



Share Repurchases and Insider Trading Behavior: Evidence from Korea*

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<Abstract>

Using the context of open-market share repurchases in Korea, we examine insider trading behavior around share repurchase disclosures. In particular, we investigate managerial opportunism as a motivation for share repurchases by analyzing how insider trading behavior differs between direct share repurchases with a strong signal effect and indirect share repurchases with a weak signal effect. We obtained the following research findings. First, in direct share repurchases, insiders become net sellers after share repurchase disclosure. Second, insider net selling is the highest when a company's stock is overvalued rather than when its liquidity is the highest. Third, insider buy trades are followed by insider sell trades in direct share repurchases. Fourth, this negative relationship is more pronounced in firms with low ownership concentration. Finally, in direct share repurchases, opportunistic firms experience inferior stock performance compared with non-opportunistic firms. Overall, our findings support the managerial opportunism hypothesis, that is, in direct share repurchases, managers engage in informed trades based on the market confirmation bias that a share repurchase is a signal of undervaluation.

Keywords: Share Repurchase Method; Signaling Cost; Insider Trading;
Managerial Opportunism; Market Confirmation Bias

JEL Classification: G14, G24, M41

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< 요약 >

본 연구는 한국에서 기회주의적 자사주 매입가설이 성립하는지를 조사하기 위해 자사주 매입 공시 주변의 내부자 거래행태를 분석한다. 특히, 신호 효과가 강한 자사주 직접매입방법과 상대적으로 신호 효과가 약한 자사주 간접매입방법 간에 자사주 매입공시 주변에 내부자 거래행태가 차별적인지를 비교하였다. 분석 결과를 요약하면 다음과 같다. 첫째, 자사주 직접매입방법을 선택한 기업은 간접매입 기업보다 내부자가 자사주 매입공시 이후에 더 크게 순매도함을 발견하였다. 둘째, 내부자 순매도는 가격이 고평가 될 가능성이 큰 시점에서 유의하게 증가함을 확인하였다. 셋째, 직접매입방법의 경우 자사주 매입공시 주변 기간에서 내부자가 순매수하고 그 이후에 순매도하는 거래행태를 나타냈다. 넷째, 내부자 거래행태의 시계열적 음의 관계는 내부자 지분이 낮은 기업에서 더 강하게 나타났다. 마지막으로, 자사주 직접매입 표본에서 자사주 매입 전 내부자가 순매수하고 자사주 매입 이후 내부자가 순매도한 기업은 다른 기업보다 유의하게 낮은 주식성과를 경험한다는 것을 확인하였다. 전반적으로 이 연구는 자사주 매입이 저평가 신호라는 시장 확증 편향을 이용하여 내부자가 사적 정보에 입각한 거래에 참여한다는 기회주의적 가설을 지지하는 증거를 제시하고 있다.

핵심 단어: 자사주 매입 방법, 신호 원가, 내부자 거래, 경영자 기회주의, 시장 확증 편향

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1. Introduction

Share repurchases can be used to signal positive information that is known exclusively to firm insiders; however, insiders may use it as a false signal to inflate stock prices. Due to this uncertainty, outside investors face informational risk when there is a share repurchase announcement. In this study, we examine the possibility that insiders (managers and related parties) may engage in informed trades for private gain while conducting share repurchases. Specifically, we focus on investigating whether opportunistic share repurchases are conducted in the Korean stock market, where share repurchases are typically conducted in an open market.¹⁾

Firms may decide to buy and sell their own shares for many reasons. The motivations for share repurchases include the stabilization of stock prices, executive compensation, incentive pay, changes in the capital structure (Masulis, 1980), defense against hostile takeovers (Bagnoli et al., 1989; Bagwell, 1991), tax savings (Ofer and Thakor, 1987), and managerial opportunism (Fried, 2000, 2001, 2005). There are two prominent explanations for the motivation to conduct share repurchases, namely, the firm value signaling hypothesis and managerial opportunism hypothesis.

The firm value signaling hypothesis states that, when a firm is undervalued in the market relative to its intrinsic value, the manager of the firm announces a share repurchase to signal this information credibly to the market. A large body of research empirically (Comment and Jarrell, 1991; Ikenberry et al., 1995; Nohel and Tarhan, 1998) confirms the value signaling hypothesis. On the contrary, the managerial opportunism hypothesis states that managers can use a share repurchase to take advantage of the market confirmation bias that a share repurchase is a positive signal of firm value (Fried, 2000, 2001, 2005). According to this hypothesis, managers announce a share repurchase only to inflate the share price and subsequently, sell shares at this inflated

1) In Korea, share repurchases are regulated primarily by the Commercial Act (Article 341) and the Financial Investment Services and Capital Markets Act (Article 165). Although share repurchases are classified as either open-market repurchases or tender offer repurchases, in Korea, firms typically choose to conduct open-market repurchases. In Korea, such open-market repurchases are further classified into direct and indirect share repurchases. In direct share repurchases, firms purchase shares directly within three months; since these shares are bought within a relatively short time period, they are likely bought at a price higher than the price announced during share repurchase disclosure. To the extent of the relatively high repurchase cost, this repurchase method is similar to tender offer repurchases. In contrast, in indirect share repurchases, firms engage an intermediary that is tasked to repurchase shares from an entrusted fund over a long period. In view of the relatively low cost of share repurchase, this repurchase method is similar to open-market repurchases in the US.

price. Since managerial opportunism is likely to be more acute in emerging markets, where information asymmetry is pronounced, we empirically test the managerial opportunism hypothesis by analyzing share repurchases in the Korean market.

Since the gains from trades based on information asymmetry increases with the effect of disclosed information regarding uninformed trades, we expect that managerial opportunism is likely to be more prevalent under the direct share repurchase method than under the indirect share repurchase method since the former is a stronger signal of firm value than the latter. Moreover, since the direct and indirect share repurchase methods differ from each other in terms of disclosure costs and the probability of actual share repurchase, they correspondingly differ in the market perception of their information signals. Since the direct share repurchase method, which involves high disclosure costs and a high probability of actual share repurchase, is viewed as a strong signal of value, while the indirect share repurchase method, which does not, is a weak signal, opportunistic managers (or insiders) are more likely to use the former rather than the latter. Therefore, this study focuses on insider trading behaviors under the direct share repurchase method rather than the indirect share repurchase method since the managerial opportunism hypothesis is more likely to be supported when managers choose the former.

In this study, the research period is 2004–2012. Utilizing data regarding the firms listed on the main board (the Korean Composite Stock Price Index market, i.e., the KOSPI market) and the market for technology firms (the Korean Securities Dealers Automated Quotations market, i.e., the KOSDAQ market), we identify the share repurchases that occurred during the sample period and construct a test sample of 608 share repurchases that satisfy the sampling criteria. For each share repurchase, we calculate the insider net sell ratio during each quarter from the seventh quarter prior to the share repurchase disclosure to the seventh quarter following share repurchase disclosure. Furthermore, we examine the temporal and cross-sectional variations in insider net sell ratios in the period surrounding share repurchase disclosure using share repurchase method as the grouping variable.

In particular, the focus of our study is explained as follows. First, we determine whether any differences exist between direct and indirect share repurchases in terms of the insider net trades surrounding share repurchase disclosure. When insiders engage in share repurchases with an opportunistic intention, they tend to prefer the direct share repurchase method, which investors are more likely to perceive as an unambiguous signal of positive value. Therefore, we investigate whether insiders engage in net sell trades after share repurchase disclosure when the direct repurchase method rather than the indirect repurchase method is utilized. Second, we investi-

gate the timing of insider selling after the share repurchase disclosure. If a share repurchase is opportunistically motivated, insider net sell trades may increase when the gains from insider net sell trades are highest. Therefore, we investigate whether insider net sell trades tend to increase abnormally soon after the completion of share repurchase and at the conclusion of the lock-up period (i.e., the second quarter after a share repurchase disclosure). Third, if insiders seek to maximize the gains obtained from informed trades, they will buy firm shares before a share repurchase disclosure at a low price and then sell the acquired shares after the share repurchase disclosure when the highest price has been established. Therefore, we investigate whether a negative relationship exists between insider net sell trades executed before and after the share repurchase disclosure. Fourth, we investigate whether this negative relationship is more pronounced in firms in which insiders have low ownership concentration since the possibility of managers engaging in informed trades using share repurchases may be higher in firms that suffer from significant agency problems. Finally, we investigate whether opportunistic share-repurchasing firms (i.e., firms in which insiders are net buyers before a share repurchase disclosure and net sellers after the share repurchase) underperform in comparison with non-opportunistic share-repurchasing firms in terms of their long-term stock returns.

The overall evidence indicates that opportunistic share repurchases are more likely in direct share repurchases, which are viewed as unambiguous signals of positive value. The findings of this study support Fried's (2000, 2001, 2005) managerial opportunism hypothesis, which states that insiders buy firm shares at a low price, inflate the share price through a share repurchase disclosure, which is perceived as a positive signal of firm value, and then sell these shares at an inflated price, resulting in a transfer of wealth from outside investors to insiders.

In Sections 2 and 3, we describe the research background and discuss the development of the hypotheses, respectively. In Section 4, we describe the sample and variables, while we present the research models and discuss the main empirical findings in Section 5. In Section 6, we provide a summary of this study.

2. Theoretical Background

2.1 Literature Review

A number of research papers have observed a positive stock return after a share repurchase disclosure. The information signaling hypothesis has received the most support from researchers as an explanation for this finding (Comment and Jarrell, 1991; Ikenberry et al., 1995; Nohel and Tarhan, 1998). More recently, however, some

research studies report that insiders tend to use share repurchases to manipulate stock prices and/or execute informed trades by taking advantage of the investors' belief that a share repurchase is a positive signal of firm value. Fried's (2000, 2001, 2005) series of studies discuss the conceptual foundation of the managerial opportunism hypothesis. He states that, since managers enjoy an informational advantage over investors, managers have a perverse incentive to signal to the market that their firm stock is undervalued, even when it is not undervalued, to sell the firm shares they own at an inflated price. Hence, he argues that a share repurchase is an informational risk that can lead to a transfer of wealth from the outside shareholders to the insiders. As shown above, such conflicting interpretations exist among studies that analyze the motivations for share repurchases.²⁾

Some studies have analyzed whether insider trades during the period surrounding share repurchase disclosures strengthen the signal of undervaluation or are opportunistically motivated. Several studies claim that the combination of insiders' net purchases prior to a share repurchase disclosure and the share repurchase disclosure itself send a stronger signal of undervaluation than otherwise (Raad and Wu 1995; Louis et al., 2010; Babenko et al., 2012; Chan et al., 2012; Bonaime and Ryngaert, 2013). Raad and Wu (1995) and Babenko et al. (2012) report that a positive relationship exists between insider net purchases prior to an open-market share repurchase and the stock returns obtain after the share repurchase. Moreover, Babenko et al. (2012) report that insider net purchases have a positive relationship with short-term and long-term stock returns and increase the probability of fulfilling share repurchase targets. Chan et al. (2012) show that, for low market-to-book value firms (value

2) We summarize below the studies that examined opportunistic share repurchases using Korean data. Kim et al. (2016) analyze the relationship between earnings management and long-term performance after share repurchases in the Korean market. They find that firms that choose the direct share repurchase method tend to manage earnings downward before a share repurchase disclosure. They argue that, when firms choose the direct share repurchase method, which incurs high repurchase costs, managers have an incentive to manage earnings downward to reduce repurchase costs. Kim and Park (2021) report that, when firms that exhibit low accounting transparency choose the low-cost share repurchase method (indirect share repurchase), they have inferior long-term stock performance than other firms, thus supporting the opportunistic share repurchase hypothesis. Byun and Pyo (2006) report that, in 35% of share repurchases that are motivated by undervaluation, large shareholders sell their own firm shares in support of the opportunistic share repurchase hypothesis. Moreover, Park and Shin (2022) find that, in share repurchases where insiders sold their own firm shares prior to a share repurchase disclosure, there is no statistically significant long-term positive stock performance following share repurchases, which the authors interpret as suggesting that share repurchases that are preceded by insider sell trades may provide a false signal of value.

firms or undervalued firms), insiders engage in the net buying (selling) of firm shares before (after) a share repurchase disclosure. According to them, this finding as implies that managers display market timing for the share repurchases of potentially undervalued firms. Bonaime and Ryngaert (2013) compare stock returns after a share repurchase between firms wherein insiders execute a net buy and firms wherein insiders execute a net sell, using a sample of firms that have high actual-to-announced repurchase ratios. They find that both firm types experience positive abnormal returns in the year following a share repurchase disclosure. However, firms in which insiders execute a net buy (sell) tend to experience positive (negative) three-year abnormal returns. Based on these findings, they infer that insider net buys (sells) before a share repurchase disclosure increase (weaken) a share repurchase's credibility as a signal of firm undervaluation. Overall, the weight of the evidence compiled in prior literature supports the view that insiders' net purchases of their own firm shares prior to a share repurchase disclosure strengthen the signaling effect of a share repurchase.

