

# Free Lunches for Insiders under Investor Inertia and Limited Arbitrage

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## Abstract

This paper examines how investor inertia and limited arbitrage might interact to benefit the controlling families of business groups in a way that is distinct from conventional tunneling or expropriation. Based on a sample of new parent-subsidiary relationships created through spin-offs followed by stock-for-stock tender offers in Korean business groups, we find that family insiders actively tender their shares of the operating subsidiary in exchange for the new shares issued by the parent while outside investors remain passive, even though the new parent shares are likely to have been offered at a bargain. Controlling families experience a wealth gain of 30% or roughly USD 38 million on average relative to the pre-split value, a third of which consists of *voluntary* wealth transfers by inertial investors. We also find that pricing deviations relative to those implied in the tender offer exchange ratio is not arbitrated away in 2/3 of our sample transactions, which speeds up wealth recoveries for the controlling families. Our results suggest that insiders may actively exploit behavioral aspects of the stock market to maximize their personal benefits.

*JEL Classifications:* D03, G34

*Keywords:* Inertia, Limits of Arbitrage, Holding Companies, Spin-Offs, Tender Offers, Mispricing, Short Sale, Korea

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## **Abstract**

This paper examines how investor inertia and limited arbitrage might interact to benefit the controlling families of business groups in a way that is distinct from conventional tunneling or expropriation. Based on a sample of new parent-subsidiary relationships created through spin-offs followed by stock-for-stock tender offers in Korean business groups, we find that family insiders actively tender their shares of the operating subsidiary in exchange for the new shares issued by the parent while outside investors remain passive, even though the new parent shares are likely to have been offered at a bargain. Controlling families experience a wealth gain of 30% or roughly USD 38 million on average relative to the pre-split value, a third of which consists of *voluntary* wealth transfers by inertial investors. We also find that pricing deviations relative to those implied in the tender offer exchange ratio is not arbitrated away in 2/3 of our sample transactions, which speeds up wealth recoveries for the controlling families. Our results suggest that insiders may actively exploit behavioral aspects of the stock market to maximize their personal benefits.

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## 1. Introduction

Recent development in behavioral finance suggests that investors' psychological biases may influence not only the cross-section of security returns but also certain corporate financial policies. Specifically, researchers have noted that a specific form of investor behavior, namely *inertia* or tendency to stick with the default option, may have a significant influence on managerial decisions. For example, Baker, Coval, and Stein (2007) show that because investors are reluctant to resell stocks they receive in an acquisition, i.e. exhibit inertia, stock-for-stock merger can be cheaper than issuing new shares in an SEO and use the proceeds to buy the target shares.<sup>1</sup> This suggests that managers may actively take into account investors' potential behavioral biases when making financial decisions.

In this paper, we propose an additional implication of investor inertia. If managers own significant portion of the company's shares, such financial decisions may not only affect outcomes at the *corporate* level, but also their *personal* benefits. More specifically, we examine how such investor inertia may provide 'free lunches' for controlling families of business groups, a typical corporate structure often found outside U.S. Our perspective is quite distinct from the recent literature in international corporate governance that emphasizes the possibility of *tunneling* or expropriation of minority shareholders in countries where investor protection is weak. Rather, investors in our study may *voluntarily* give up some of their wealth due to inertia rather than be expropriated *involuntarily* through tunneling. In this context, our inertial investors are quite similar to shareholders who forfeit their rights to subscribe to new shares in a rights offering, even though the new issues are being offered at a deep discount.<sup>2</sup>

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<sup>1</sup> According to Baker, Coval, and Stein (2007), inertial behavior can arise from endowment effects, a tendency to procrastinate in decision making, and the cognitive fixed costs associated with reevaluating and re-optimizing an existing portfolio.

<sup>2</sup> Brealey and Myers (2000) introduce a rights offering case by American Electric Power Company in 1977 where 10% of the existing shareholders forfeited their rights to subscribe even though the new shares were being

We focus on a sample of business groups in Korea that went through a series of transactions that involve a spin-off followed by a stock-for-stock tender offer which ultimately results in a parent-subsidary relationship between the two spun-off firms. Such group-level reorganization became popular following recent regulatory changes that facilitated business groups to switch from a complex inter-corporate circular shareholding or “loop” structure into a less pyramidal and more horizontal structure that involves a pure holding company at the apex.<sup>3</sup>

Holding companies are those firms whose sole function is to hold stocks in other companies. Although such structure is mostly pronounced in banking and utilities in U.S., mostly to circumvent restrictions on the scope and location of business operations, other manufacturing firms often reorganize themselves into a holding company structure to isolate risk within a business segment or to take advantage of new growth opportunities through acquisitions. At any rate, holding company structure is generally considered to provide more formal independence among subsidiaries. In U.S., holding companies typically own 100% of subsidiaries’ equities.<sup>4</sup> Such structure is often established by creating a wholly-owned subsidiary and transferring business-related operating assets to the new subsidiary.<sup>5</sup> Shareholders receive stocks of the holding company in proportion to their existing ownership, and only the holding company remains to be publicly traded.

Similar holding company structure also exists in Korea. Since 1997 Asian Crisis, holding companies were perceived by the Korean government as a more transparent structure with potentially little deviation between cash flow rights and control rights held by the

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offered at a 10% discount relative to the prevailing market price. They refer to these investors as *incognoscenti* or vacationers (p. 426).

<sup>3</sup> Kim, Kim, and Park (2012) provide a detailed account of the regulatory changes and holding companies in general in Korea.

<sup>4</sup> U.S. tax laws require at least 80% or more of stock ownership to be provided with tax-free dividends.

<sup>5</sup> It is often the case that the original firm A sets up wholly owned subsidiary B which in turn sets up a second tier wholly owned subsidiary C, after which C merges with A. The main reason for using this cumbersome procedure seems to be related with the avoidance of a shareholder approval of such organizational change. See, for example, Section 251(g) of the General Corporation Law of the State of Delaware.

controlling shareholders, which in turn were expected to reduce overall information asymmetry and agency problems in business groups. A major difference between subsidiaries under holding companies in Korea and those in U.S. is that Korean subsidiaries are typically owned by much less than 100%, and are often themselves publicly traded.<sup>6</sup>

The most straight forward way to establish a holding company is to create a 100% subsidiary or do a carve-out where a part of subsidiary shares are sold to the public, which is generally the case in U.S. However, since Korean business groups typically have dominant controlling families, they rarely favor this approach since it results in the same proportional ownership - or even less in the case of a carve out - in the holding company, which may leave them vulnerable to a potential (hostile) takeover. Instead, holding companies are commonly created through a sequential process of a spin-off followed by a stock-for-stock tender offer by the (to be) holding company for the (to be) subsidiary's shares. Figure 1 provides a detailed time line of the events related with the two transactions.

The initial spin-off gives the existing shareholders new shares of the two new firms in proportion to their original ownership after which both stocks are publicly traded. Thus, there is no equity relationship between the two spun-off firms initially.<sup>7</sup> For the holding company to obtain shares in the subsidiary, it implements a tender offer for subsidiary's shares where the payment would be made through new shares issued by the holding company based on a fixed exchange ratio to be determined at a later date according to a regulatory formula based on prevailing prices. Even though the tender offer occurs at a much later date, investors generally expect that the two spun-off firms will eventually establish a parent-subsidary relationship because the new (to be) parent company almost always bears the expression

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<sup>6</sup> Korean regulations require holding companies to hold at least 20% of subsidiaries that are publicly traded. For private subsidiaries, the required holding threshold increases to 40%.

