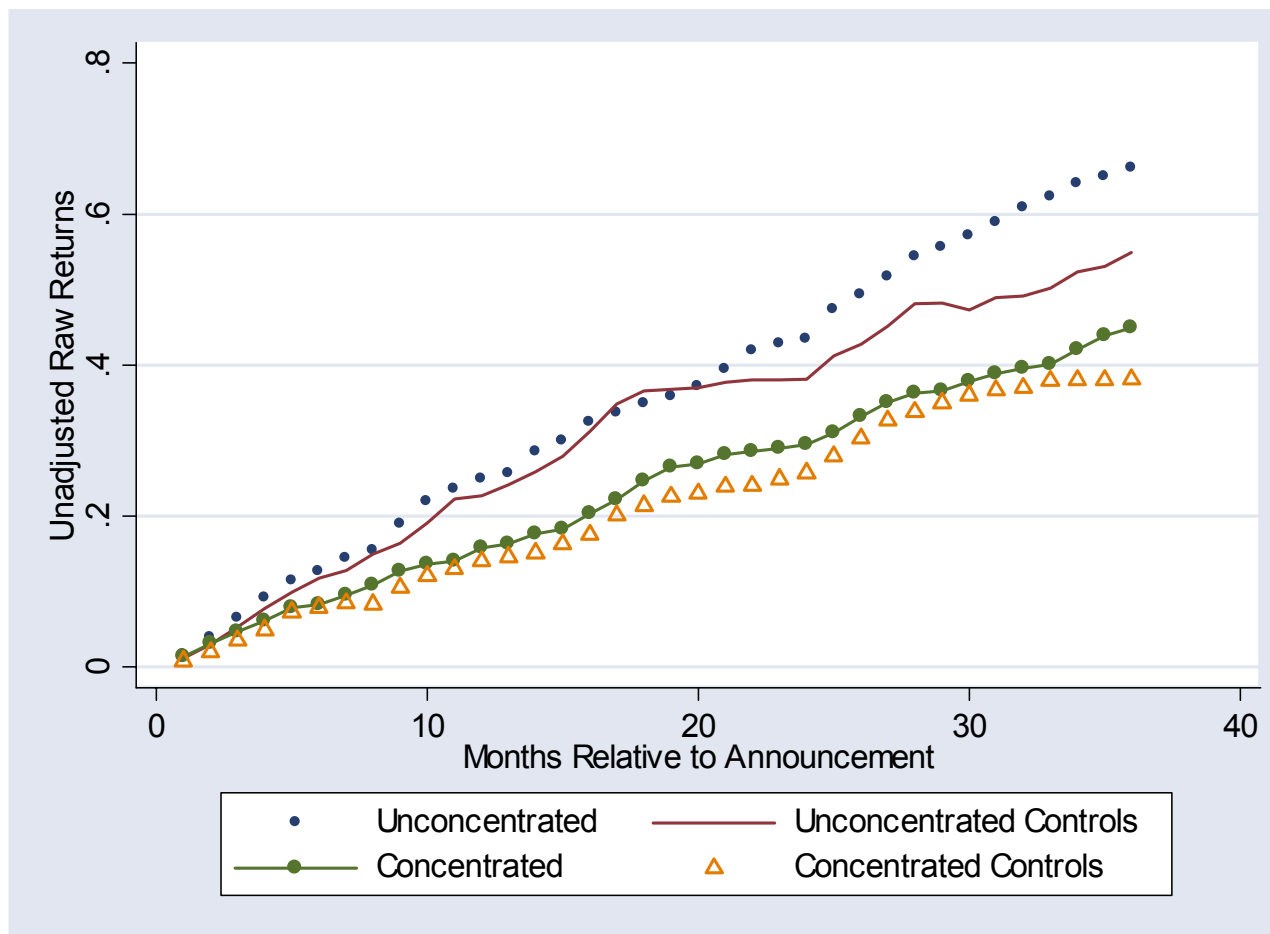


Figure 1: Unadjusted Raw Returns for matched extreme concentration quintiles and their control firms. Repurchasing firms have been matched with each other on the basis of time of announcement, size and market to book ratio. Controls are defined as in Table 6, 10 and 11.