However, there is a controversy around the informational effect of insiders' net sales of their own firm shares. Insider sell trades after a share repurchase disclosure ostensibly contradict the undervaluation signaling hypothesis, raising questions about insiders' true motivation for sell trades after the share repurchase disclosure. Insiders' motivations for sell trades after share repurchase disclosures could be attributed to two possibilities, namely, the liquidity hypothesis and the informed trade hypothesis. The liquidity hypothesis states that insiders sell their own firm shares when liquidity is maximized to minimize the effect of latent undervaluation (Chan et al., 2012). Therefore, since insider trades are motivated by the enhanced liquidity that exists during the share repurchase period, this explanation does not imply that managerial opportunism is the motivation for insider selling after a share repurchase disclosure.

However, the informed trade hypothesis holds that insiders, being privately informed about the true firm value, tend to sell their own firm shares when these shares reach their highest valuation. Moreover, these shares may even become overvalued due to the share repurchase disclosure that leads investors to believe that firm shares are undervalued (Fried, 2001, 2001, 2005). Thus, the informed trade hypothesis views insider sell trades that are executed after a share repurchase disclosure as informed trades, which is a manifestation of managerial opportunism that takes advantage of information asymmetry. Given that only a few studies provide evidence that insider net sell trades are opportunistic in nature, our study focuses on empirically analyzing whether insider trading occurs in the time period surrounding share repurchases as predicted by Fried's (2001, 2001, 2005) opportunistic share repurchase hypothesis .

2.2 Uniqueness of this Research

Our study differs from the previous studies in the following aspects. First, unlike prior studies that analyze insider buy and sell trades before and after share repurchases based on the signaling hypothesis (Chan et al., 2012), we analyze insider buy and sell trades in the period surrounding share repurchases based on opportunistic share repurchases (Fried, 2000, 2001, 2005). Chan et al. (2012) claim that insider net buy trades strengthen the value signaling effect of share repurchase disclosures. They rule out the inference that insider net sell trades following a share repurchase are opportunistic (or informed) trades by noting that insider net sell trades are not associated with lower stock returns. However, we note that, since informed share purchases by insiders lead to a transfer of wealth from outside investors to insiders, it is not necessarily the case that insider net sell trades after a share repurchase are associated with stock returns. Therefore, we focus on verifying the link between insider buy and sell trades before and after share repurchases as evidence of the opportunistic share repurchase hypothesis.

Several studies claim that share repurchases signal firm undervaluation and a significant amount of evidence has been presented in support of this interpretation. This long list of studies that support the signaling interpretation of share repurchases may have created a market confirmation bias that share repurchases are a positive signal of value. Fried (2001, 2001, 2005) notes that insiders may engage in informed trades by taking advantage of this confirmation bias; insiders purchase shares before a share repurchase announcement, which inflates the share price, and then sell their shares at the inflated price shortly after the share repurchase. Therefore, we can define opportunistic share repurchase firms as firms in which insiders are net buyers before a share repurchase and net sellers after the share repurchase and thus verify the link between net buy trades before share repurchases and net sell trades after share repurchases. Furthermore, we examine whether this link that represents opportunistic trading is more evident when the method of share repurchase is widely perceived as a strong signal of undervaluation and when the agency problem is acute. Additionally, we examine whether opportunistic share repurchase firms experience inferior stock returns as compared with non-opportunistic share repurchase firms.

Second, we examine whether the time series linkage between insider trades before and after share repurchase disclosures varies with the share repurchase method in a cross-sectional setting. This approach allows us to discern the motivation underlying share repurchases more unambiguously. Previous studies have highlighted that the signaling effect increases with the cost of share repurchase and the announced-to-

actual share repurchase ratio (Comment and Jarrell, 1991; Stephens and Weisbach, 1998; Lie, 2005; Louis and White, 2007). In Korea, firms tend to choose between two open-market share repurchase methods, i.e., the direct and indirect share repurchase methods. Since the direct share repurchase method incurs a higher share repurchase cost and leads to a higher announced-to-actual share repurchase than the indirect method, it is viewed as a stronger signal of value (Kim et al., 2016; Kim and Park, 2021). Since opportunistic share repurchases seek to take advantage of the market confirmation bias that share repurchases are a positive signal of undervaluation, opportunistic managers are likely to choose the direct share repurchase method, which is considered as a stronger signal of value by the market. Therefore, we expect that opportunistic trades are more likely to be undertaken in firms that choose the direct share repurchase method than those that choose the indirect share repurchase method. Furthermore, our research uses difference-in-differences method since Korean firms can choose between two distinct share repurchase methods; thus, our study offers more robust results based on stronger controls than previous studies that did not use cross-sectional controls.

Lastly, in an attempt to test the opportunistic share repurchase hypothesis, we measure insider net sell trades for the 15 quarters around the time of a share repurchase disclosure and examine whether abnormal insider sell trades are executed in the two quarters following the share repurchase disclosure. For firms that disclose their share repurchases to take advantage of the market confirmation bias that share repurchases are a positive signal of undervaluation, insider sell trades are likely to be high shortly after a share repurchase disclosure when the profit gained from insider selling is likely at its maximum. In particular, abnormal insider sell trades are most likely to occur (1) under the direct share repurchase method, which is considered a stronger positive signal of value, and (2) in the two quarters following a share repurchase disclosure, when liquidity and market prices are relatively high as the lock-up period, which lasts six months, expires. Our study is distinct from previous studies in that previous studies on share repurchases based on the signaling hypothesis (Chan et al. 2010, 2012) focused on net sell trades prior to a share repurchase disclosure, while our study, which is based on the opportunism hypothesis, focuses on abnormal insider sell trades following a share repurchase disclosure.

3. Hypothesis Development

We explore the possibility that insiders pursue their private interests by taking advantage of the market confirmation bias that the share repurchase disclosures are a

positive signal of firm value. This research focuses on analyzing insider trades before and after a share repurchase disclosure to determine whether the share repurchase is staged for managerial opportunism, and explores the implications of the choice of share repurchase method. To achieve these research objectives, we propose the following four hypotheses.

First, we investigate insider trading behavior after a share repurchase disclosure conducted using the direct share repurchase method as well as the differences in insider trading behaviors following a share repurchase disclosure between direct and indirect share repurchases. Regardless of whether a share repurchase is motivated by the signaling of share undervaluation or insider opportunism, insiders are incentivized to increase their own firm shareholdings before a share repurchase disclosure. If a share repurchase is motivated by the signaling of share undervaluation, insiders have an incentive to buy their own firm's shares prior to the share repurchase disclosure since prices are likely to rise thereafter. If a share repurchase is motivated by insider opportunism, insiders have an incentive to buy firm shares prior to the share repurchase disclosure to make a profit by selling them after the disclosure at a higher price. However, insider trading behaviors after a share repurchase disclosure are likely to differ depending on the motivation for the share repurchase. If a share repurchase is genuinely motivated by the signaling of share undervaluation, insiders have little incentive to sell their own firm's shares after a share repurchase disclosure. In contrast, if a share repurchase is motivated by insider opportunism, insiders tend to engage in net sell trades of their own firm's shares.

For this reason, we investigate insiders' net sell trades after a share repurchase disclosure to test the managerial opportunism hypothesis. Since this hypothesis is based on the market confirmation bias that share repurchases are a positive signal of firm value, we expect a higher number of net sell trades under the direct share repurchase method, which is likely to be perceived by the market as a strong signal of firm undervaluation. This conjecture leads to our first hypothesis.

H1: If a direct share repurchase is opportunistic, the insider trades following a share repurchase disclosure are net sell trades. Furthermore, insider net sell behavior after a share repurchase disclosure is more evident for direct share repurchases than for indirect share repurchases.

Second, we investigate whether there is a difference between direct and indirect share repurchases in terms of the size and timing of insider net sell trades after share repurchases. Insider net sells after share repurchases undermine the undervaluation signaling hypothesis. Fidrmuc et al. (2006) and Agrawal and Nasser (2012) argue that

insider buy trades are a positive signal of value since they are costly to insiders, while insider sell trades are a negative signal since they reduce the cost of signaling.

There are two possible explanations of insider net sell trades. The liquidity trade hypothesis, which supports the signaling hypothesis, states that insiders simply time the sale of shares held by themselves by taking advantage of the increased liquidity caused by share repurchases. In contrast, the informed trading hypothesis, which supports the managerial opportunism hypothesis, states that insiders are privately informed of the true value of a firm and sell firm shares following a share repurchase disclosure in response to the overvaluation of firm shares caused by the market confirmation bias. Since insider net sell trades following a share repurchase disclosure is consistent with both hypotheses, one cannot interpret insider net sell trades after share repurchase disclosure as an unambiguous implication that managerial opportunism is present. Therefore, we propose that the timing of insider net sell trades following a share repurchase disclosure should be used to determine which of the two competing hypotheses is supported by the data.

Under the direct share repurchase method, liquidity tends to be highest in the first three months following share repurchase disclosure since firms are mandated to complete share repurchases during this period. However, insiders cannot trade during this period of maximum liquidity since they are barred from trading their own firm shares during the lock-up period, which lasts for the six months after a share repurchase disclosure. Therefore, if the liquidity hypothesis, i.e., insiders are concerned about liquidity, holds true, it is unlikely that firms will choose the direct share repurchase method. In contrast, there is a scenario wherein opportunistically motivated firms can choose the direct share repurchase method, which is viewed as a stronger positive signal than the indirect method. Opportunistic insiders can engage in net sell trades at the conclusion of the lock-up period when liquidity and market prices are relatively high, ensuring that the gains obtained from insider net sell trades are likely to be at their maximum. Therefore, we expect an abnormally high level of insider net sell trades in the second quarter following a share repurchase disclosure. To test this argument, we propose the following hypothesis.

H2: In direct share repurchases, a substantial number of insider net sell trades occur when the gains obtained from the net sell trades of insiders are likely to be high (in the second quarter after a share repurchase disclosure, i.e., soon after the lock-up period ends).

Third, we investigate the relationship between insider net sell trades before a share repurchase and immediately after the completion of a share repurchase. Insid-

ers can maximize the opportunistic gains obtained from share repurchases by buying a firm's shares before share repurchase disclosure, announcing the share repurchase using the direct share repurchase method, which is considered as a strong signal of undervaluation, and then selling the firm shares that they hold shortly after the completion of the share repurchase when the market optimism for the firm's stock is still high. Therefore, we expect a negative relationship between insider net sell trades before a share repurchase disclosure and insider net sell trades immediately following the completion of a share repurchase since insiders engage in opportunistic trades by taking advantage of the market confirmation bias concerning share repurchases.

In contrast, if insiders motivated by opportunism choose the indirect share repurchase, which is a weak signal of firm undervaluation, they run the risk of an adverse market response. Hence, opportunistic insiders are less likely to use indirect share repurchases for opportunistic trades. Consequently, we expect the negative relationship between insider net sell trades before a share repurchase disclosure and insider net sell trades immediately after the completion of a share repurchase to be less likely under the indirect share repurchase method. This observation leads to our third hypothesis.

H3: In direct share repurchases, there is a negative relationship between insider net sell trades before a share repurchase disclosure and insider net sell trades immediately after the completion of a share repurchase.