<sup>7</sup> Immediately after the spin-off, the two companies do not have any equity relationship, so technically we cannot refer to them as holding companies and subsidiaries, yet, which is the reason we have inserted '(to be)'. In what follows, we omit '(to be)' if the meaning is clear.

'holdings' in its name at spin-off disclosures.

Since the incentive of the controlling families is to increase their direct ownership in the holding company, it is in their interest to receive as many new holding company shares as possible for a given number of subsidiary shares tendered. This implies that the lower the holding company's stock price relative to the subsidiary's price prior to the fixing of the exchange ratio, the family would end up with more new holding company shares once they tender their subsidiary shares.

Once the tender offer exchange ratio is fixed, however, the families' interest with respect to the price deviation between holding company and the subsidiary is reversed. Since the families now directly own holding company shares but only indirectly own subsidiary shares, they no longer would prefer a low price for the holding companies. Instead, it would be in their interest for the holding company price to recover as much as possible. Recognizing such incentives of the controlling families during this process, analyst reports actually recommend buying subsidiary shares up until the exchange ratio fix date, and then switching to holding company shares once the exchange ratio is fixed.<sup>8</sup>

If all shareholders of the subsidiary recognize that the tender offer exchange ratio is indeed a bargain and tender their shares for new holding company shares, then controlling families' proportional ownership in the holding company would not increase, and there would not be any wealth transfer from outside investors to controlling families. However, if some investors exhibit inertial behavior and do not tender their subsidiary shares, then controlling families are able to increase their direct ownership in the holding company as well as transfer some of the wealth from the inertial investors to themselves.

Since there are two publicly traded firms following a spin-off, and the shares of the

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<sup>8</sup> For example, see 2012 Second Half Outlook Report from KDB Daewoo Securities, by analyst Jung, Daero (2012.6.27, in Korean). He explicitly refers to this investment strategy as the one that 'shares the interests of the controlling shareholders'.

two firms can be exchanged at a later date based on a fixed exchange ratio, our sample closely resembles Lamont and Thaler (2003)'s sample of carve-outs followed by spin-offs. That is, market price differential between the two firms could allow for a riskless arbitrage opportunity when the market price of the holding company relative to the subsidiary is higher than those implied in the fixed exchange ratio.<sup>9</sup> If no arbitrage condition strictly holds, then the market prices of the two stocks should not deviate from the fixed exchange ratio at least until the end of the tender offer period. That is, holding company stock price cannot recover by more than those implied in the fixed exchange ratio. However, if arbitrage is limited for any reason, then holding company stock may recover relatively quickly providing controlling families with a faster wealth gain.

Using a sample of 21 business group-level transactions in Korea that consists of spin-offs followed by stock-for-stock tender offers that ultimately results in a parent-subsidiary relationship between the two spun-off firms, we find the following empirical patterns. First, stock prices of the (to be) holding companies continue to drop while those of the (to be) subsidiaries continue to rise between the spin-off and the tender offer. For example, mean geometric daily return between spin-off and tender offer announcement is -1.52% for holding companies and 1.13% for subsidiaries, the difference of which is statistically significant at 1%. Mean holding period returns for the same period is -35.38% for holding companies and 161.29% for subsidiaries, which are both economically substantial.<sup>10</sup> Moreover, the deviation between the two prices continues to widen as we near the exchange ratio fix date. As a partial explanation for the deviation between the two prices, we did a comprehensive

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<sup>9</sup> Our situation is also similar to a conventional merger arbitrage, where acquirer stocks are shorted and target stocks are purchased. However, merger arbitrage is considered as a type of risk arbitrage where the risk is the probability that the deal may not go through, and the arbitrage profit is compensation for taking this risk. On the other hand, our case as well as Lamont and Thaler (2003)'s constitute a pure riskless arbitrage opportunity since it does not involve any bargaining between two independent parties.

<sup>10</sup> The actual number of calendar days between each spin-off and corresponding tender offer are all different by construction, which is one reason it is difficult to present this pattern in a figure over event time. The mean number of days across the 21 cases is 120 days as depicted in figure 1.

news search for both holding companies and subsidiaries and find that the number of good news for the subsidiaries is more than twice as many as those for the holding companies between the spin-off and tender offer announcement. These findings are consistent with the controlling families' incentive to acquire as many holding company shares as possible through the tender offer.

Second, controlling families tender almost all of their shares held in the subsidiary in exchange for the new shares issued by the holding company, while outside minority investors mostly remain passive and do not tender their shares, even though the new shares are likely to have been offered at a bargain considering the controlling shareholder's incentives. This inertial behavior of the outside investors allows the controlling families to almost double their direct proportional ownership in the holding company.

Third, controlling families realize a wealth gain of 30% on average relative to the pre-split value of their holdings. Roughly a third of this gain occurs between spin-off announcement and re-listing of the two stocks, which can broadly be attributed to pure spin-off effect. Another third of this gain occurs between re-listing up to the exchange ratio fix date, which reflects the price increase of subsidiaries which more than offsets price decrease of holding companies. Up until this point, however, both controlling shareholders and minority shareholders enjoy the same proportional gain as long as they hold on to both subsidiary and holding company shares. But from this date on, controlling families switch to holding companies while minorities do not. This accounts for the remaining third of the gain for the controlling shareholders, which reflects wealth transfers from the inertial outside investors.

Finally, we find that in 13 out of our 21 sample transactions, there is a pure arbitrage opportunity where the market price of the holding company relative to the subsidiary remains higher than those implied in the fixed exchange ratio of the tender offer. These arbitrage



opportunities do not disappear during the subscription period, providing the investors with a chance to reap riskless profits by shorting holding company shares. Such arbitrage opportunity implies that the value of holding company quickly recovers once the exchange ratio is fixed providing the controlling shareholders a fast wealth gain.

Overall, these findings suggest that there may be channels other than explicit tunneling or expropriation of minority shareholders that could provide personal benefits to the controlling party. If investors exhibit inertial behavior, insiders may actively take advantage of this situation and optimally create ‘free lunches’ for themselves.

The remainder of the paper is organized as follows. The next section describes our data sources and sample construction process. Section 3 examines the stock price patterns of the two spun-off firms from its re-listing date until the end of the tender offer process. Section 4 explores the tendering decisions of the controlling families and minority shareholders and consequent changes in wealth. Section 5 provides evidence of violation of law of one price during the tender offer period. Section 6 provides a brief conclusion.

## **2. Data and Sample**

We obtain our spin-off sample manually from Korea Investor’s Network for Disclosure System (KIND), which is an electronic disclosure platform similar to EDGAR in U.S. operated by the Korea Exchange (KRX). Initially, there are a total of 322 spin-offs that took place between 2000 and 2010. Among them, 37 cases are directly related with creating a holding company. Out of 37 cases, we exclude the following; those where the (to be) holding company does not announce a stock-for-stock tender offer for the (to be) subsidiary’s shares after the spin-off, private offers to selected parties, and spin-offs in the KOSDAQ market.<sup>11</sup> Our final sample consists of 21 spin-offs followed by stock-for-stock tender offers for the (to

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<sup>11</sup> There are only 3 cases where the operating subsidiary is publicly traded in the KOSDAQ market.

be) subsidiary's shares in exchange for new shares of the (to be) parent holding company. Appendix A provides a detailed list of all our sample firms and exact calendar dates of relevant events.