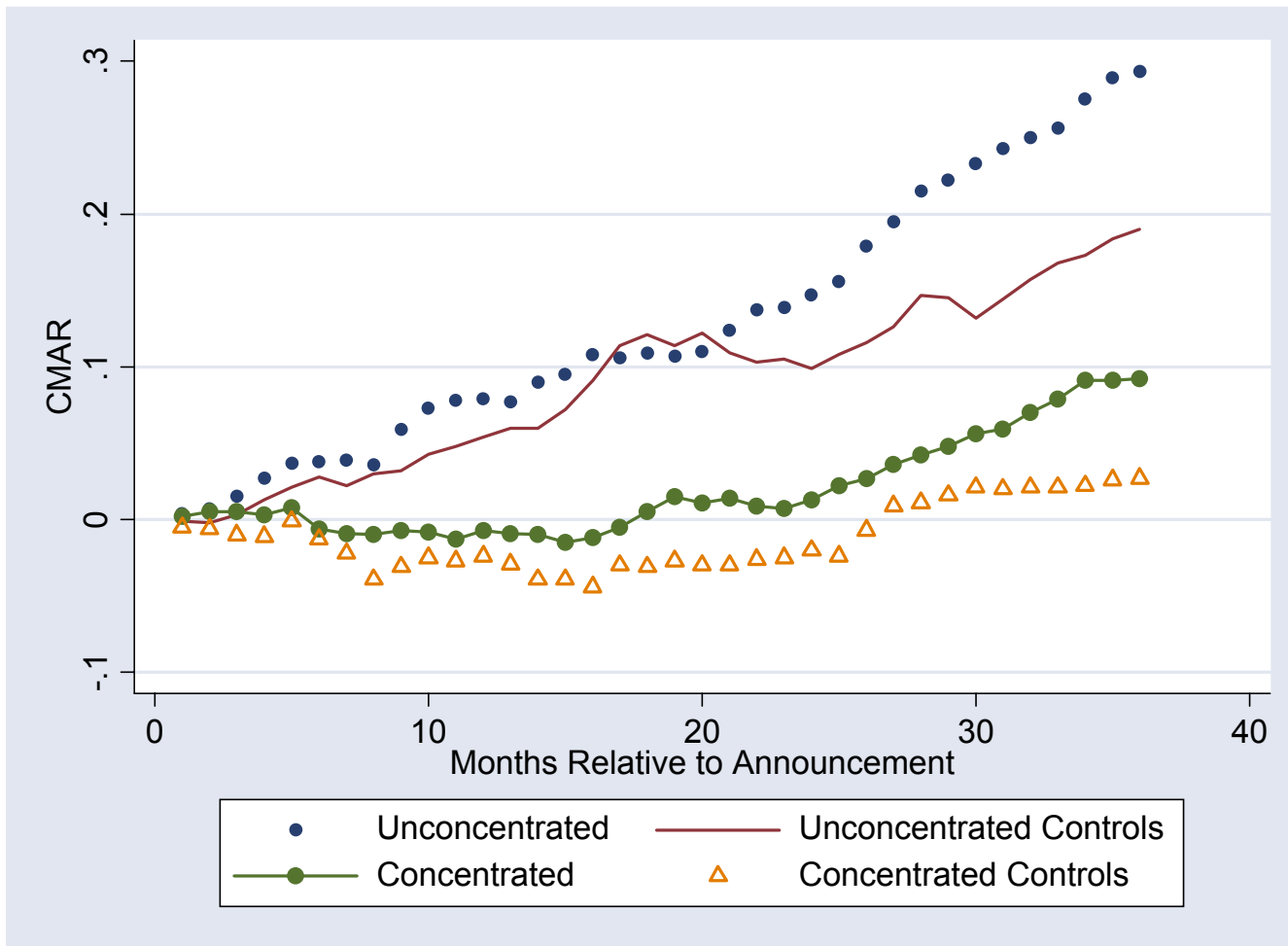


Figure 2: Cumulative Market Adjusted Returns (CMAR) using the VW Market Index for matched extreme concentration quintiles and their control firms. . Repurchasing firms have been matched with each other on the basis of time of announcement, size and market to book ratio. Controls are defined as in Table 6, 10 and 11.