Fourth, we investigate whether opportunistic share repurchases vary with ownership concentration. We expect that opportunistic share repurchases will be more pronounced in firms with low ownership concentration. Our predictions are based on two grounds. First, Jensen and Meckling (1976), who develop the interest alignment hypothesis, claim that agency cost decreases with ownership concentration (especially managerial ownership). They argue that, the higher the level of managerial ownership, the more aligned the manager's interests will be with those of the shareholders (Jensen and Meckling, 1976; Ang et al., 2000). Opportunistic share repurchases are an unfair business practice that exploit the mistaken belief held by market participants that a share repurchase is a positive signal of value; here, insiders engage in informed trades to obtain quick trading profits. Share repurchases driven by opportunistic motivations that are based on information asymmetry lead to the transfer of wealth from outside investors to insiders; this practice can have an adverse effect on a firm's long-term valuation by increasing the firm's idiosyncratic risk. Since the short-term benefits from opportunistic share repurchases are more (less) likely to be more important than the long-term benefits in low (high) managerial share-ownership firms, opportunistic share repurchases are expected to be more (less) pronounced in low (high) managerial ownership firms.

On the other hand, opportunistic share repurchases may be influenced by the ownership of large outside shareholders. Previous studies claim that a negative relationship exists between the ownership of large outside shareholders and agency costs (Shleifer and Vishny, 1986; Holderness and Sheehan, 1988; Dechow et al., 1996; Bhaumik and Selarka, 2012). For example, Shleifer and Vishny (1986) claim that large outside shareholders play an important role in controlling managerial agency risk.³⁾ Outside shareholders with large ownership blocks, who enjoy improved access to firm information, experience lower information asymmetry and can exert pressure to increase firm value from a long-term perspective and reduce agency costs through active monitoring activities. Based on this line of research, opportunistic share repurchases are likely to decrease with the ownership of large outside shareholders, who actively monitor managers in an effort to increase the long-term firm value.

For the reasons stated above, opportunistic share repurchases in which insiders seek to obtain short-term trade profits by being net buyers before a share repurchase and net sellers after a share repurchase disclosure are more likely in firms with low ownership concentration (managerial share-ownership plus share-ownership of large outside shareholders). Thus, we predict that opportunistic share repurchases are more (less) likely in firms with low (high) ownership concentration. Using the ownership of the largest shareholder and related parties as a proxy for ownership concentration, we examine whether opportunistic share repurchases are more pronounced in firms with a lower ownership concentration than their counterparts.⁴⁾ Moreover, we examine whether the negative correlation between the net buy trades before

3) Holderness and Sheehan (1988) report that firms with large outside shareholders at least do not underperform. Dechow et al. (1996) find that earnings management is lower in firms with an outside blockholder. Bhaumik and Selarka (2012) document that conflicts between managers and shareholders following a merger tend to be relatively few in firms with high ownership concentration.

4) We measure ownership concentration with the ownership held by the largest shareholder and the related parties of the largest shareholder. If the largest shareholder is the manager of the firm, the ownership held by the largest shareholder and the related parties of the largest shareholder will coincide with the managerial ownership. In contrast, if the largest shareholder is not the manager of the firm, the ownership held by the largest shareholder and the related parties of the largest shareholder reflects the ownership held by the large outside shareholder. Therefore, the ownership held by the largest shareholder and the related parties of the largest shareholder is a measure that can capture both the managerial ownership and the ownership of the large outside shareholder; therefore, we use it as a proxy for ownership concentration. Specifically, we examine whether opportunistic share repurchases are more pronounced in firms in the bottom quartile of ownership concentration than the higher quartile firms.

share repurchases and net sell trades after share repurchases is greater in firms with low ownership concentration and firms that choose the direct share repurchase method. To test this prediction, we posit the following hypothesis.

H4: In direct share repurchases, the negative relationship between insider net sell trades before share repurchase disclosures and insider net sell trades after the completion of share repurchases is more pronounced for firms with low ownership concentration.

Finally, we examine whether share performance following a share repurchase disclosure differs between opportunistic share repurchase firms and non-opportunistic share repurchase firms. We define opportunistic share repurchase firms as firms in which the insiders are net buyers in the two quarters before a share repurchase and net sellers in the two quarters after a share repurchase. If managers use share repurchases for their own private gains, we expect that opportunistic share repurchase firms will demonstrate a more inferior share performance than non-opportunistic share repurchase firms. Therefore, we examine whether there are any differences in long-term share performance between firms involved in opportunistic insider trading and those that conduct share repurchases for signaling purpose. Thus, we formulate the following hypothesis for our empirical analysis.

H5: In a sample of direct share repurchase firms, opportunistic share repurchase firms (firms in which insiders are net buyers before share repurchases and net sellers after share repurchases) will experience inferior long-term share performance compared with their non-opportunistic counterparts.

4. Sample and Variable Definitions

4.1 Sample Selection

For the empirical analysis, we utilize firms listed in the KOSPI and KOSDAQ markets. Our sample period runs from 2004 to 2012. Panel A of <Table 1 >summarizes the sample selection process along with the sampling criteria. We identify 2,460 share repurchase disclosures. Of these, 214 share repurchase announcements indicate only one objective for share repurchases, while the remaining announcements indicate two or more objectives. Since our objective is to investigate share repurchases in which information asymmetry regarding the motivation for share repurchases exists, we look for share repurchases that facilitate greater opportunistic trades by insiders. For this reason, we restrict our sample to cases in which managers present

multiple reasons for share repurchases and exclude the cases in which managers identify only one reason (214 observations).⁵⁾

Furthermore, we exclude 1,562 cases in which two or more share repurchase disclosures are executed in two consecutive years.⁶⁾ The two types of share repurchases differ in terms of disclosure costs and the probability of actual share repurchase, which leads to different trading motivations for insiders. If the same firm experiences two or more share repurchases in two consecutive years, they may adopt different share repurchase methods for different share repurchases. For this reason, we exclude these cases despite the substantial reduction in the sample size. Additionally, we remove 76 observations for which we were unable to find the accounting and market data required to compute the variables for the sample period. Therefore, the final sample comprises 608 share repurchase firms.

Panel B of <Table 1> shows the distribution of the sample firms by year and repurchase method. A total of 299 firms chose the direct share repurchase method, wherein firms purchase shares directly in the open market for three months. In contrast, 309 firms chose the indirect share repurchase method, under which a financial institution is hired to purchase firm shares over an extended period depending on the market conditions. The yearly distribution of the sample firms does not indicate any subperiods of unusually high or low occurrences.

5) Firms that conduct share repurchases for signaling tend to indicate share price stabilization by itself or in combination with other reasons as reasons for share repurchase disclosures. A firm has an incentive to list multiple reasons for disclosure in order to avoid regulatory sanctions and/or lawsuits, to which a firm is exposed if a firm lists one specific reason for disclosure such as executive compensation, mergers, stock splits, stock cancellation, and defense of managerial control and fails to use share repurchase for the stated purpose. As the goal of this study is to examine whether insider opportunism is a part of motivations for share repurchases, we define share repurchases for signaling purpose as share repurchases for which the firm lists as reasons for disclosure the share price stabilization by itself or lists the share price stabilization in combination with other reasons and use only these share repurchases as the sample for this study. For this reason, we exclude 214 share repurchase disclosures for which reasons such as executive compensation, mergers, stock splits, stock cancellation, and defense of managerial control are given for the share repurchase disclosure.

6) We measure the quarterly net sell ratios for 15 quarters from the seventh quarter before a share repurchase to the seventh quarter after a share repurchase. If a firm announces share repurchases twice or more during the study period, an overlap in measurements of insider trading may occur causing a measurement error. Therefore, to reduce measurement errors in the insider net sell ratios before and after share repurchases, we exclude cases that involve multiple share repurchase announcements from the study sample.

<Table 1> Sample

Panel A: Sample selection criteria

| Classification | Number of observations |
|--|------------------------|
| Total share repurchases disclosed | 2,460 |
| - Firms that disclose only one reason for share repurchase (e.g., executive performance pay, mergers, stock splits, share cancellation, anti-takeover defense) | (214) |
| - Firms that have announced share repurchases twice or more in two years | (1,562) |
| - Firms that have incomplete financial and market data for the estimation period | (76) |
| Final sample | 608 |

Panel B: Yearly distribution of the sample

| Year | Indirect share repurchase | Direct share repurchase | Number of observations |
|-------|---------------------------|-------------------------|------------------------|
| 2004 | 26 | 41 | 67 |
| 2005 | 8 | 21 | 29 |
| 2006 | 28 | 38 | 66 |
| 2007 | 29 | 28 | 57 |
| 2008 | 65 | 47 | 112 |
| 2009 | 8 | 16 | 24 |
| 2010 | 36 | 27 | 63 |
| 2011 | 58 | 47 | 105 |
| 2012 | 51 | 34 | 85 |
| Total | 309 | 299 | 608 |

4.2 Variable Definitions and Descriptive Statistics

<Table 2> shows the descriptive statistics of the variables used in this research. We define insiders as the largest shareholder and related parties of the largest shareholder.⁷⁾ *Net Sell Ratio* (Q_{t1} , Q_{t2}) is the sum of the insider net sell ratio of each quarter between Quarter $t1$ and Quarter $t2$. *Net Sell Ratio* (Q_t) refers to the firm shares held by insiders (the largest shareholder and related parties) at the end of Quarter $t-1$ minus the firm shares held by insiders (the largest shareholder and related parties) at the end of Quarter t divided by the total number of shares outstanding at the end of

7) The related parties of the largest shareholder of a firm are defined as the family members of the largest shareholder, subsidiaries of the firm, other firms controlled by the firm or by the largest shareholder, other firms related to the firm, and executives or employees of the firm or individuals closely related to the firm who are in a position to influence the management or the policy of the firm. In Korea, the share ownership of the largest shareholder and related parties is disclosed as a footnote in the financial statements of firms.

Quarter $t-1$. If *Net Sell Ratio* (Q_t) is positive, insiders execute net sell trades in Quarter t ; if it is negative, they execute net buy trades. *Prior Net Buy_D* (Q_{t1} , Q_{t2}) is an indicator variable that takes the value of 1 if insiders show net buy trades between Quarters $t1$ and $t2$ before a share repurchase disclosure and zero otherwise. *Following_Net Sell_D* (Q_{t1} , Q_{t2}) is an indicator variable that takes the value of 1 if insiders show net sell trades between Quarters $t1$ and $t2$ after a share repurchase disclosure and zero otherwise. *Method_D* is an indicator variable taking the value of 1 if the direct share repurchase method is used and zero otherwise.

Our approach to testing the opportunistic share repurchase hypothesis involves comparing insider trading behaviors for the 15 quarters around the time of a share repurchase disclosure. Therefore, it is necessary to effectively control for cross-sectional differences to enhance the accuracy of the temporal comparison. For this reason, we add control variables to control for cross-sectional differences in our analysis. The control variables are described as follows. Abnormal return (*Abnormal Return*) is the holding-period abnormal stock returns for the 24 months following a share repurchase disclosure. We calculate the holding-period abnormal stock return by subtracting the market index return from the sample firm's return. This variable controls for the cross-sectional effect of the signal strength on insider net sell trades. Similarly, we add firm size, growth opportunity, leverage, and cash holdings to the regression equation to control for cross-sectional differences. Firm size (*SIZE*) is the log of the market value of a firm's equity measured in one billion Korean won. Growth opportunity (*BM*) is the ratio of the book value of equity to the market value of equity. The debt-to-equity ratio (*LEV*) represents the ratio of debt to equity. Cash holdings (*CASH*) represent the ratio of cash and cash equivalents to the cash-adjusted assets (total assets minus cash and cash equivalents). The share repurchase ratio (*RepRatio*) is the value of the announced number of shares to be repurchased divided by the market value of equity. We add this variable to the regression equation to control for the effect of share repurchase size on cross-sectional signal strength. Additionally, we add a market dummy (*Market_D*), which takes the value of 1 if a firm is listed in the KOSDAQ market and 0 if it is listed in the KOSPI market. Moreover, we add year dummies (*YEAR*) to control for the year fixed effects. Appendix I shows the Pearson correlation coefficients among the variables. We obtain the financial and market data along with the ownership information required to measure the variables from FnGuide Data Guide Pro, a widely used financial database in Korea.