We obtain stock price information, market capitalization and other financial variables from Fn Data Guide. Detailed information on spin-offs, stock-for-stock tender offer announcement dates, number of tendered shares and subscription results are manually obtained from disclosures available through KIND. KIND provides the time stamp of each announcement or disclosure, which allows us to identify the exact event dates for both spin-offs and tender offers<sup>12</sup>. We obtain short-selling information from a proprietary data set provided by KRX. The main advantage of this data set is that we could distinguish investors by three types, domestic individual investors, domestic institutional investors and foreign investors. We also implement a comprehensive manual web search to identify various types of news reported for the two spun-off firms, which are classified into good, neutral and bad based on textual analysis of the content. If multiple media sources report news about a firm, but the main factual information is the same among them, then we treat this as a single piece of news.

Table 1 presents the mean and median characteristics of sample firms both before and after the spin-off. Panel A reports the numbers for the pre-spin-off stage while panel B reports those after the spin-off is complete. In panel B, 'H' denotes spun-off firms that are planned to become the parent holding company at a later date while 'S' denotes spun-off firms that are planned to become the subsidiary of this holding company. In the third and 6<sup>th</sup> column of panel B, we report the numbers for the hypothetical combined entity by aggregating

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<sup>12</sup> If the spin-off or tender offer is announced before or during the trading hour, that day is assigned as the event date. But if the firm makes the announcement after the trading hour, then the next trading day is assigned as the event date.

characteristics of both ‘H’ and ‘S’.<sup>13</sup>

The results indicate that average total assets before and after the spin-offs are largely similar, reflecting that spin-offs simply divide existing book assets and reallocate them into two firms. We also note that ‘S’ firms are typically reallocated with more assets and book equity. However, the proportion of total assets reallocated to ‘S’ is greater than those of book equity on average, which results in higher book leverage for ‘S’ firms.

An interesting result is that market capitalization of ‘S’ relative to those of ‘H’ is much larger than those implied by the differences in book equity. For example, market cap of ‘S’ relative to ‘H’ is almost 2.5 times, while those implied by differences in book equity is roughly 1.5 times. This result implies that market participants expect more growth opportunities to be embedded in ‘S’ rather than ‘H’, reflecting the fact that most operations and business activities are reallocated to ‘S’. There also seems to be noticeable increase in combined market value following the spin-offs, which could potentially reflect alleviation of diversification discount as argued by proponents of spin-offs, but the difference in average market cap before and after the spin-off is not statistically significant.

### **3. Stock Price Patterns of Spun-Off Firms**

In this section, we examine the stock price patterns of our sample firms throughout the spin-off and subsequent tender offer procedure. Prior to the spin-off, we only observe one stock price per each of our sample observation. Once the spin-off is complete and the two spun-off firms are relisted, we observe two stock prices, one for the (to be) parent holding company, and the other for the (to be) subsidiary.<sup>14</sup>

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<sup>13</sup> In some cases, ‘H’ already has shares in ‘S’ immediately following the spin-offs. This is because treasury shares held prior to the spin-off are treated as assets rather than offsetting account for equities. Such practice is highly controversial among local civil organizations and regulators. In calculating combined market capitalization, we make sure to subtract off the value of ‘S’ shares held by ‘H’, if any, to avoid double counting.

<sup>14</sup> As outlined in figure 1, it takes 86 days on average from spin-off announcement to a trading halt to prepare

Since there is a period of no-trade around the actual spin-off, 31 days on average, Korea Exchange provides reference prices for the two newly listed shares on the re-listing date before trading starts. Without any distortions, the reference prices for both firms should mechanically reflect the pre-split last closing price. However, since the denominator for the reference price, the number of shares allocated to each firm respectively, is based on relative book equity as of the spin-off *announcement*, while the numerator, value of pre-split market cap distributed to each firm respectively, is based on relative book equity as of the *actual* spin-off date, the reference prices for the two firms could deviate from the pre-split closing price.<sup>15</sup> The opening price is set between 90% to 200% of the reference price based on orders submitted during the 60 minutes of call auction market immediately prior to the market opening. This opening price is likely to reflect the investors' expectations about the growth opportunities of the two spun-off firms.

Once the two stocks are re-listed, they continue to trade separately with a daily price limit of  $\pm 15\%$  of the opening price, which is a general rule that applies to all stocks listed in KRX. Roughly 4 months later, (to be) holding company announces a stock-for-stock tender offer for (to be) subsidiary shares to establish a parent-subsidiary equity relationship between the two firms.<sup>16</sup> Soon after the tender offer announcement, the exchange ratio between subsidiary shares to be tendered and new shares to be issued by the parent is determined. Based on this fixed exchange ratio, subsidiary's shareholders, including the controlling families, decide whether to tender and subscribe. Once the subscription period ends, new shares are issued shortly after which trade with the existing holding company shares on the

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for the spin-off. It takes another 4 days to actually implement the spin-off so that the original company becomes two separate legal entities. It takes another 27 days for the two separate companies to re-list on the stock exchange and start trading again.

<sup>15</sup> Sometimes, the value of treasury shares are added to the (to be) holding company in distributing market cap across the two firms, which further adds to the deviation from the pre-split price.

<sup>16</sup> The regulatory minimum holdings required for a publicly traded subsidiary is 20%, as noted in footnote 6. Thus, the parent must acquire at least 20% of the subsidiary shares through the stock-for-stock tender offer.

exchange.

Table 2 presents the stock price patterns of the two firms around three specific events. Panel A, B, and C report those around a spin-off announcement, re-listing of the two spun-off firms, and tender-offer announcements, respectively. The results from panel A of table 2 indicate that spin-off decision itself does not generate much significant reactions, even though investors are aware that spin-offs are the 1<sup>st</sup> stage procedure of establishing a pure holding company. For example, both mean and median three day CARs around the spin-off announcements are not statistically significant.

However, once the two firms re-list after the completion of the spin-off as reported in panel B of table 2, cumulative abnormal returns for ‘H’ firms is significantly negative the magnitude of which is substantial. For example, a two day CAR for ‘H’ firms is as low as -16% on average. Part of this large negative reaction could potentially reflect delayed market reactions since the opening prices of both ‘H’ and ‘S’ as well as their daily changes in prices are restricted within a certain regulatory boundary when they re-list after the spin-off completion as mentioned before. Since the controlling families can obtain more ‘H’ shares through stock-for-stock tender offers the lower the ‘H’s price relative to ‘S’, the negative returns for ‘H’ is consistent with the controlling family’s incentives to secure more ‘H’ shares for a given number of ‘S’ shares tendered.

Panel C of table 2 presents cumulative abnormal returns around the subsequent stock-for-stock tender offer announcement by ‘H’ for ‘S’s stock. The results indicate that ‘H’ shares continue to exhibit significantly negative abnormal returns upon the announcement of the tender offer, which is again consistent with the controlling family’s incentive to acquire as much ‘H’ shares as possible through the tender offer. It is somewhat surprising that the market reaction is quite strong over the three trading days, since this tender offer should have been expected at least to some extent once the spin-off is complete. We do not observe any

significant leakages or reversals following the tender offer announcement as can be seen from  $CAR(-5,-1)$  and  $CAR(0,+5)$ .