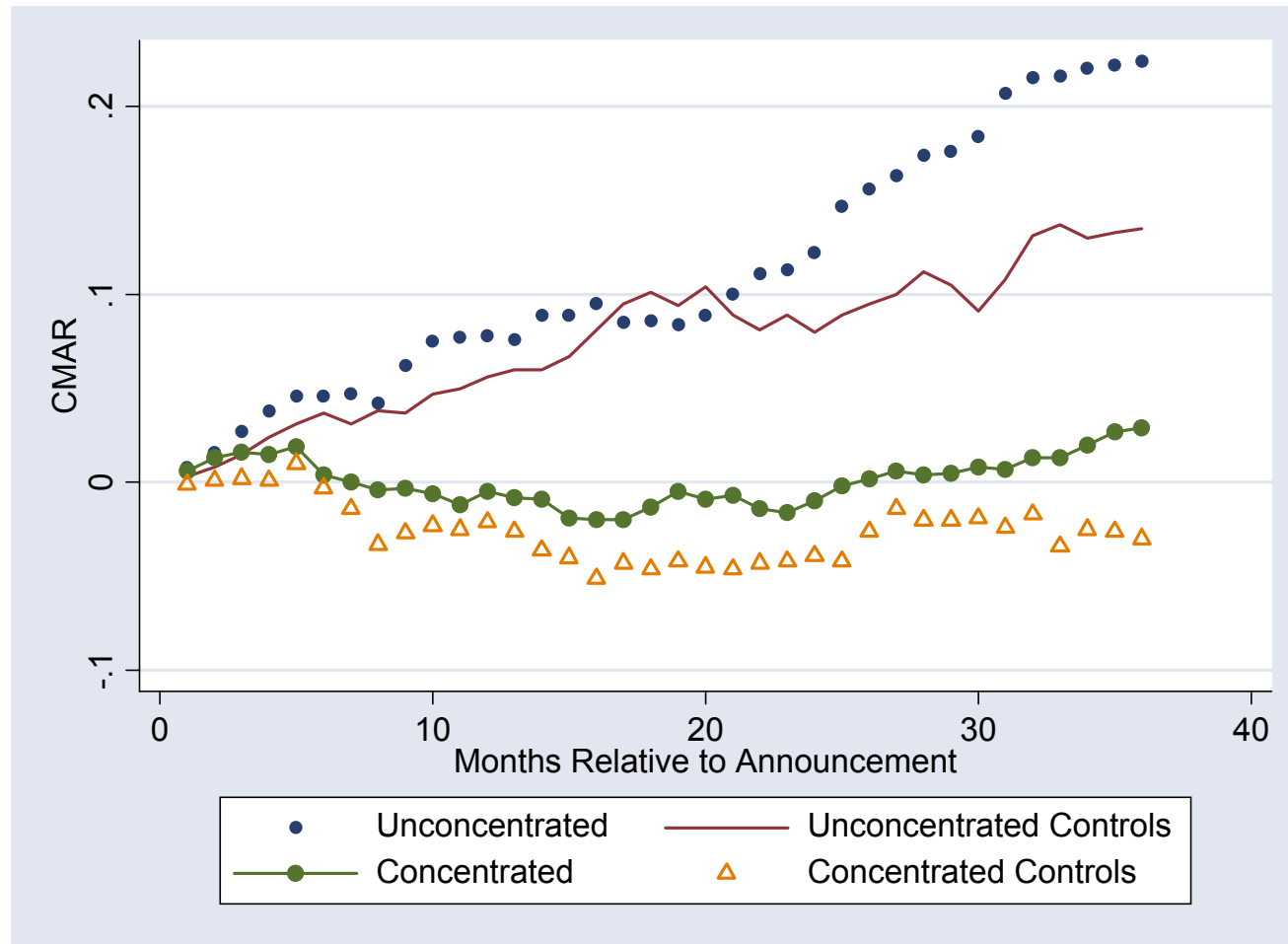


Figure 3: Cumulative Market Adjusted Returns (CMAR) using the EW Market Index for matched extreme concentration quintiles and their control firms. . Repurchasing firms have been matched with each other on the basis of time of announcement, size and market to book ratio. Controls are defined as in Table 6, 10 and 11.