As shown in <Table 2> the average *Net Sell Ratio* (Q_{-7} , Q_{-1}) and *Net Sell Ratio* (Q_{-4} , Q_{-1}) have negative values of -0.047 and -0.029 ; in contrast, the average *Net Sell Ratio*

(Q_1, Q_4) and *Net Sell Ratio* (Q_1, Q_7) are 0.009 and 0.016. This finding implies that insiders tend to be net buyers before a share repurchase and net sellers following a share repurchase. *Prior Net Buy D* (Q_{-7}, Q_{-1}) and *Prior Net Buy D* (Q_{-4}, Q_{-1}) show an average value of 0.570 and 0.490, respectively, while *Following Net Sell D* (Q_1, Q_4) and *Following Net Sell D* (Q_1, Q_7) have an average value of 0.350 and 0.410, respectively. This finding implies that, prior to a share repurchase, the proportion of insider net buy firms is greater than that of insider net sell firms. *Method_D* has an average value of 0.493, indicating that the proportion of direct share repurchase firms in the sample is 49.3%. The average *Abnormal Return* is positive at 7.8%, which suggests that share repurchase events, on average, produce a positive signaling effect.

<Table 2> Descriptive statistics

The variables are defined in Appendix II.

| | <i>Mean</i> | <i>Std. Dev</i> | <i>Max</i> | <i>Q3</i> | <i>Median</i> | <i>Q1</i> | <i>Min</i> |
|---|-------------|-----------------|------------|-----------|---------------|-----------|------------|
| <i>Net Sell Ratio</i> (Q_{-7}, Q_{-1}) | -0.047 | 0.175 | 0.285 | 0.029 | 0.000 | -0.049 | -0.627 |
| <i>Net Sell Ratio</i> (Q_{-4}, Q_{-1}) | -0.029 | 0.135 | 0.210 | 0.009 | 0.000 | -0.011 | -0.029 |
| <i>Net Sell Ratio</i> (Q_0) | -0.001 | 0.038 | 0.090 | 0.000 | 0.000 | -0.001 | -0.081 |
| <i>Net Sell Ratio</i> (Q_1, Q_4) | 0.009 | 0.054 | 0.195 | 0.015 | 0.000 | -0.003 | -0.193 |
| <i>Net Sell Ratio</i> (Q_1, Q_7) | 0.016 | 0.087 | 0.282 | 0.034 | 0.002 | -0.005 | -0.251 |
| <i>Prior Net Buy D</i> (Q_{-7}, Q_{-1}) | 0.570 | 0.495 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 |
| <i>Prior Net Buy D</i> (Q_{-4}, Q_{-1}) | 0.490 | 0.500 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| <i>Following Net Sell D</i> (Q_1, Q_4) | 0.350 | 0.478 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| <i>Following Net Sell D</i> (Q_1, Q_7) | 0.410 | 0.492 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| <i>Method_D</i> | 0.493 | 0.500 | 1.000 | 1.000 | 0.000 | 0.000 | 0.000 |
| <i>Abnormal Return</i> | 0.078 | 0.967 | 4.567 | 0.393 | -0.104 | -0.465 | -1.741 |
| <i>SIZE</i> | 2.923 | 0.632 | 4.958 | 3.254 | 2.817 | 2.497 | 1.404 |
| <i>BM</i> | 1.153 | 0.830 | 4.576 | 1.483 | 0.947 | 0.558 | 0.042 |
| <i>LEV</i> | 0.872 | 1.091 | 6.322 | 1.028 | 0.495 | 0.218 | 0.001 |
| <i>CASH</i> | 0.104 | 0.135 | 0.811 | 0.133 | 0.057 | 0.025 | 0.000 |
| <i>ROA</i> | 0.101 | 0.111 | 0.590 | 0.142 | 0.080 | 0.032 | -0.108 |
| <i>Size of Repurchase</i> | 0.032 | 0.028 | 0.159 | 0.038 | 0.023 | 0.014 | 0.000 |
| <i>Market</i> | 0.608 | 0.489 | 1.000 | 1.000 | 1.000 | 0.000 | 0.000 |

5. Results

5.1 Univariate Analysis

<Table 3> presents the insider net sell ratios for each quarter surrounding share repurchase disclosure (Q_0) for the entire sample, the direct share repurchase group, and the indirect share repurchase group. We do not observe any significant insider trading within the two quarters prior to share repurchase disclosure in either the direct or the indirect share repurchase sample. This is likely because insiders do not

want to trade shortly before share repurchase disclosure due to regulatory concerns. In contrast, in direct share repurchases, there are statistically significant insider net sell trades (0.0083, $t=3.490$) in the second quarter following share repurchase disclosure. This result supports Hypothesis 2. Furthermore, in direct share repurchases, there are no statistically significant insider net sell trades in first quarter after share repurchase disclosure. In indirect share repurchases, there are statistically significant insider net sell trades (0.0034, $t=2.348$) in the third quarter following share repurchase disclosure.

<Table 3> Insider Net Sell Ratios in the Time Period around Share Repurchase Disclosure

This table presents the insider net sell ratios in a given quarter by sample group. *Net Sell Ratio* (Q_t) refers to the number of shares held by insiders at the end of quarter $t-1$ minus the number of shares held by insiders at the end of quarter t divided by the total number of shares outstanding at the end of quarter $t-1$. If the *Net Sell Ratio* (Q_t) is positive, insiders execute net sell trades in quarter t ; if it is negative, they engage in net buy trades. Q_0 is the quarter in which the share repurchase is disclosed. The t -statistics test whether the means are different from zero.

| | (1) Full sample | | (2) Direct repurchase sample | | (3) Indirect repurchase sample | |
|-----------------------|-----------------|------------|------------------------------|-----------|--------------------------------|-----------|
| | (n=608) | | (n=299) | | (n=309) | |
| <i>Net Sell Ratio</i> | Mean | t-stat | Mean | t-stat | Mean | t-stat |
| Q-7 | -0.0073 | -1.991 ** | -0.0027 | -0.502 | -0.0117 | -2.399 ** |
| Q-6 | -0.0055 | -1.696 * | -0.0077 | -1.433 | -0.0033 | -0.910 |
| Q-5 | -0.0051 | -1.794 * | -0.0002 | -0.079 | -0.0097 | -2.091 ** |
| Q-4 | -0.0132 | -3.536 *** | -0.0094 | -2.273 ** | -0.0168 | -2.739 ** |
| Q-3 | -0.0109 | -3.223 *** | -0.0086 | -2.279 ** | -0.0131 | -2.356 ** |
| Q-2 | -0.0023 | -0.721 | 0.0013 | 0.309 | -0.0058 | -1.180 |
| Q-1 | -0.0029 | -1.191 | -0.0025 | -0.898 | -0.0034 | -0.836 |
| Q ₀ | -0.0008 | -0.514 | 0.0011 | 0.520 | -0.0026 | -1.201 |
| Q ₁ | 0.0013 | 1.260 | 0.0024 | 1.583 | 0.0002 | 0.136 |
| Q ₂ | 0.0049 | 3.669 *** | 0.0083 | 3.490 *** | 0.0016 | 1.290 |
| Q ₃ | 0.0015 | 1.220 | -0.0003 | -0.152 | 0.0034 | 2.348 ** |
| Q ₄ | 0.0010 | 0.772 | 0.0026 | 1.289 | -0.0006 | -0.386 |
| Q ₅ | 0.0037 | 2.749 *** | 0.0065 | 3.007 *** | 0.0010 | 0.602 |
| Q ₆ | 0.0009 | 0.715 | 0.0011 | 1.022 | 0.0006 | 0.283 |
| Q ₇ | 0.0027 | 2.201 ** | 0.0045 | 2.694 *** | 0.0010 | 0.542 |

These findings can be interpreted as follows. In direct share repurchases, where the share repurchase should be completed within three months, insiders tend to enter

into sell trades immediately after completion of the share repurchase. In contrast, in indirect share repurchases, where the share repurchase takes place over a longer period (typically one year), insider share repurchases tend to be executed later than in direct share repurchases. Therefore, we can conclude that, in direct share repurchases, insiders tend to enter into sell trades only after the completion of the share repurchase rather than during the share repurchase period.

<Table 4> presents the insider net sell ratios before and after share repurchase disclosure along with the insider net sell ratios of direct and indirect share repurchases. It also shows the differences in insider net sell ratios before and after share repurchase disclosure as well as the differences in insider net sell ratios between direct and indirect share repurchases. In Panel A, the cumulative insider net sell ratios for the seven quarters before share repurchase disclosure, *Net Sell Ratio* (Q_{-7}, Q_{-1}), are compared with the cumulative insider net sell ratios for the seven quarters after share repurchase disclosure, *Net Sell Ratio* (Q_7, Q_1). Similarly, in Panel B, the cumulative insider net sell ratios for the four quarters before share repurchase disclosure, *Net Sell Ratio* (Q_{-4}, Q_{-1}), are compared with the cumulative insider net sell ratios for the four quarters after share repurchase disclosure, *Net Sell Ratio* (Q_1, Q_4).

In Panel A, the average cumulative insider net sell ratios for the seven quarters prior to share repurchase are negative for all samples, while the average cumulative insider net sell ratios for the seven quarters following a share repurchase are positive for all samples. The average seven-month cumulative net sell ratio following a share repurchase exceeds that prior to a share repurchase in a statistically significant manner. Comparisons between the two periods based on median values provide the same results. Panel B presents the comparison results between four-month cumulative net sell ratios before and after a share repurchase. The results based on both the mean and median values are similar to those found in Panel A. These findings suggest that, on average, insiders engage in net buy trades before share repurchase and net sell trades after a share repurchase. On the other hand, before a share repurchase, the net sell (buy) ratio of the direct share repurchase group is lesser (greater) than that of the indirect share repurchase group. After share repurchase, the net sell ratio of the direct share repurchase group is greater than that of the indirect share repurchase group. We interpret this result as suggesting that opportunistic share repurchases in which insiders become net sellers before share repurchase and net sellers after share repurchase is more likely to occur under the direct share repurchase method than the indirect share repurchase method.

The overall findings in <Table 4> support Hypothesis 1. Hypothesis 1 predicts that if direct share repurchases are opportunistic, the insider net trades after share re-

purchase disclosure will be net sell trades and that the insider net sell trades after share repurchase disclosure are greater for direct share repurchases than indirect share repurchases. In both Panels A and B, we find that insider net sell trades following a share repurchase disclosure (i.e., net sell ratio) are positive for direct share repurchases and, after share repurchase disclosure, the insider net sell trades for direct share repurchases are greater than for indirect share repurchases.

<Table 4> Comparison of Insider net Sell Ratios by Share Repurchase Method and the Time Period around Share Repurchase Disclosure

Panel A: Comparison of the insider net sell ratios for the seven quarters prior to share repurchase disclosure, i.e., *Net Sell Ratio* (Q_{-7}, Q_{-1}), and the insider net sell ratios for the seven quarters following share repurchase disclosure, i.e., *Net Sell Ratio* (Q_1, Q_7). The t-values are given in the round brackets and the Wilcoxon z-values are given in the square brackets. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | | (a) <i>Net Sell Ratio</i> (Q_{-7}, Q_{-1}) | (b) <i>Net Sell Ratio</i> (Q_1, Q_7) | (c) Difference (b)-(a) (t-value) / [z-value] |
|---|-----------|---|---|---|
| (1) Entire sample (N=608) | Mean | -0.0471 | 0.0162 | (7.693) *** |
| | Median | 0.000 | -0.002 | [5.867] *** |
| (2) Direct share repurchase sample (N=299) | Mean | -0.0298 | 0.0265 | (5.230) *** |
| | Median | 0.000 | -0.000 | [4.457] *** |
| (3) Indirect share repurchase sample (N=309) | Mean | -0.0639 | 0.0061 | (5.651) *** |
| | Median | 0.000 | -0.005 | [3.800] *** |
| (4) Difference (2)-(3) | (t-value) | (2.413) ** | (2.909) *** | |
| | [z-value] | [1.037] | [1.645] * | |

Panel B: Comparison of the insider net sell ratios for the four quarters prior to share repurchase disclosure, i.e., *Net Sell Ratio* (Q_{-4}, Q_{-1}), and the insider net sell ratios for the four quarters following share repurchase disclosure, i.e., *Net Sell Ratio* (Q_1, Q_4). The t-values are given in the round brackets and the Wilcoxon z-values are given in the square brackets. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | | (a) <i>Net Sell Ratio</i> (Q_{-4}, Q_{-1}) | (b) <i>Net Sell Ratio</i> (Q_1, Q_4) | (c) Difference (b)-(a) (t-value) / [z-value] |
|---|-----------|---|---|---|
| (1) Entire sample (N=608) | Mean | -0.0293 | 0.0087 | (6.277) *** |
| | Median | 0.000 | 0.000 | [3.529] *** |
| (2) Direct share repurchase sample (N=299) | Mean | -0.0192 | 0.0130 | (4.058) *** |
| | Median | 0.000 | 0.000 | [2.244] ** |
| (3) Indirect share repurchase sample (N=309) | Mean | -0.0392 | 0.0046 | (4.788) *** |
| | Median | 0.000 | 0.000 | [1.731] * |
| (4) Difference (2)-(3) | (t-value) | (1.834) * | (1.935) * | |
| | [z-value] | [0.700] | [1.592] | |