The above analyses suggest that ‘H’ shares experience a price drop around the re-listing of the two stocks and also around the announcement of a subsequent stock-for-stock tender offer for ‘S’ shares. However, since the analysis is centered *around* a specific event, it doesn’t provide information on stock price patterns *between* two different events. Table 3 specifically addresses this by providing buy-and-hold returns between various dates from re-listing to the completion of the tender offer. We convert holding period returns into geometric average daily returns since the lengths of calendar time between any two event dates are different for each observation in our sample.

The results from the first line of table 3 indicate that ‘H’ shares experience an average daily return of -1.52% while ‘S’ shares exhibit 1.13% from re-listing date to the tender offer announcement (120 days on average), the difference of which is statistically significant. This result suggests that ever since the re-listing, ‘H’ prices continue to drop while ‘S’ prices continue to rise. Once we drop the first day return on the re-listing date from the analysis as reported in the second row, the magnitude of the drop and the rise is reduced, but the pattern and the statistical significance still holds. We also observe a 6.72% (2.96%) return for the holding company (subsidiary) from the exchange ratio fix date to new share issue date, but the difference is not statistically significant.

Figure 2 presents a graphical representation of this result. In this figure, we plot the cumulative returns of both ‘H’ and ‘S’ starting from the re-listing date. We observe that ‘H’ exhibits a cumulative return of around -50% during the 60 trading days while ‘S’ exhibits between 20 to 30% return during the same period. The reported pattern for ‘S’ reveals that price increase occurs rather gradually so that they were not captured in the event study analysis in table 2. These results are again consistent with the controlling families’ incentive

to acquire as much ‘H’ shares as possible by tendering a given number of ‘S’ shares through the subsequent tender offer.

#### **4. Tendering Decisions and Wealth Changes**

In this section, we examine how controlling families and outside investors tender their holdings of the subsidiary shares in exchange for the new shares issued by the parent holding company, and in turn how such decisions ultimately affect the value of their holdings in the two firms. Table 4 provides summary statistics of the stock-for-stock tender offer by ‘H’ for shares of ‘S’. The mean and median number of ‘S’ shares sought by ‘H’ amounts up to roughly 30% of the total shares outstanding. This partly reflects ‘H’s effort to satisfy the regulatory requirement that the holding company must hold at least 20% (40%) stake in public (private) subsidiaries. Still, the percentage ownership sought is much less than 100%, potentially reflecting the controlling families’ intention to maintain a certain level of cash flow-control disparity. If the number of tendered shares exceeds the number of sought shares, then the new shares would be allocated on a pro rata basis.<sup>17</sup>

The second line reports the distribution of fixed exchange ratios which is the number of new ‘H’ shares that would be issued in exchange for one old share of ‘S’ tendered. The mean (median) exchange ratio is 2.5 (2.1), indicating that per share price of ‘S’ is more than twice as large as ‘H’ when the exchange ratio is determined. This is precisely due to the fact that ‘H’ price has continuously decreased since the completion of the spin-off as documented in the previous section.

In figure 3, we examine how prices of ‘H’ and ‘S’ change around the date when the exchange rate in the tender offer is fixed. Specifically, we report the cumulative returns of both ‘H’ and ‘S’, 28 trading days both before and after the exchange ratio fix date. The results

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<sup>17</sup> There are only two cases in our sample where the actual subscription exceeds the number of sought shares.

indicate that the prices of the two firms continue to diverge up until the exchange ratio is fixed. Once the exchange ratio is fixed, however, the divergence stops getting wider.

Figure 4 presents supplementary evidence. In panel A, we simulate hypothetical fixed exchange ratios as if the exchange ratio was fixed one day (two, three and so on) prior to the actual fix date. That is, we move the board decision date to launch a tender offer one day at a time and recalculate the fixed exchange ratio for each day. The reference price for the subsidiary (i.e. numerator used to calculate the fixed exchange ratio) and for the holding company (i.e. denominator used to calculate the fixed exchange ratio) is based on a pre-determined regulatory formula.<sup>18</sup> In panel B, we report the average prices of both the holding company and the subsidiary normalized to 100 as of the exchange ratio fix date.

The results from panel A of figure 4 indicate the simulated fixed exchange ratio exhibits an increasing trend leading up to the exchange ratio fix date. Once the exchange ratio is fixed, however, both 'H' and 'S' stock prices increase as reported in panel B of figure 4, but more so for 'H' stocks. These results imply that either controlling shareholders are able to time the market so that they passively chose the date when the exchange ratio is maximized or they may try to influence relative prices of the two stocks to actively maximize the exchange ratio.

If the controlling families could indeed somehow influence the relative prices of the two firms so that they would temporarily diverge from the fundamental values, they could achieve a wealth gain by actively tendering their shares, on condition that at least some

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<sup>18</sup> Specifically, reference price for both the subsidiary and the holding company is based on the following three prices; (1) volume weighted average closing price for the past one month, (2) volume weighted average closing price for the past one week (3) the most recent closing price. For the subsidiary, the reference price is the arithmetic average of the three prices as of the day before the board's decision to launch the tender offer. If this is higher than the most recent closing price, then the latter becomes the reference price. The reference price for the holding company is the highest price among the three prices as of the 5<sup>th</sup> trading day before the subscription starts which is indeterminate as of the tender offer decision. Issuing firms may apply additional discount or premium to the holding company's reference price. Since 2010, holding company reference price is determined as the volume weighted average closing price between 3<sup>rd</sup> and 5<sup>th</sup> day before the subscription starts, without any discounts or premiums. If this is lower than the par value, then par value becomes the reference price.



outsiders do not tender. The intuition is that the tender offer could be a bargain if ‘H’s price relative to ‘S’ implied in the fixed exchange ratio is lower, at least temporarily, than those implied by the fundamental values. This is similar to a rights offering where the new shares are offered at a deep discount. If all existing shareholders subscribe to new shares offered at a discount, there is no wealth transfer among shareholders. Although per share price may drop, overall value of each shareholder is not affected based on simple Miller and Modigliani argument. However, if some shareholders do not subscribe to the new shares offered at a discount, their existing share value would decrease due to dilution. Since some new shares are forfeited, the dilution for the subscribing shareholders would not be as severe as in the full subscription case. As a result, a wealth transfer occurs from non-subscribing shareholders to subscribing shareholders. We formally state this intuition as follows;

Proposition 1: Let  $k$  be the minority subscription ratio and  $\Delta W$  be the changes in the controlling family’s wealth following the tendering decision. Suppose ‘H’s price is lower than those implied by the fundamentals when exchange ratio is fixed and that the controlling family fully subscribes.<sup>19</sup> Then,  $\frac{\partial \Delta W}{\partial k} < 0$ , where  $\Delta W|_{k=0} > 0$  and  $\Delta W|_{k=1} = 0$ .

In appendix B, we provide a formal proof of proposition 1. Proposition 1 states that if ‘H’ and ‘S’ prices deviate by more than those implied in the fundamentals when exchange rate is determined, controlling families’ wealth change is a function of minority shareholders’ inertia. If minority shareholders fully subscribe to take advantage of the low ‘H’ price, then there is no gain in value for the controlling families. However, if minority shareholders extrapolate the recent price run-ups of the subsidiaries and do not bother to tender subsidiary shares, then controlling families’ wealth may increase at the expense of minority shareholders.

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<sup>19</sup> This proposition also holds when ‘S’ is relatively overvalued than ‘H’ compared to fundamental values.