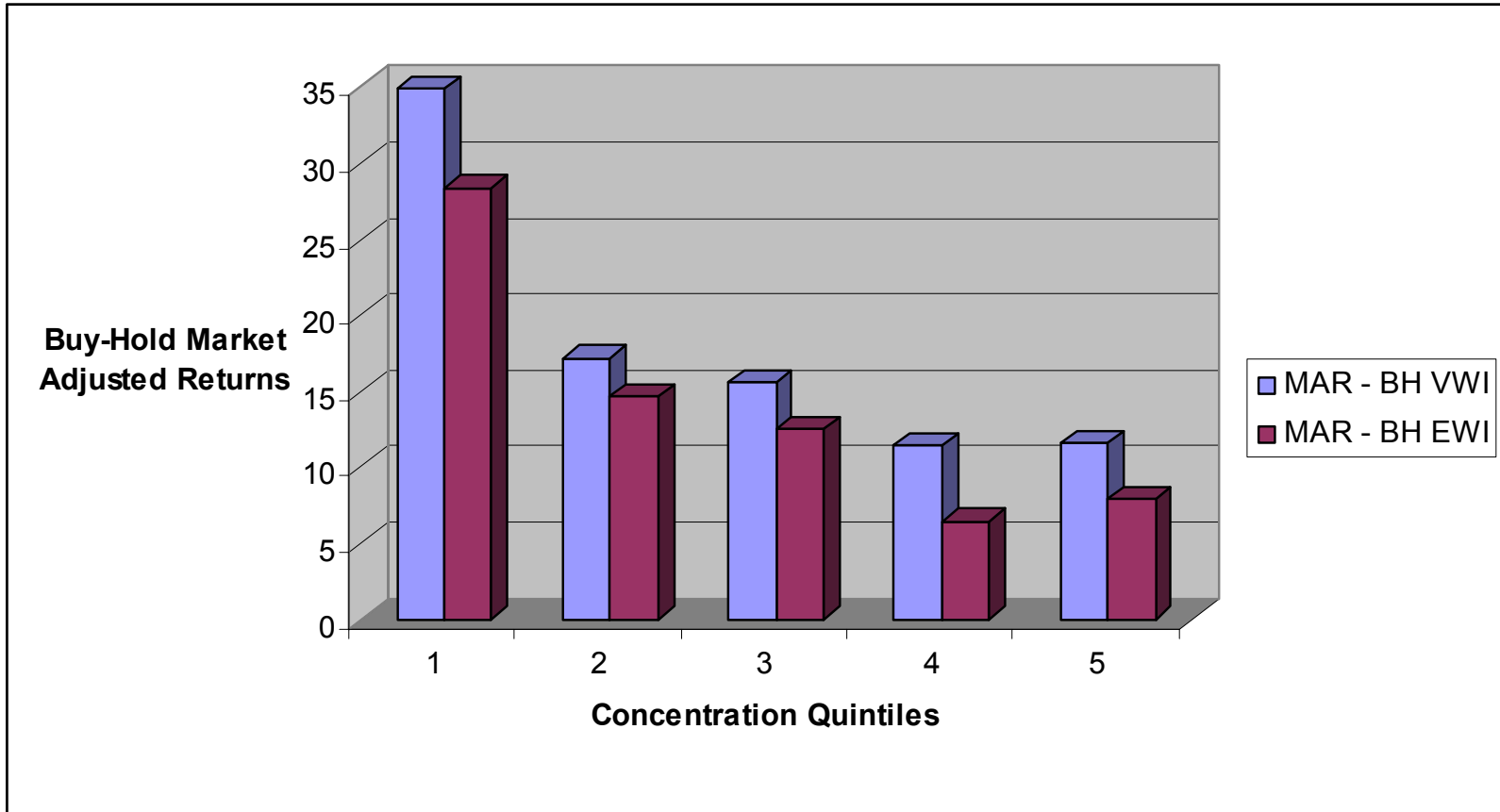


Figure 4: Buy-hold Market Adjusted Returns (MAR - BH) using the Value-Weighted Index (VWI) and the Equal Weighted Index (EWI) for Concentration Quintiles (Concentration is increasing from 1 to 5.)