5.2 Regression Analysis

We propose four models estimated using the logit and ordinary least squares (OLS) regression methods to test our four proposed hypotheses. Model 1 investigates insider trading behavior after a share repurchase disclosure as well as the difference in insider trading behavior after a share repurchase disclosure between direct and indirect share repurchases. To test Hypothesis 1 as directly as possible, we use the share repurchase method dummy as the dependent variable and insider net sell trades after a share repurchase disclosure as the explanatory variable of interest. *Net Sell Ratio* (Q_{t1} , Q_{t2}) refers to the net sell volume from Quarters $t1$ to $t2$ divided by the total number of shares outstanding:

(Model 1-1)

$$\begin{aligned} Method_D = & \beta_0 + \beta_1 Net\ Sales\ Ratio(Q_{-7}, Q_{-1}) + \beta_2 Net\ Sales\ Ratio(Q_1, Q_7) \\ & + \beta_3 AbnormalReturns + \beta_4 Size + \beta_5 BM + \beta_6 CASH + \beta_7 ROA \\ & + \beta_8 Size\ of\ Repurchase + \beta_9 Market_D + \Sigma YEAR_D + \varepsilon \end{aligned}$$

(Model 1-2)

$$\begin{aligned} Method_D = & \beta_0 + \beta_1 Net\ Sales\ Ratio(Q_{-4}, Q_{-1}) + \beta_2 Net\ Sales\ Ratio(Q_1, Q_4) \\ & + \beta_3 AbnormalReturns + \beta_4 Size + \beta_5 BM + \beta_6 CASH + \beta_7 ROA \\ & + \beta_8 Size\ of\ Repurchase + \beta_9 Market_D + \Sigma YEAR_D + \varepsilon \end{aligned}$$

According to Hypothesis 1, we expect that the coefficient of *Net Sell Ratio* (Q_1 , Q_7) is statistically significant and positive. To obtain *Net Sell Ratio* (Q_1 , Q_7), we first aggregate the insider net trades from Quarters 1 to Quarter 7 following a share repurchase disclosure. Next, we divide the aggregate insider net trades by the number of shares outstanding. Similarly, for *Net Sell Ratio* (Q_{-7} , Q_{-1}), we aggregate the insider net sell trades from Quarter 7 to Quarter 1 before a share repurchase disclosure. For Model 1-2, which is not shown explicitly, we aggregate insider net trades from Quarter 4 to Quarter 1 before a share repurchase disclosure to obtain the *Net Sell Ratio* (Q_{-4} , Q_{-1}) and from Quarter 1 to Quarter 4 after a share repurchase disclosure to obtain the *Net Sell Ratio* (Q_1 , Q_4).

We estimate Models 1-1 and 1-2; the results are presented in <Table 5>. In the first two columns showing the logit regression results, the coefficients of the *Net Sell Ratio* (Q_1 , Q_7) and the *Net Sell Ratio* (Q_1 , Q_4) are 3.189 and 2.851, respectively; both values are statistically significant (the p-values are 0.003 and 0.092, respectively). The same results are found in the OLS regression analysis shown in the last two columns. Hence, more net sell trades occur after a share repurchase disclosure in the direct share repurchase sample than in the indirect share repurchase sample.

<Table 5> Share Repurchase Method and Insider Trades before and after Share Repurchase Disclosure

This table shows whether the insider trades following the share repurchases are net sell trades and whether the insider net sell trades after share repurchase disclosure are associated with the direct share repurchase method. The dependent variable is *Method_D*, which is an indicator variable that takes the value of 1 when the direct share repurchase method is used and zero otherwise. The explanatory variables of interest are *Net Sell Ratio (Q₁, Q₇)*, which represents the insider net trades between Quarters 1 and 7 scaled by the shares outstanding, and *Net Sell Ratio (Q₁, Q₄)*, which represents the insider net trades between Quarters 1 and 4 scaled by the shares outstanding. The other variables are defined in Appendix II and p-values are given in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | <i>Dependent Variables = Method_D</i> | | | |
|--|---------------------------------------|-------------------|-------------------------|---------------------|
| | Panel A. Logistic regression | | Panel B. OLS regression | |
| | (1) | (2) | (3) | (4) |
| <i>Net Sell Ratio (Q₋₇, Q₋₁)</i> | 1.007* (0.064) | | 0.228* (0.071) | |
| <i>Net Sell Ratio (Q₁, Q₇)</i> | 3.189*** (0.003) | | 0.728*** (0.003) | |
| <i>Net Sell Ratio (Q₋₄, Q₋₁)</i> | | 0.859 (0.218) | | 0.198 (0.227) |
| <i>Net Sell Ratio (Q₁, Q₄)</i> | | 2.851* (0.092) | | 0.659* (0.094) |
| <i>Abnormal Return</i> | 0.001 (0.995) | 0.019 (0.831) | 0.000 (0.988) | 0.004 (0.844) |
| <i>SIZE</i> | -0.230 (0.246) | -0.233 (0.234) | -0.053 (0.257) | -0.055 (0.242) |
| <i>BM</i> | -0.199 (0.213) | -0.209 (0.188) | -0.047 (0.219) | -0.049 (0.195) |
| <i>LEV</i> | 0.059 (0.573) | 0.077 (0.457) | 0.013 (0.582) | 0.018 (0.469) |
| <i>CASH</i> | -0.612 (0.377) | -0.573 (0.400) | -0.139 (0.387) | -0.133 (0.413) |
| <i>ROA</i> | -0.235 (0.793) | -0.371 (0.678) | -0.058 (0.785) | -0.088 (0.680) |
| <i>Size of Repurchase</i> | -4.838 (0.165) | -4.549 (0.188) | -1.117 (0.172) | -1.067 (0.195) |
| <i>Market</i> | -0.329 (0.164) | -0.331 (0.162) | -0.078 (0.165) | -0.079 (0.168) |
| <i>Intercept</i> | 0.954 (0.268) | 0.968 (0.254) | 0.720*** (0.000) | 0.727*** (0.000) |
| <i>YEAR_D</i> | Included | Included | Included | Included |
| <i>Likelihood Ratio</i> | 784.03 | 791.67 | - | - |
| <i>R-square</i> | 0.064 | 0.052 | 0.034 | 0.022 |

Next, we use indicator variables to represent insider net buy trades and net sell trades. We use two measures for insider net trades: *Prior_Net Buy_D* and *Following_Net Sell_D*. *Prior_Net Buy_D* is an indicator variable that takes the value of 1 if the insider net trade before a share repurchase disclosure is a net buy and zero otherwise. *Following_Net Sell_D* is an indicator variable that takes the value of 1 if the insider net trade after a share repurchase disclosure is a net sell and zero otherwise. Additionally, we include in the regression model other factors that may influence the relationship between the share repurchase method and insider trades.

In Models 1-3 and 1-4, *Following_Net Sell_D* is the variable of interest. According to Hypothesis 1, we expect the coefficient of *Following_Net Sell_D* to be statistically significant and positive. In Model 1-3, we aggregate insider net trades from Quarter 7 to Quarter 1 before a share repurchase disclosure and from Quarter 7 to Quarter 1 after a share repurchase disclosure. Similarly, in Model 1-4, which is not shown explicitly, we aggregate insider net trades from Quarter 4 to Quarter 1 before a share repurchase disclosure and from Quarter 4 to Quarter 1 after a share repurchase disclosure. We obtain Model 1-3 and Model 1-4 as shown below:

(Model 1-3)

$$\begin{aligned} Method_D = & \beta_0 + \beta_1 Prior_NetBuy_D(Q_{-7}, Q_{-1}) + \beta_2 Following_NetSell_D(Q_1, Q_7) \\ & + \beta_3 AbnormalReturns + \beta_4 Size + \beta_5 BM + \beta_6 CASH + \beta_7 ROA \\ & + \beta_8 Size\ of\ Repurchase + \beta_9 Market_D + \Sigma YEAR_D + \varepsilon \end{aligned}$$

(Model 1-4)

$$\begin{aligned} Method_D = & \beta_0 + \beta_1 Prior_NetBuy_D(Q_{-4}, Q_{-1}) + \beta_2 Following_NetSell_D(Q_1, Q_4) \\ & + \beta_3 AbnormalReturns + \beta_4 Size + \beta_5 BM + \beta_6 CASH + \beta_7 ROA \\ & + \beta_8 Size\ of\ Repurchase + \beta_9 Market_D + \Sigma YEAR_D + \varepsilon \end{aligned}$$

<Table 6> shows the regression estimation results based on Models 1-3 and 1-4. The logit regression estimation results are shown in Panel A and the OLS regression estimation results are shown in Panel B. In Panel A, both *Following_Net Sell_D* (Q_1, Q_7) and *Following_Net Sell_D* (Q_1, Q_4) show positive coefficients (0.340 and 0.406, respectively), which are statistically significant (the p-values are 0.056 and 0.025, respectively). This result implies that, after a share repurchase disclosure, there are more firms that execute insider sell trades in the direct share repurchase sample than in the indirect share repurchase sample. In contrast, the coefficients of both *Prior_Net Buy_D* (Q_{-7}, Q_{-1}) and *Prior_Net Buy_D* (Q_{-4}, Q_{-1}) are not statistically significant. This result implies that, before a share repurchase disclosure, there is no difference in the number of firms that execute insider buy trades between the direct and

the indirect share repurchase samples. The OLS estimation results in Panel B are qualitatively similar to the logit estimation results in Panel A.

<Table 6> Share Repurchase Method and Insider Trades in the Time Period around Share Repurchase Disclosure Using Net Buy and Net Sell Indicator Variables

This table shows whether insider trades after the share repurchases are net sell trades and whether insider net sell trades following share repurchase disclosure are associated with the direct share repurchase method. Instead of using *Net Sell Ratio*, which is a continuous variable, we convert *Net Sell Ratio* into a net buy indicator variable before share repurchase disclosure and a net sell indicator variable after share repurchase disclosure. The dependent variable is *Method_D*, which is an indicator variable that takes the value of 1 when the direct share repurchase method is used and zero otherwise. The other variables are defined in Appendix II and the p-values are given in the parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | <i>Dependent Variables = Method_D</i> | | | |
|--|---------------------------------------|--------------------|-------------------------|---------------------|
| | Panel A: Logistic regression | | Panel B: OLS regression | |
| | (1) | (2) | (3) | (4) |
| <i>Prior Net Buy_D (Q₋₇, Q₋₁)</i> | 0.268 (0.125) | | 0.064 (0.126) | |
| <i>Following Net Sell_D (Q₁, Q₇)</i> | 0.340* (0.056) | | 0.082* (0.056) | |
| <i>Prior Net Buy_D (Q₋₄, Q₋₁)</i> | | -0.013 (0.938) | | -0.003 (0.944) |
| <i>Following Net Sell_D (Q₁, Q₄)</i> | | 0.406** (0.025) | | 0.097** (0.026) |
| <i>Abnormal Return</i> | 0.022 (0.802) | 0.015 (0.863) | 0.005 (0.807) | 0.004 (0.862) |
| <i>SIZE</i> | -0.199 (0.311) | -0.241 (0.218) | -0.047 (0.318) | -0.057 (0.225) |
| <i>BM</i> | -0.207 (0.194) | -0.197 (0.215) | -0.049 (0.197) | -0.047 (0.221) |
| <i>LEV</i> | 0.094 (0.366) | 0.088 (0.399) | 0.022 (0.370) | 0.020 (0.404) |
| <i>CASH</i> | -0.464 (0.496) | -0.523 (0.441) | -0.108 (0.502) | -0.122 (0.450) |
| <i>ROA</i> | -0.791 (0.364) | -0.676 (0.437) | -0.189 (0.362) | -0.159 (0.444) |
| <i>Size of Repurchase</i> | -5.032 (0.145) | -5.124 (0.138) | -1.176 (0.152) | -1.201 (0.144) |
| <i>Market</i> | -0.267 (0.256) | -0.328 (0.167) | -0.064 (0.259) | -0.078 (0.172) |
| <i>Intercept</i> | 0.509 (0.555) | 0.852 (0.317) | 0.617*** (0.003) | 0.698*** (0.001) |
| <i>YEAR_D</i> | Included | Included | Included | Included |
| <i>Likelihood Ratio</i> | 789.35 | 790.54 | - | - |
| <i>R-square</i> | 0.056 | 0.061 | 0.026 | 0.024 |

The combined results in <Table 5> and <Table 6> suggest that, after a share repurchase disclosure, insiders are more likely to execute abnormal net sell trades in direct share repurchases than in indirect share repurchases. This result implies that managerial opportunism may be present in direct share repurchases. Thus, <Table 5> and <Table 6> support Hypothesis 1. It should also be noted that, before a share repurchase disclosure, insiders do not show greater net buy activities in the direct share repurchase sample than in the indirect share repurchase sample.