Note, however, that this wealth transfer is clearly voluntary, which distinguishes it from traditional tunneling or expropriation.

It would be extremely difficult in practice to clearly show that the controlling families intentionally pushed 'H's price below the fundamental values just before the exchange ratio is fixed. Otherwise, they would easily be indicted with criminal charges for market manipulation. Thus, we provide some evidence that is consistent with the temporary price deviation, but with an explicit caveat that our evidence is by no means complete. Specifically, we focus on the contents of the news reported in the public media from the re-listing date up to the tender offer announcement. We hypothesize that the more good (bad) news for the subsidiary (holding company), the more the price deviation between the two firms relative to the fundamentals.

We implement an extensive manual news search for both the subsidiaries and holding companies. Once we locate a piece of news, we first identify whether it reflects a genuine piece of news or it simply repeats what is reported in another media source. If there are multiple media sources that report the same news content, we treat this as a single piece of news. We then classify them into one of the three categories based on its content; bad, neutral, or good. The results reported in the first line of table 5 suggest that there are about 4.5 (3.7) news articles for the subsidiary (holding company) on average from the re-listing date to tender offer announcement.

Once we partition them based on the content, however, we observe that the number of good news is much higher for the subsidiary than for the holdings company. For example, the number of good news reported for the subsidiary is 7.3 from re-listing date to tender offer announcement which is more than twice as large as those reported for the holding company during the same period. The difference between the two numbers is statistically significant. This result suggests that relatively strong price movement for the subsidiary following the re-

listing is partly due to the disproportionate release of different types of news. Since corporate news are mostly based on press-releases or disclosures, it is highly likely that the controlling families are influencing the timing and contents of the news released for the two companies in a way consistent with their incentives.

We next examine the actual tendering decisions of the controlling families and minority shareholders, and how such decisions affect the changes in ownership structure as well as overall changes in wealth. Panel A of table 6 reports the distribution of overall subscription ratio defined as total tendered shares scaled by total sought shares. For each investor type, we also report the distribution of the number of shares tendered scaled by number of shares held prior to the tender. The results indicate that both mean and median overall subscription ratio amounts up to roughly 80%. Since total sought shares are roughly 30% on average, this suggests that only about 24% of the outstanding shares are tendered and that vast majority of the shareholders simply do not tender.

When we calculate the ratio of tendered shares by each investor type, however, we observe a sharp contrast between the controlling family and other minority investors. For example, the median ratio of tendered shares among the family shareholders amounts up to 99%, indicating that the family members tender almost all of their holdings in 'S' in exchange for new shares to be issued by 'H'. To the contrary, the corresponding number for minority outside shareholders is only 2.2%, implying that almost all outside investors remain passive and do not bother to tender their shares.<sup>20</sup>

These stark differences in the subscription rates between insiders and outsiders would first increase families' direct ownership in 'H', decrease families' direct ownership in 'S', and increase 'H's direct ownership in 'S'. We report these changes in ownership structure in panel B of table 6. The first three lines show how the family's direct ownership in 'H' changes

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<sup>20</sup> Outsider held shares is obtained by subtracting off treasury shares and shares held by the controlling family and affiliated firms including the holding company and other non-profit entities (e.g. foundations).

following the tender offer while the next three lines provide the corresponding information for the changes in the family's direct holdings in 'S'. The last two lines report increases in 'H's direct holdings in 'S' obtained through the tender offer.

The results indicate that the median holdings by the family in 'H' increase from 25% to 52% following the tender offer. In contrast, their median holdings in 'S' drop from 25% down to almost 0%. In terms of changes in the number of shares held, this drop implies a -99% drop. As a result of this tender, 'H' is able to increase its median holding in 'S' from 12% to 35%, which satisfies the regulatory requirement that holding companies must hold at least 20% of public subsidiary's ownership.<sup>21</sup>

If all shareholders tender their shares, then 'H' would obtain the desired level of ownership in 'S' as indicated in the total number of shares sought. Since this implies an oversubscription, the new issues would be allocated to all tendering shareholders on a pro rata basis and not all shares tendered by the controlling families would be exchanged for new shares issued by the holding company. As such, proportional ownership in 'H' held by insiders and outsiders would not change as stated in proposition 1. However, because at least some outsiders remain passive and do not actively participate in the tender offer, the controlling family is able to secure a much larger direct ownership in 'H'.

In table 7, we examine whether families are able to increase not only the direct holdings in 'H' by tendering 'S' shares, but also the overall value of their combined holdings in 'H' and 'S'. If the exchange ratio is fixed to maximize the number of 'H' shares for a given number of 'S' shares, the tender offer is likely to be a bargain as stated in proposition 1. Panel A provides estimates of the levels of controlling families' wealth at various points during the two-step organizational change. Panel B presents changes in wealth both in dollar amounts

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<sup>21</sup> The non-zero median holdings by 'H' in 'S' even before the tender offer reflects both open market purchases since the spin-off and treasury shares reallocated to 'H' during the spin-off. There is an intense regulatory controversy on whether treasury shares held before the spin-off could actually be treated as assets and thus be reallocated to 'H'.

and in percentages between those various points. Percentage changes are measured against the initial wealth prior to the spin-off for an easier comparison.

The results indicate that controlling families exhibit an increase in wealth on average throughout the spin-off and tender offer. For example, from spin-off to re-listing, the combined value increases by roughly 10%. From re-listing to exchange ratio fix date, there is an additional gain of roughly 10% ( $\cong 19.97\% - 10.05\%$ ). These increases in value may potentially reflect partial relief of diversification or conglomerate discount, which is enjoyed by both controlling families and outside investors.

Once the exchange ratio is fixed, however, controlling shareholders mostly tender their ‘S’ shares while minority shareholders do not. As a result, post-tender offer combined value of the controlling family will largely depend on ‘H’s value while those of the minorities would depend on both ‘H’ and ‘S’. Thus, any wealth change beyond the exchange ratio fix date can largely be interpreted as wealth transfers due to minority investors’ inertia. Specifically, the wealth gain for the controlling families from exchange ratio fix date to new ‘H’ share issue date is 8.6% relative to the pre-split value on average. These results suggest that controlling shareholders on average gain close to 30% in value throughout the whole series of transactions, a third of which is contributed by minority shareholders who voluntarily did not tender their ‘S’ shares.

In table 8, we decompose the changes in wealth into four components; those due to changes in (1) holding company’s price, (2) number of shares held in holding company, (3) changes in subsidiary’s price, and (4) number of shares held in the subsidiary. Appendix C provides the details of the wealth gain decomposition. Panel A reports the decomposition of changes in wealth between the re-listing date to the new ‘H’ share issue date. The results based on both mean and median suggest that increases in the controlling families wealth is mostly due to increases in the number of shares held in ‘H’ obtained by tendering ‘S’ shares.

Even though the family loses value through price decrease for the holdings company, the magnitude is trivial. Since the families tender most of their 'S' shares, they also lose value from decreases in 'S' holdings. But since they still hold on to some 'S' shares, price increases in 'S' also contribute to their value increase.

In panels B and C, we provide decomposition results for two intermediary periods; from re-listing to exchange ratio fix date, and from exchange ratio fix date to new shares issue date, respectively. Since there are no changes in shares between re-listing to exchange ratio fix date, wealth decomposition in panel B only consists of changes in prices. The results from panel B indicate that although the controlling family loses from decreases in holding company prices up to the exchange ratio fix date, price increases in the subsidiary dominates which ultimately results in a wealth gain during this period.