We utilize Model 2 to test Hypothesis 2. Model 2 uses the timing of insider net sell trades to determine whether insider net sell trades that occur after the share repurchase disclosure are liquidity trades (motivated by liquidity) or informed trades (motivated by private information). We expect that insider net sell trades that occur in direct share repurchases are the greatest during the share repurchase period (the three months following a share repurchase disclosure) when liquidity is likely greatest if insider net sell trades are motivated by liquidity. Hence, if the liquidity trade hypothesis holds, the coefficient of the insider net sell ratio in Quarter 1 after A share repurchase disclosure (*Net Sell Ratio* (Q_1)) is positive and larger than those in the other quarters. In contrast, if insider net sell trades that occur in direct share repurchases are informed trades, insiders are more likely to execute sell trades immediately after a share repurchase is completed, when shares are likely most highly valued than when liquidity is the greatest. Thus, if the informed trade hypothesis holds, the coefficient of the insider net sell ratio in Quarter 2 after a share repurchase disclosure (*Net Sell Ratio* (Q_2)) is positive and larger than those in the other quarters. Below, we show Model 2, which tests Hypothesis 2:

(Model 2)

$$\begin{aligned} \text{Method_D} = & \beta_0 + \beta_1 \text{Net Sell Ratio}(Q_{-1}) + \beta_2 \text{Net Sell Ratio}(Q_{-2}) + \dots \\ & + \beta_{15} \text{Net Sell Ratio}(Q_7) + \beta_{16} \text{AbnormalReturns} \\ & + \beta_{17} \text{Size} + \beta_{18} \text{BM} + \beta_{19} \text{CASH} + \beta_{20} \text{ROA} + \beta_{21} \text{Size of Repurchase} \\ & + \beta_{22} \text{Market_D} + \Sigma \text{YEAR_D} + \varepsilon \end{aligned}$$

We estimate Model 2 and present the results in <Table 7>. The *Net Sell Ratio* (Q_t) is the net sell ratio t quarters before a share repurchase disclosure and the *Net Sell Ratio* (Q_t) is the net sell ratio t quarters after a share repurchase disclosure. In Panel A, which shows the logit regression results, the coefficient of the *Net Sell Ratio* (Q_2) is 4.257, which is larger than the coefficient of any other quarter and is statistically significant ($p=0.039$). In contrast, the coefficient of the *Net Sell Ratio* (Q_1) is not statistically significant. Similar results are obtained in the OLS regression analysis

shown in Panel B. Overall, the results in <Table 7> indicate that insider sell trades that occur after the completion of a share repurchase are more likely to occur in direct share repurchases than in indirect share repurchases, and these trades are more motivated by the private information held by managers than by liquidity.⁸⁾ Thus, we conclude that the findings in <Table 7> support Hypothesis 2.

Furthermore, we examine the relationship between insider trades before a share repurchase disclosure and insider trades thereafter. If insiders attempt to maximize the gains from informed trades, insiders will buy firm shares before a share repurchase disclosure at a low price and then sell the acquired shares after the share repurchase disclosure when a higher price is established. This sequence of insider trades is more likely to happen in direct repurchases, which are viewed as stronger signals of firm value.

Model 3 is designed to identify the buy-low-sell-high sequence of trades by insiders. The two dependent variables are the insider net sell ratios after a share repurchase disclosure. One dependent variable is the insider net sell ratio at the time of a share repurchase disclosure (Q_0) to one quarter after the share repurchase disclosure (Q_1), namely *Net Sell Ratio* (Q_0, Q_1). The other dependent variable is the insider net sell ratio from one quarter after a share repurchase disclosure (Q_1) to two quarters after the share repurchase disclosure (Q_2), namely *Net Sell Ratio* (Q_1, Q_2). If insiders' net sell trades are informed trades, we expect a negative sign between *Net Sell Ratio* (Q_1, Q_2) and *Net Sell Ratio* (Q_2, Q_1). However, if insiders' net sell trades are liquidity-based trades, we expect a negative sign between *Net Sell Ratio* (Q_0, Q_1) and *Net Sell Ratio* (Q_2, Q_1). Model 3, which tests Hypothesis 3, is shown below:

(Model 3)

$$\text{Net Sell Ratio}(Q_0, Q_1) \text{ or } \text{Net Sell Ratio}(Q_1, Q_2)$$

8) Additionally, we examine whether there is any difference in stock returns following share repurchase between firms in which insiders are net sellers in one quarter and two quarters after share repurchase and firms in which insiders are not net sellers in the same periods. For the entire sample, 12-month and 24-month holding period excess returns for firms in which insiders are not net sellers after share repurchase are 8.2% and 19.0%, respectively. In comparison, 12-month and 24-month holding period excess returns for firms in which insiders are net sellers after share repurchase are 6.3% and 4.7%, respectively. As for the direct share repurchase sample, 12-month and 24-month holding period excess returns for firms in which insiders are not net sellers after share repurchase are 16.8% and 34.5%, respectively. In comparison, 12-month and 24-month holding period excess returns for firms in which insiders are net sellers after share repurchase are 11.8% and 12.6%, respectively. Overall, firms in which insiders are net sellers within two quarters following share repurchase experience inferior stock returns than firms in which insiders are not net sellers. This finding² suggests that insider net sell trades are motivated by private information than by liquidity.

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$$\begin{aligned}
 &= \beta_0 + \beta_1 \text{Net Sell Ratio}(Q_{-7}, Q_{-5}) + \beta_2 \text{Net Sell Ratio}(Q_{-4}, Q_{-3}) \\
 &\quad + \beta_3 \text{Net Sell Ratio}(Q_{-2}, Q_{-1}) + \beta_4 \text{Net Sell Ratio}(Q_0) \\
 &\quad + \beta_5 \text{BM} + \beta_6 \text{CASH} + \beta_7 \text{ROA} + \beta_8 \text{Size of Repurchase} \\
 &\quad + \beta_9 \text{Market}_D + \Sigma \text{YEAR}_D + \varepsilon
 \end{aligned}$$

<Table 7> Share Repurchase Method and Quarterly Insider Net Trades in the Time Period around Share Repurchase Disclosure

This table shows whether insider net sell trades after share repurchases occur when the stock price is the highest or the liquidity is the highest. The dependent variable is *Method_D*, which is an indicator variable that takes the value of 1 when the direct share repurchase method is used and zero otherwise. The explanatory variable of interest is the *Net Sell Ratio* (Q_2), which represents the insider net trades in the second quarter following share repurchase disclosure. The other variables are defined in Appendix II and the p-values are given in the parentheses. *, **, and *** represent significance at 10%, 5%, and 1% levels, respectively.

| | <i>Dependent Variables = Method_D</i> | | | |
|--|---------------------------------------|------------------|-------------------------|------------------|
| | Panel A: Logistic regression | | Panel B: OLS regression | |
| <i>Net Sell Ratio</i> (Q ₋₇) | 1.124 | (0.289) | 0.336 | (0.304) |
| <i>Net Sell Ratio</i> (Q ₋₆) | 0.372 | (0.542) | -0.251 | (0.545) |
| <i>Net Sell Ratio</i> (Q ₋₅) | 0.520 | (0.471) | 0.305 | (0.482) |
| <i>Net Sell Ratio</i> (Q ₋₄) | 1.482 | (0.223) | 0.330 | (0.233) |
| <i>Net Sell Ratio</i> (Q ₋₃) | 0.179 | (0.672) | 0.125 | (0.703) |
| <i>Net Sell Ratio</i> (Q ₋₂) | 1.075 | (0.300) | 0.379 | (0.318) |
| <i>Net Sell Ratio</i> (Q ₋₁) | 0.006 | (0.937) | -0.041 | (0.938) |
| <i>Net Sell Ratio</i> (Q ₀) | 0.181 | (0.671) | -0.411 | (0.689) |
| <i>Net Sell Ratio</i> (Q ₁) | 2.682 | (0.101) | 1.857 | (0.111) |
| <i>Net Sell Ratio</i> (Q ₂) | 4.257 | (0.039)** | 1.829 | (0.038)** |
| <i>Net Sell Ratio</i> (Q ₃) | 0.000 | (0.993) | 0.022 | (0.986) |
| <i>Net Sell Ratio</i> (Q ₄) | 0.515 | (0.473) | 0.609 | (0.484) |
| <i>Net Sell Ratio</i> (Q ₅) | 3.334 | (0.068)* | 1.905 | (0.068)* |
| <i>Net Sell Ratio</i> (Q ₆) | 0.014 | (0.907) | 0.120 | (0.929) |
| <i>Net Sell Ratio</i> (Q ₇) | 2.716 | (0.099)* | 1.774 | (0.102) |
| <i>Abnormal Return</i> | 0.002 | (0.962) | -0.001 | (0.970) |
| <i>SIZE</i> | 0.875 | (0.350) | -0.043 | (0.371) |
| <i>BM</i> | 1.378 | (0.240) | -0.045 | (0.246) |
| <i>LEV</i> | 0.419 | (0.517) | 0.015 | (0.546) |
| <i>CASH</i> | 1.070 | (0.301) | -0.163 | (0.321) |
| <i>ROA</i> | 0.122 | (0.727) | -0.081 | (0.713) |
| <i>Size of Repurchase</i> | 2.038 | (0.153) | -1.139 | (0.171) |
| <i>Market</i> | 1.859 | (0.173) | -0.077 | (0.179) |
| <i>Intercept</i> | 0.820 | (0.365) | 0.679 | (0.001)*** |
| <i>YEAR_D</i> | Included | | Included | |
| <i>Likelihood Ratio</i> | 777.28 | | - | |
| <i>R-square</i> | 0.075 | | 0.023 | |

<Table 8> shows the estimation results of Model 3 for the direct and indirect share repurchase samples in Panels A and B, respectively.⁹⁾ For the direct share repurchase sample, the relationship between *Net Sell Ratio* (Q_1, Q_2) and *Net Sell Ratio* (Q_{-2}, Q_{-1}) is statistically significant and negative (-0.167, $p=0.000$). In contrast, no statistically significant relationship between *Net Sell Ratio* (Q_0, Q_1) and *Net Sell Ratio* (Q_{-2}, Q_{-1}) is found. For the indirect share repurchase sample, no statistically significant relationship is observed either between the *Net Sell Ratio* (Q_1, Q_2) and the *Net Sell Ratio* (Q_{-2}, Q_{-1}) or between the *Net Sell Ratio* (Q_0, Q_1) and the *Net Sell Ratio* (Q_{-2}, Q_{-1}). These results suggest that, in direct share repurchases, insiders buy firm shares before share repurchase disclosure and then sell the firm shares they own shortly after the completion of the share repurchase. This trading pattern of insiders is consistent with insiders engaging in informed trades by taking advantage of their positions in the firm. Thus, we conclude that the results in <Table 8> support Hypothesis 3.

Additionally, we investigate whether the negative relationship between insiders' net buy trades before a share repurchase disclosure and those thereafter varies with insider equity ownership to test Hypothesis 4. The possibility that managers pursue their private interests by using their informational advantage may be greater in firms that suffer from a significant agency problem. A large number of researchers have shown that firms with low managerial ownership suffer from more acute agency problems than firms with high managerial ownership (Jensen and Meckling, 1976; DeAngelo and DeAngelo, 1985; Shleifer and Vishny, 1986).

We identify firms vulnerable to agency problems using ownership concentration. Based on previous studies, we define firms with low ownership concentration as firms vulnerable to agency problems. We classify sample firms among the bottom 30% of insider share-ownership in the total sample as the group of firms with low ownership concentration and examine whether the insider trading behaviors of the group with low ownership concentration differs from the comparison group, namely, sample firms among the top 70% of insider share-ownership. The OLS regression estimation results indicate the relationship between insider sell trades after a share repurchase disclosure and insider sell trades before a share repurchase disclosure. We measure insider ownership by using the equity ownership of the largest shareholder and related parties, as measured at the end of the third quarter before a share repurchase disclosure.

9) We divided the sample into the direct share repurchase sample and the indirect share repurchase sample and conducted the Pearson correlation analysis for main variables. Appendix I shows the Pearson correlation coefficients. The correlation coefficient between net sell ratios for two quarters before and after share repurchase is negative and statistically significant at 5% for the direct share repurchase sample, while it is not statistically significant for the indirect share repurchase sample.

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<Table 8> Relationship between Insider Net Trades before and after the Share Repurchase Disclosure for Direct vs. Indirect Share Repurchase Sample

This table shows whether insiders buy firm shares prior to share repurchase disclosure and then sell the firm shares they own shortly after completion of the share repurchase for the direct and indirect share repurchase samples, respectively. The dependent variable is the *Net Sell Ratio* after share repurchase disclosure and the variable of interest is the *Net Sell Ratio* before share repurchase disclosure. The first two columns (Panel A) correspond to the direct share repurchase sample and the last two columns (Panel B) correspond to the indirect share repurchase sample. The other variables are defined in Appendix II and the p-values are given in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | Panel A: Direct share repurchase sample | | Panel B: Indirect share repurchase sample | |
|--|---|------------------------------------|---|------------------------------------|
| | <i>Net Sell Ratio</i> | | <i>Net Sell Ratio</i> | |
| | (Q ₀ , Q ₁) | (Q ₁ , Q ₂) | (Q ₀ , Q ₁) | (Q ₁ , Q ₂) |
| <i>Net Sell Ratio</i> (Q ₋₇ , Q ₋₅) | -0.032 (0.248) | -0.023 (0.349) | -0.019 (0.284) | -0.018 (0.310) |
| <i>Net Sell Ratio</i> (Q ₋₄ , Q ₋₃) | -0.038 (0.211) | -0.066** (0.019) | -0.003 (0.861) | 0.012 (0.432) |
| <i>Net Sell Ratio</i> (Q ₋₂ , Q ₋₁) | -0.013 (0.784) | -0.167*** (0.000) | 0.024 (0.317) | -0.005 (0.819) |
| <i>Net Sell Ratio</i> (Q ₀) | | -0.023 (0.747) | | 0.025 (0.807) |
| <i>SIZE</i> | 0.010* (0.070) | 0.009* (0.089) | -0.002 (0.679) | -0.006 (0.251) |
| <i>BM</i> | -0.003 (0.538) | 0.007 (0.124) | -0.001 (0.854) | 0.003 (0.408) |
| <i>LEV</i> | -0.004 (0.257) | -0.000 (0.948) | -0.001 (0.790) | -0.002 (0.399) |
| <i>CASH</i> | 0.012 (0.616) | 0.049* (0.035) | 0.011 (0.396) | 0.002 (0.865) |
| <i>ROA</i> | -0.044 (0.121) | -0.034 (0.210) | -0.011 (0.584) | -0.003 (0.871) |
| <i>Size of Repurchase</i> | 0.159 (0.114) | 0.225** (0.020) | 0.063 (0.457) | -0.064 (0.465) |
| <i>Market</i> | 0.015** (0.041) | 0.009 (0.220) | -0.002 (0.745) | 0.003 (0.518) |
| <i>Intercept</i> | -0.036 (0.159) | 0.045* (0.065) | 0.010 (0.641) | 0.018 (0.394) |
| <i>YEAR_D</i> | Included | Included | Included | Included |
| <i>R-square</i> | 0.015 | 0.075 | -0.023 | -0.010 |

As shown in <Table 8>, the two dependent variables are the insider net sell ratio during the share repurchase period, *Net Sell Ratio* (Q_0, Q_1), and the insider net sell ratio during the quarter immediately after the completion of a share repurchase, the

<Table 9> Relationship between Insider Net Trades before and after the Share Repurchase disclosure for low insider ownership vs. high insider ownership

This table shows whether the insider trading in the direct share repurchases shown in Table 8 is more acute for firms with low insider equity ownership. We divide the direct share repurchase sample into firms with an insider ownership of 30% or above and those with an insider ownership of below 30%. Next, we rerun the same regression as shown in Table 8. The dependent variable is the *Net Sell Ratio* following share repurchase disclosure and the variable of interest is the *Net Sell Ratio* prior to share repurchase disclosure. The first two columns (Panel A) present the estimation results for the low-insider-ownership firms and the last two columns (Panel B) present the estimation results for the high-insider-ownership firms. The other variables are defined in Appendix II and the p-values are given in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | Panel A: Direct share- repurchase firms in the top 70% in terms of ownership con- centration (N=210) | | Panel B: Direct share- repurchase firms in the bottom 30% in terms of ownership concentration (N=89) | |
|--|---|-------------------|---|---------------------|
| | <i>Net Sell Ratio</i> | | <i>Net Sell Ratio</i> | |
| | (Q_0, Q_1) | (Q_1, Q_2) | (Q_0, Q_1) | (Q_1, Q_2) |
| <i>Net Sell Ratio</i> (Q_{-2}, Q_{-1}) | 0.000 (0.998) | -0.040 (0.365) | -0.017 (0.742) | -0.181** (0.023) |
| <i>Net Sell Ratio</i> (Q_0) | | 0.037 (0.731) | | -0.344 (0.126) |
| <i>SIZE</i> | 0.017** (0.015) | 0.001 (0.852) | -0.008 (0.198) | 0.007 (0.468) |
| <i>BM</i> | 0.005 (0.393) | 0.001 (0.859) | -0.018*** (0.002) | 0.013 (0.122) |
| <i>LEV</i> | -0.005 (0.273) | 0.000 (0.961) | 0.001 (0.807) | -0.002 (0.704) |
| <i>CASH</i> | 0.054 (0.130) | 0.021 (0.403) | -0.032 (0.138) | 0.026 (0.463) |
| <i>ROA</i> | -0.032 (0.389) | -0.018 (0.489) | -0.021 (0.424) | -0.017 (0.669) |
| <i>Size of Repurchase</i> | 0.261** (0.038) | 0.087 (0.319) | 0.120 (0.259) | 0.074 (0.654) |
| <i>Market</i> | 0.020** (0.034) | 0.008 (0.221) | 0.005 (0.601) | 0.005 (0.696) |
| <i>Intercept</i> | -0.066** (0.025) | -0.001 (0.952) | 0.038 (0.165) | -0.035 (0.420) |
| <i>R-square</i> | 0.024 | -0.017 | 0.131 | 0.078 |

Net Sell Ratio (Q_1, Q_2). The independent variable is the insider net trade ratio immediately before a share repurchase disclosure, *Net Sell Ratio* (Q_2, Q_1). Panel A (the first two columns) shows the estimation results for high insider-ownership firms and Panel B (the last two columns) shows the estimation results for low insider-ownership firms. In Panel A of <Table 9>, we do not observe a statistically significant relationship between the dependent and independent variables for firms with high insider equity ownership. In contrast, in Panel B, we find that, for firms with low insider equity ownership, the relationship between the *Net Sell Ratio* (Q_1, Q_2) and the *Net Sell Ratio* (Q_2, Q_1) is statistically significant and negative (-0.181, $p=0.023$). Thus, for direct share repurchases, we conclude that, in firms that are more prone to agency problems, insiders are more likely to engage in informed trading using direct share repurchases than firms that are less prone to agency problems.

Lastly, we analyze whether there is any difference in holding-period excess returns following share repurchases between opportunistic and non-opportunistic share repurchase firms using Model 4. The dependent variables in Model 4 are *BHAR_12M* and *BHAR_24M*, which represent the 12-month and 24-month holding period excess returns following a share repurchase, respectively. We measure holding-period excess returns following share repurchase by subtracting the 12-month holding-period returns of control firms, selected on the basis of industry, size, and growth prospects, from the 12-month holding-period returns of a share repurchase firm. *Opportunism_D* is a dummy variable that takes the value of 1 if insiders are net buyers in two quarters prior to a share repurchase and net sellers in two quarters following a share repurchase, and 0 otherwise.

(Model 4)

$$\begin{aligned} BHAR_{12M} \text{ or } BHAR_{24M} = & \beta_0 + \beta_1 Opportunism D + \beta_2 SIZE \\ & + \beta_3 BM + \beta_4 LEV + \beta_5 CASH + \beta_6 ROA \\ & + \beta_7 Size of Repurchase + \beta_8 Market D \\ & + \Sigma YEAR_D + \varepsilon \end{aligned}$$

<Table 10> presents the regression estimation results based on Model 4. Panel A represents the results for the direct share repurchase group, while Panel B presents the results for the indirect share repurchase group. In Panel A, the estimated regression coefficients of *Opportunism D* are -0.149 ($t=-1.655$) and -0.271 ($t=-1.731$) for the *BHAR_12M* and *BHAR_24M* regression equations, respectively. These coefficients are negative and statistically significant at the 10% level. In contrast, from Panel B, we find that the estimated regression coefficients of *Opportunism D* are -0.007 ($t=-$

0.059) and -0.088 ($t=-0.500$) for the *BHAR_12M* and *BHAR_24M* regression equations, respectively, both of which are statistically insignificant. These findings imply that opportunistic share repurchase firms underperform compared with non-opportunistic share repurchase firms in the direct share repurchase group, while there is no difference in post-share repurchase stock performance between opportunistic and non-opportunistic share repurchase firms in the indirect share repurchase group. This result supports Hypothesis 5.

<Table 10> Relationship between Opportunistic Share Repurchase and Post-share-repurchase Long-term Stock Performance

This table shows the regression estimation results of the effect of opportunistic share repurchase on stock performance following share repurchase. Panel A shows the results for the direct share repurchase sample, while Panel B shows the results for the indirect share repurchase sample. The dependent variables for the regression equations are *BHAR_12M* and *BHAR_24M*, which represent the holding-period excess returns for the 12 months and 24 months following share repurchase disclosure, respectively. *Opportunism_D* is a dummy variable that takes the value of 1 when the insiders are net buyers in the two quarters prior to share repurchase and net sellers in the two quarters following share repurchase, and 0 otherwise. The other variables are defined in Appendix II. The numbers in the parentheses are the t-values. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | Panel A: Direct share repurchase sample | | Panel B: Indirect share repurchase sample | |
|---------------------------|---|---------------------|---|--------------------|
| | <i>Dependent Variables</i> | | <i>Dependent Variables</i> | |
| | <i>BHAR_12M</i> | <i>BHAR_24M</i> | <i>BHAR_12M</i> | <i>BHAR_24M</i> |
| <i>Intercept</i> | -0.183 (-0.580) | -0.947* (-1.740) | -0.106 (-0.280) | -0.267 (-0.452) |
| <i>Opportunism_D</i> | -0.149* (-1.655) | -0.271* (-1.731) | -0.007 (-0.059) | -0.088 (-0.500) |
| <i>SIZE</i> | -0.009 (-0.106) | 0.171 (1.185) | -0.007 (-0.062) | 0.012 (0.073) |
| <i>BM</i> | -0.061 (-0.899) | 0.036 (0.308) | 0.098 (1.292) | 0.076 (0.643) |
| <i>LEV</i> | 0.056 (1.224) | 0.068 (0.861) | 0.014 (0.259) | 0.074 (0.849) |
| <i>CASH</i> | 0.408 (1.143) | -0.206 (-0.334) | -0.021 (-0.069) | -0.093 (-0.193) |
| <i>ROA</i> | 1.242*** (2.728) | 0.646 (0.824) | 0.886* (1.904) | 1.541** (2.132) |
| <i>Size of Repurchase</i> | 3.090** (2.088) | 2.653 (1.040) | -0.486 (-0.245) | -0.571 (-0.185) |
| <i>Market</i> | 0.000 (0.572) | 0.000 (-1.255) | 0.000 (-0.695) | 0.000 (-0.253) |
| <i>R-square</i> | 0.089 | | 0.030 | |

The overall results of <Table 10> suggest that, based on the market confirmation bias, share repurchase is a signal of undervaluation, insiders engage in net buy trades at a lower price before share repurchases and net sell trades at a higher price after share repurchases. Thus, our results support the Fried's (2000, 2001, 2005) opportunistic share-repurchase hypothesis.