In panel C, we observe that even changes in the price of the holding company contribute positively to the wealth gain once exchange ratio is fixed. This implies that holding company share prices recover following the exchange ratio fix and that controlling families additionally gain by switching to 'H' shares by tendering 'S' shares.

Overall, the results in this section provide evidence that minority shareholders' decision not to tender their shares, potentially due to behavioral biases like inertia or extrapolation, affects not only the controlling shareholders' direct ownership in 'H', but the value of their combined holdings. This suggests that insiders are actively considering potential behavioral biases of outside investors and are effectively taking advantage of such behaviors.

## **5. Arbitrage Opportunities and Violation of Law of One Price**

Our sample transactions, namely spin-offs followed by stock-for-stock tender offers, provide a unique pure arbitrage opportunity with few or no risks similar to those introduced in Lamont and Thaler (2003). This is possible since the ratio of new 'H' shares to be issued in

exchange for one 'S' share tendered is fixed prior to the subscription period and investors can take advantage of this fixed exchange ratio whenever the market price of 'H' relative to 'S' becomes more expensive than those implied in the fixed exchange ratio. Specifically, if the market price of 'H' relative to 'S', referred to as the market exchange ratio, is higher than those implied in the fixed exchange ratio, then investors could short 'H' and buy 'S' with the proceeds at market exchange ratio, and then tender 'S' shares and receive newly issued 'H' shares later at the fixed exchange ratio which is used to cover the short position. We refer to this situation as 'narrower' since the difference between 'H' and 'S' is now narrower than those implied in the fixed exchange ratio.

For example, on November 15, 2007, S&T Group, a mid-sized family owned business group in Korea with group-level total sales of KRW 1.5 trillion (roughly USD 1.5 billion) declared to spin-off its core member firm S&TC into S&T Holdings which is to become the holding company and S&TC which is to become the operating subsidiary. About 9 months later, S&T Holdings announced a stock for stock tender offer for S&TC's shares in exchange for S&T Holdings' new shares. Following the announcement, the exchange ratio between the two shares in the tender offer was fixed at 5.81, based on the prevailing price of KRW 14,050 for S&T Holdings and KRW 81,700 for S&TC. A few days later, S&T Holdings price dropped down to KRW 13,800, but S&TC dropped even more to KRW 64,500. Because S&T Holdings is now overvalued relative to those implied in the fixed exchange ratio of the tender offer, investors may engage in riskless arbitrage strategy.

Specifically, investors can short 5 shares of S&T Holdings at the prevailing market price of KRW 13,800, and buy one share of S&TC at the prevailing market price of KRW 64,500 which leaves them with KRW 4,500 in cash. S&TC share is immediately tendered which will later be converted into 5.81 S&T Holdings shares. Investor can then cover the short position with the received S&T Holdings shares, which leaves them with KRW 4,500 in

cash and 0.81 share of S&T Holdings. Under no arbitrage, such situation cannot last long since arbitrageurs will step in and eliminate this profit opportunity. But, if arbitrage is not readily feasible for any reason, mispricing may not be eliminated until the end of the subscription period.

If there are no limits to arbitrage, such 'narrower' price differential cannot exist since arbitrageurs would quickly eliminate this opportunity. Thus, under no arbitrage, we may observe 'wider' price differentials where the market price of 'H' relative to 'S' is even lower than those implied in the fixed exchange ratio, but not 'narrower' price differentials. But, if we do observe 'narrower' price differentials nevertheless, this would imply that there is some limitation to arbitrage opportunities and the law of one price is violated. This situation is logically the same as the 'negative stubs' found in carve-outs followed by spin-offs documented in Lamont and Thaler (2003).

In Table 9, we report how many of our 21 cases represent wider or narrower price differentials. The first column presents masked sample IDs and the second column presents the value of fixed exchange ratios. The next three columns report the distribution of the market exchange ratio subsequent to the date when tender offer exchange ratio is fixed until the last day of subscription. The next three columns present the number of days during which arbitrage transaction is possible (i.e. from exchange ratio fix date to end of subscription), and the number of 'narrower' days and 'wider' days based on daily closing prices during the arbitrage possible period, respectively. In the final column, we categorize each sample transaction as narrower if the number of narrower days is more than 5 or wider otherwise.

The results from Table 9 indicate that out of 21 sample transactions, 13 of them are actually narrower and only 8 of them are wider. Note that under no arbitrage, the null hypothesis is that we should not observe any narrower cases since they should be quickly arbitrated away. Instead, our result strongly suggests that no arbitrage condition does not



hold for quite some time, most likely due to shortage of shortable shares. Thus, we observe that the law of one price is strictly violated.

In Table 10, we report the differences in the fixed exchange ratio between the narrower and wider cases. Our conjecture is that if the original fixed exchange ratio had been more extreme, there could be some form of mean reversion which would result in less deviation between the two stock prices and thus a narrower price differential. Consistent with our conjecture, we find that the fixed exchange ratio is marginally significantly higher in the narrower group than in the wider group. This implies that in cases where the controlling family obtains more shares in 'H' (i.e. higher fixed exchange ratios), the price differential is likely to get narrower and violate the law of one price.

We also test whether the subscription ratio of the family and outsiders are different between the narrower group and the wider group. For the controlling families, narrower or wider market price differential would not affect their tendency to subscribe since they need to tender their shares anyway to secure maximum ownership in 'H'. In contrast, for outside investors, market price differentials could affect their tendency to tender since narrower cases represent a pure arbitrage opportunity. We find no difference between narrower and wider cases for family shareholders, consistent with our conjecture. But, we also find no difference between the two groups for outside investors as well, presumably due to small number of observations in our sample.

In Table 11, we examine whether there are more short sales of 'H' when the price differential is narrower. We report the results for all short sales activities of 'H' as well as for each investor group. We observe that overall short sale of 'H' is higher when the market price differential is narrower. That is, at least a subset of investors seems to be trying to take advantage of the mispricing in 'H' relative to 'S'. The difference in short sales activities is the most pronounced for the foreign investor group. Previous research in Korean short sales

document that vast majority of short sales in Korea, the volume of which is much smaller than those in U.S., is driven by foreign investors (e.g. Lee and Wang(2012)).

In figure 5, we examine how the market price differential between the two stocks behaves once the tender offer exchange ratio is fixed. Specifically, we plot the average difference between the fixed exchange ratio and market exchange ratio over time, where a positive value indicates that fixed exchange ratio is larger than market exchange ratio. The difference is reported for the full sample as well as for narrower and wider group, respectively. The difference between the two exchange ratios for the full sample are initially positive, indicating that market price of 'H' relative to 'S' is larger than those implied in the fixed exchange ratio on average. Over time, the degree of mispricing is gradually mitigated potentially due to the short selling activities. However, we note that diminishing arbitrage opportunity is not driven by the narrower group but by the wider group. That is, mispricing within the narrower group is not arbitrated away during the arbitrage possible period.

Overall, the results in this subsection suggest that law of one price is clearly violated when Korean firms implement a spin-off followed by a stock-for-stock tender offer. Although there are some efforts by some investor group to take advantage of the mispricing of 'H' relative to 'S', the activity is not large enough to remove or eliminate the arbitrage opportunity for more than two weeks. Such limits of arbitrage are most likely due to the shortage of shortable stocks in the Korean stock market.