6. Conclusion

In this study, we examine opportunistic trades executed by insiders during the time period surrounding share repurchases, using share repurchases that occur in the Korean stock market, which facilitates two share repurchase methods. We summarize our evidence on opportunistic share repurchases based on Korean market data as follows. First, we find that, in the case of direct share repurchases, insider trades executed after share repurchase disclosure are net sell trades. Additionally, we compare the insider trades following disclosure based on the share repurchase method utilized and find that a greater number of insider net sell trades are executed after share repurchase disclosure when the direct method, rather than the indirect method, is adopted. This result suggests that opportunistic sell trades by insiders are more likely to occur in direct share repurchases, which investors may perceive as a stronger signal of firm undervaluation.

Second, we investigate the difference in the timing of insider sell trades to distinguish whether the abnormal insider net sell trades following share repurchase disclosure under the direct share repurchase method are motivated by liquidity or the private information held by insiders. In the case of direct share repurchases, we find that insider net selling increases sharply when the gains obtained from insider net sell trades are likely the highest (after completion of the share repurchase period and immediately after the lock-up period) rather than when the liquidity is highest (during the share repurchase period). This result suggests that insider net sell trades following share repurchase disclosure are based on the private information held by insiders rather than liquidity.

Third, we investigate the trading pattern of insiders by examining whether they buy immediately before share repurchase disclosure and sell when the share price is the highest after the completion of a share repurchase. Under the direct share repurchase method, we observe a negative relationship between the insider net sell ratio immediately before share repurchase disclosure and immediately after the completion of share repurchase. This negative relationship is more pronounced in firms in which insiders hold a low ownership concentration. This result suggests that firms

that are more exposed to agency problems are more likely to experience insider opportunism that takes advantage of share repurchases.

Lastly, we analyzed the long-term stock performance of opportunistic share repurchase firms, which we defined as firms in which insiders are net buyers in the two quarters prior to a share repurchase and net sellers in the two quarters following a share repurchase. These findings show that, in the direct share repurchase sample, opportunistic share repurchase firms underperform compared with non-opportunistic share repurchase firms as measured by the 12-month and 24-month holding-period excess returns. In contrast, we do not find any statistically significant difference between the two groups for the indirect share repurchase sample. Our findings suggest managerial opportunism can be a motivation for share repurchase if insiders link buy trades before share repurchases with sell trades after share repurchase.

We expect that our study makes the following contributions. First, it produces evidence in support of Fried's (2000, 2001, 2005) opportunistic share repurchase hypothesis. In view of the fact that a majority of previous studies provide evidence that share repurchases are a managerial signal of undervaluation, market participants may develop a confirmation bias that share repurchases are a positive signal of undervaluation. Fried (2000, 2001, 2005) hypothesizes that, leaning on this confirmation bias and using share repurchase disclosure to inflate share price, opportunistic insiders may buy their own firm shares at a lower price before a share repurchase and sell these shares back at a higher price after a share repurchase. Furthermore, we provide evidence in support of opportunistic share repurchases in the Korean stock market by documenting that share repurchase firms in which insiders engage in abnormally high net buy trades before share repurchases show abnormally high net sell trades by insiders following share repurchases. This finding contributes to literature that investigates markets, such as the Korean stock market, where unsophisticated investors constitute a large segment of the market participants, who are exposed to informed trades and take advantage of their confirmation bias.

Second, adopting the methodology used to investigate abnormal earnings management surrounding financial events, such as initial public offerings, secondary equity offerings, mergers, and share repurchases, in this study, we measure abnormal insider trading activities for an extended period of time extending from seven quarters before share repurchase to the seven quarters following share repurchase. In particular, we identify the opportunistic trades executed by insiders by examining the link between insider net buy trades before share repurchases and insider net sell trades after share repurchases. Unlike previous studies that focus on measuring the stock returns following share repurchase disclosure, our study looks at connections in the

time series to identify abnormal trading activities by insiders. We expect that this long-window methodology will complement the prevailing event-based methodology.

Finally, our study shows that opportunistic share repurchases are more likely in firms with low ownership concentration and those that choose the direct share repurchase method. This finding highlights the possibility that firms that are vulnerable to agency problems may choose a share repurchase method that is perceived by the market as a strong positive signal of undervaluation in an attempt to facilitate informed trading activities by insiders. We expect that this study can assist market regulators to be alert to yet another mechanism of unfair market practices.

The limitations of our study are as follows. First, we remove from the sample share repurchases of firms that disclosed share repurchases twice or more in the two-year time period before and after the share repurchase disclosure. This sampling approach, while enhancing the measurement accuracy, reduces the sample size, thereby undermining the generalizability of our study. Second, we study the relationship between insider net sell ratios before and after share repurchase disclosure to investigate the possibility of opportunistic share repurchases. In particular, we look for abnormal insider net sell trades in (i) a temporal comparison over the 15 quarters that surround the time of share repurchase disclosure and (ii) a cross-sectional comparison based on the share repurchase method utilized. However, this approach loses information on the direction of trades making it difficult to pinpoint the exact effect of insider trading at the time of share repurchase disclosure. Third, considering the prevalence of dominant shareholder-managers in Korea, we define insiders as the largest shareholder and related parties of the largest shareholder and measure insider net sell trades using their shareholdings disclosed in quarterly financial statements. While we employ temporal and cross-sectional comparisons to measure abnormal insider trading activities based on insider shareholdings, there remains scope for measurement errors to the extent that the largest shareholder and related parties of the largest shareholder do not necessarily have access to the firm's internal information. Finally, we examine temporal differences and relationships in insider trading activities to test the opportunistic share-repurchase hypothesis. However, the effectiveness of the temporal comparison approach depends critically on controlling the cross-sectional differences. Therefore, we cannot rule out the possibility of misspecification errors due to residual cross-sectional differences.

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Share Repurchases and Insider Trading Behavior

<Appendix I> Pearson correlation coefficients

Appendix I presents the Pearson correlation coefficients of the variables used in Model 4. The upper triangle of Appendix I represents the indirect share repurchase firms, while the lower triangle represents the direct share repurchase firms. The numbers in round brackets are the p-values. The numbers in bold are statistically significant at the 10% significance level.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|-------------------------------|--------------------------|-------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| (1) Net Sell Ratio (Q1, Q2) | | 0.001 (0.991) | 0.049 (0.391) | -0.134 (0.019) | 0.049 (0.396) | -0.015 (0.789) | 0.023 (0.687) | -0.034 (0.560) | 0.030 (0.596) | 0.067 (0.238) |
| (2) Net Sell Ratio (Q-2, Q-1) | -0.120 (0.038) | | -0.052 (0.366) | -0.009 (0.880) | -0.004 (0.938) | 0.049 (0.387) | -0.039 (0.495) | -0.087 (0.131) | -0.072 (0.205) | 0.003 (0.958) |
| (3) Abnormal Return | 0.079 (0.172) | -0.021 (0.719) | | -0.213 (0.000) | 0.323 (0.000) | 0.170 (0.003) | -0.114 (0.046) | 0.075 (0.195) | 0.112 (0.049) | 0.034 (0.550) |
| (4) SIZE | -0.070 (0.229) | 0.040 (0.492) | -0.158 (0.006) | | -0.348 (0.000) | -0.147 (0.010) | -0.025 (0.659) | 0.186 (0.001) | -0.421 (0.000) | -0.432 (0.000) |
| (5) BM | 0.083 (0.151) | -0.018 (0.760) | 0.243 (0.000) | -0.407 (0.000) | | 0.607 (0.000) | -0.221 (0.000) | -0.146 (0.011) | 0.307 (0.000) | -0.299 (0.000) |
| (6) LEV | 0.061 (0.294) | 0.005 (0.936) | 0.193 (0.001) | -0.286 (0.000) | 0.633 (0.000) | | -0.223 (0.000) | -0.099 (0.086) | 0.110 (0.053) | -0.235 (0.000) |
| (7) CASH | 0.071 (0.220) | 0.065 (0.259) | 0.023 (0.686) | -0.096 (0.096) | -0.154 (0.008) | -0.203 (0.000) | | 0.137 (0.017) | 0.054 (0.346) | 0.155 (0.006) |
| (8) ROA | -0.073 (0.217) | -0.080 (0.172) | 0.082 (0.165) | 0.156 (0.008) | -0.166 (0.004) | -0.179 (0.002) | -0.002 (0.972) | | -0.074 (0.203) | 0.017 (0.772) |
| (9) Size of Repurchase | 0.104 (0.073) | 0.015 (0.802) | 0.128 (0.026) | -0.307 (0.000) | 0.329 (0.000) | 0.355 (0.000) | 0.032 (0.586) | -0.047 (0.421) | | 0.068 (0.236) |
| (10) Market D | 0.053 (0.361) | -0.026 (0.651) | -0.046 (0.429) | -0.472 (0.000) | -0.204 (0.000) | -0.181 (0.002) | 0.219 (0.000) | -0.035 (0.546) | -0.047 (0.417) | |

<Appendix II> Explanation of the Variables

| | |
|---|---|
| Net Sell Ratio (Q _{t1} , Q _{t2}) | Sum of insider net trades in each quarter between quarter t1 and quarter t2 divided by shares outstanding. If the ratio is positive, insiders engage in net sell trades; if it is negative, they engage in net buy trades. |
| Net Sell Ratio (Q _t) | Insider net trades in quarter t; this is estimated as the firm shares held by insiders at the end of quarter t-1 minus the firm shares held by insiders at the end of quarter t, which is then divided by the total number of shares outstanding at the end of quarter t-1. If the ratio is positive, insiders engage in net sell trades; if it is negative, they engage in net buy trades. |
| Prior Net Buy_D (Q _{t1} , Q _{t2}) | Indicator variable that takes the value of 1 if insiders engage in net buy trades between quarter t1 and quarter t2 before share repurchase disclosure and 0 otherwise |
| Following Net Sell_D (Q _{t1} , Q _{t2}) | Indicator variable that takes the value of 1 if insiders engage in net sell trades between quarter t1 and quarter t2 after share repurchase disclosure and 0 otherwise |

| | |
|--------------------|--|
| Method_D | Indicator variable that takes the value of 1 if the direct share repurchase method is used and 0 otherwise |
| Abnormal Return | Holding-period abnormal returns calculated as own stock returns minus returns on the market index in the 24 months after share repurchase disclosure |
| SIZE | Log of the market value of a firm's equity measured in one billion Korean won |
| BM | Ratio of the book value of equity to the market value of equity |
| LEV | Ratio of debt to equity |
| CASH | Ratio of cash and cash equivalents to cash-adjusted assets (total assets minus cash and cash equivalents) |
| ROA | Earnings divided by the total assets at the beginning of the year of share repurchase disclosure |
| Size of Repurchase | Value of the announced number of shares to be repurchased divided by the market value of equity |
| Market_D | Market dummy, which takes the value of 1 if the share repurchase firm is listed on the KOSDAQ market and 0 if it is listed on the KOSPI market |
| Insider Ownership | Equity ownership of the largest shareholder and related parties, measured at the end of the third quarter before share repurchase disclosure |
| Opportunism_D | Indicator variable that takes the value of 1 if the insiders are net buyers in the two quarters prior to share repurchase and net sellers in the two quarters following share repurchase, and 0 otherwise |
| BHAR_12M | Holding-period excess returns for the 12 months following share repurchase disclosure, calculated by subtracting the 12-month holding-period returns of control firms, selected based on their industry, size, and growth prospects, from the 12-month holding period returns of a share repurchase firm |
| BHAR_24M | Holding-period excess returns for the 24 months following share repurchase disclosure, calculated by subtracting the 24-month holding-period returns of control firms, selected based on their industry, size, and growth prospects, from the 24-month holding period returns of a share repurchase firm |
| YEAR_D | Year dummies to control for the year fixed effects |