Violation of the law of one price or limits of arbitrage reported above has clear value implications for tendering shareholders. If the market price differential becomes narrower, it provides tendering shareholders with a gain in value since they are able to obtain 'H' shares at a cheaper price, or obtain more 'H' shares at the same price compared to the prevailing market price. If all shareholders tender their shares when the market price differential gets narrower, then both the controlling family and outside shareholders would benefit from tendering.

However, as reported in the previous subsection, most outside investors remain passive or exhibit inertia, while the controlling family tenders almost all shares they hold in 'S' in exchange for newly issued shares in 'H'. Thus, it is in the family's interest for the price of 'H' to increase more (or decrease less) than those of 'S' once the exchange ratio is fixed. As a result, the family is able to not only secure their control in 'H' but also increase their wealth under investor inertia and limited arbitrage.

## **6. Conclusion**

Literature on family business groups and international corporate governance have focused on expropriation of minority shareholders or tunneling of corporate resources as the main source of personal wealth gains for the controlling family. In this paper, we present a different channel based on investor inertia and limited arbitrage through which the controlling families may benefit themselves without resorting to expropriation or tunneling.

Specifically, we focus on Korean business groups who set up a pure holding company through a series of transactions involving spin-offs followed by stock-for-stock tender offers. Our key findings are of threefold. First, we find that the parent holding companies' prices drop while the subsidiaries' prices increase substantially subsequent to the spin-off. Such divergence in prices allows the tendering shareholders to obtain more new 'H' shares for a given number of 'S' shares tendered.

Second, outside investors exhibit a tendency to remain passive when provided with a chance to tender their shares in the operating subsidiary ('S') in exchange for new shares in the holding company ('H'). As a result, the controlling family is able to not only double their direct ownership in the parent holding company, but also increase the value of their combined holdings.

Third, we find that in 13 out of 21 sample transactions, law of one price is strictly

violated. That is, apparent overvaluation of 'H' relative to 'S' compared with those implied in the fixed exchange ratio is not arbitrated away for more than two weeks on average, presumably due to shortage of shortable shares in the Korean market. Such violations imply wealth increases for the controlling families since they are given the opportunity to obtain 'H' shares at a more favorable condition compared to the prevailing market price.

Overall, this paper suggests that insiders may be evolving in terms of how to maximize their personal benefits. Outright theft, frauds, or other non-market price transactions are now being regulated with more scrutiny than ever before. But, if minority shareholders exhibit behavioral biases and market efficiency is yet to be established, there is some chance that insiders might be able to take advantage of such situation to increase their personal benefits.

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Table 1. Characteristics of Spin-Off Firms

This table presents summary characteristics of our sample firms. The sample consists of all firms that implemented a spin-off followed by a stock-for-stock tender offer which ultimately resulted in a parent-subsidiary relationship between the two spun-off firms between 2000 and 2010 in Korea Exchange. Panels A and B report the results before and after the spin-off, respectively. In panel A, market capitalization is as of the spin-off announcement date in KRW billion. Total assets are as of the most recent fiscal quarter before the spin-off announcement. Leverage is total debt divided by total assets. B/M is book to market ratio defined as book equity divided by market equity. Book equity is total equity as of the most recent fiscal quarter before the spin-off announcement and market equity is market capitalization on spin-off announcement date. Panel B shows characteristics of (to be) holding companies and (to be) subsidiaries on the re-listing date after spin-off is complete. The numbers are as disclosed in the spin-off completion filings. 'H' represents parent holding companies and 'S' represents subsidiaries. We adjust for possible double counting when we aggregate market values for the combined entity.

(Unit: KRW billion)						
	Mean			Median		
Panel A: Spin off announce date						
Market Cap	1,550.28			577.84		
Total Assets	2,820.25			1,121.79		
Book Equity	1,132.33			529.86		
Leverage	0.51			0.53		
B/M	0.95			0.68		
Panel B: Re-listing after spin-off						
	H	S	H+S	H	S	H+S
Market Cap	609.01	1,489.76	1,856.67	119.72	468.79	642.65
Total Assets	808.16	1,940.14	2,748.30	186.75	683.51	1,278.81
Book Equity	454.38	667.68	1,122.06	175.67	191.83	367.50
Leverage	0.22	0.76	0.44	0.19	0.60	0.49
B/M	1.48	0.75	1.03	1.04	0.55	0.65

Table 2. Cumulative Abnormal Returns around Spin-Offs and Tender Offers

This table reports cumulative abnormal returns around the spin-off and subsequent stock-for-stock tender offers. We consider three events. Panels A, B, and C report the results around the spin off announcement, re-listing after the spin-off is complete, and tender offer announcement, respective. Cumulative abnormal return (CAR) is adjusted for market returns during the respective event period, reported in %. In panels B and C, 'H' represents parent holding companies and 'S' represents subsidiaries, respectively. The numbers in the parentheses are  $t$ -stats from mean tests and the numbers in the brackets are  $p$ -value of median rank sign tests. Superscripts \*, \*\*, and \*\*\* denote statistical significance at 10%, 5% and 1% level, respectively. The sample period is from 2000 to 2010.

Mean				Median		
Panel A: Spin off announcement date						
CAR(0,0)		-0.512 (-0.62)			0.020 [0.7756]	
CAR(-1,+1)		-0.868 (-1.02)			-0.969 [0.200]	
CAR(-5,+5)		-2.978 (-1.52)			-2.187 <sup>*</sup> [0.085]	
CAR(-5,-1)		-0.638 (-0.41)			-0.020 [0.776]	
CAR(0,+5)		-2.340 <sup>*</sup> (-1.82)			-2.092 <sup>*</sup> [0.092]	
	H	S	<i>t</i> -value of (S-H)	H	S	<i>p</i> -value of (S-H)
Panel B: Re-listing after spin-off						
CAR(0,0)	-8.028 <sup>***</sup> (-3.18)	1.568 (0.72)	9.596 <sup>***</sup> (2.85)	-16.087 <sup>***</sup> [0.002]	3.989 [0.533]	20.076 <sup>***</sup> [0.009]
CAR(0,+1)	-16.322 <sup>***</sup> (-4.20)	0.413 (0.12)	16.735 <sup>***</sup> (3.20)	-25.231 <sup>***</sup> [0.000]	0.573 [0.828]	25.804 <sup>***</sup> [0.006]
CAR(0,+5)	-21.714 <sup>***</sup> (-2.95)	7.264 (1.29)	28.978 <sup>***</sup> (3.12)	-18.661 <sup>***</sup> [0.005]	4.492 [0.254]	23.153 <sup>***</sup> [0.005]
Panel C: H announces tender offer for S's shares						
CAR(0,0)	-2.342 <sup>*</sup> (-1.99)	0.752 (1.12)	3.094 <sup>**</sup> (2.29)	-2.194 <sup>*</sup> [0.065]	0.666 [0.269]	2.860 <sup>***</sup> [0.008]
CAR(-1,+1)	-5.148 <sup>***</sup> (-5.31)	0.175 (0.23)	5.323 <sup>***</sup> (4.35)	-5.419 <sup>***</sup> [0.000]	-0.416 [0.987]	5.003 <sup>***</sup> [0.001]
CAR(-5,+5)	-4.467 (-1.58)	2.763 (1.12)	7.230 <sup>*</sup> (1.94)	-7.700 <sup>**</sup> [0.015]	1.753 [0.408]	9.453 <sup>**</sup> [0.033]
CAR(-5,-1)	-2.130 (-1.13)	0.678 (0.37)	2.808 (1.07)	-2.956 <sup>**</sup> [0.010]	0.147 [0.880]	3.103 [0.244]
CAR(0,+5)	-2.539 (-1.28)	2.085 (1.37)	4.624 <sup>*</sup> (1.85)	-4.266 [0.143]	1.253 [0.468]	5.519 <sup>**</sup> [0.022]

Table 3. Holding period return during sample period

The table shows holding period return (HPR) and average daily return between different events during the tender offer process. Holding period return (HPR) is buy-and-hold return (%). Daily return is geometric average daily return reported in %. *t*-statistics and *p*-value of difference between Holding and Subsidiary are reported in the parentheses. The superscripts \*, \*\*, and \*\*\* denote statistical significance at 10%, 5% and 1% level, respectively. The sample period is from 2000 to 2010.

Period	mean						Median					
	Holding		Subsidiary		t value of S-H		Holding		Subsidiary		p value of S-H	
	HPR	Daily Return	HPR	Daily return	HPR	Daily return	HPR	Daily return	HPR	Daily return	HPR	Daily Return
Re-listing to tender announcement	-35.38	-1.52	161.29	1.13	(2.26)**	(4.78)***	-40.57	-0.96	49.87	0.88	(0.000)***	(0.000)***
Re-listing to tender announcement (excluding the first day return on re-listing)	-7.14	-0.29	50.02	0.29	(1.57)	(2.29)**	-6.16	-0.10	17.12	0.17	(0.026)**	(0.062)*
Tender announcement to exchange ratio fix	-1.03	-0.19	-0.92	-0.16	(0.04)	(0.10)	-1.26	-0.14	-1.37	-0.19	(0.907)	(0.907)
Exchange ratio fix to new shares issue	6.72	0.13	2.96	0.05	(-0.54)	(-0.33)	6.75	0.23	6.12	0.12	(0.593)	(0.457)



Table 4. Summary Statistics of the Tender Offer

The table presents summary statistics of the tender offers. Fixed exchange ratio is the number of new shares to be issued by the holding company in exchange for one subsidiary share tendered. Tender size (in KRW billion) is the market value of tender offer defined as total shares sought times the closing price of the tender offer announcement date. The sample period is from 2000 to 2010.

	mean	median	min	max
Share sought/share outstanding (%)	32.76	27.38	5.20	80.69
Fixed exchange ratio	2.52	2.09	0.76	5.81
Tender size (KRW billion)	324.17	120.10	7.68	1,820.00

Table 5. Number of News Reported: Holding Companies vs. Subsidiaries

This table presents the average number of news reported between different events during the tender offer process. If there are multiple media sources that report the same news content, we treat this as a single piece of news. We report the averages of total news as well as those of bad, neutral, and good news based on textual analysis for both subsidiaries and holding companies. The sample period is from 2000 to 2010.

	Subsidiary				Holding				<i>t</i> -value of Subsidiary-Holding		
	avg. # of news	Bad	Neutral	Good	avg. # of news	Bad	Neutral	Good	Bad	Neutral	Good
Re-listing to tender announcement	4.48	1.88	1.58	7.25	3.66	3.38	4.18	3.38	(-1.33)	(-2.25)	(2.28)
Re-listing to exchange ratio fix	5.37	1.90	1.92	9.35	3.68	2.82	4.83	3.40	(-0.96)	(-2.42)	(2.99)
Exchange ratio fix to new share issue	4.10	1.75	1.57	6.80	3.31	1.88	4.27	3.40	(-0.23)	(-2.19)	(1.79)

Table 6. Tendering Decisions and Subsequent Ownership Changes

This table presents a summary of tendering decisions of different shareholder types and subsequent ownership changes. Panel A reports the results of tendering decisions and panel B reports changes in ownership structure as a result of the stock-for-stock tender offer. Subscription ratio (%) is total tendered shares divided by total sought shares. Family (affiliated) tender is tendered shares of controlling shareholders (affiliated firms). Outsider tender is tendered shares of minority shareholders. Family held (affiliated held) is the ownership of controlling shareholder (affiliated firms) in the subsidiary before the tender. Outsider held is the ownership of minority shareholders in the subsidiary before the tender. The first three lines of panel B present families' ownership changes in the holding company (H) while the next three lines report families' ownership changes in the subsidiary (S). The last two lines report holding company (H)'s ownership in the subsidiary (S). The sample period is from 2000 to 2010.

Panel A: Tendering Decisions

	mean	median	min	Max
Subscription ratio (%)	78.86	78.44	60.09	109.63
Family tender/family held (%)	84.55	99.03	24.07	100.00
Affiliated tender/affiliated held (%)	45.95	50.18	0.00	100.00
Outsider tender/outsider held (%)	5.25	2.20	0.00	31.12

Panel B: Changes in Ownership Structure

		mean	median	min	max
Family→Holding (H)	Before (%)	24.60	25.03	0.99	65.91
	After (%)	49.90	51.83	2.25	89.26
	Increase in number of shares held (%)	581.43	340.69	54.60	2,143.88
Family→Subsidiary (S)	Before (%)	24.60	25.03	0.99	65.91
	After (%)	4.26	0.09	0.00	24.57
	Increase in number of shares held (%)	-84.17	-99.47	-100.00	-24.07
Holding (H) → Subsidiary (S)	Before (%)	12.63	12.20	0.00	42.09
	After (%)	37.55	35.30	23.34	67.09

Table 7. Wealth Changes of Controlling Families following the Spin-Off and Tender Offer

This table reports wealth changes of controlling families following the spin-off and subsequent stock-for-stock tender offer. Panel A shows level of wealth held by controlling families at various points in time while panel B reports the changes in wealth between them. The wealth before the spin-off is defined as shares held by controlling families times closing price of last trading day before the spin-off. The wealth at re-listing is defined as the sum of the following two products; shares held by the controlling family in holding company times its closing price at re-listing date and shares held by the controlling family in the subsidiary times its closing price at re-listing date. The wealth at exchange ratio fix is computed using the same number of shares, but closing prices as of the exchange ratio fix date. The wealth at new H shares issue reflects both changes in prices and changes in holdings, since the controlling families mostly switched their 'S' shares into 'H' shares. The unit of wealth is in KRW billion. In panel B, mean changes reported in percentages are relative to the pre-spin-off value. The numbers in the parentheses are *t*-stats for mean tests and *p*-values for median tests. The numbers in the brackets are percentages of cases where relative to total case. The sample period is from 2000 to 2010.

Panel A: Wealth of Controlling Families				
	(1)	(2)	(3)	(4)
	Before Spin-off	Re-listing	Exchange ratio fix	New H shares issued
Mean	208.47	214.80	238.46	249.75
Median	108.57	121.32	121.50	142.68
Min	18.37	14.07	13.97	13.45
Max	876.40	844.74	1,009.96	1,279.57
Panel B: Wealth Changes of Controlling Families				
	$\Delta(2)-(1)$	$\Delta(3)-(1)$	$\Delta(4)-(1)$	$\Delta(4)-(3)$
Mean change (amount)	6.33	29.99	41.28	11.29
Mean change (%)	10.05%	19.97%	28.55%	8.58%
<i>t</i> -value	(1.69)	(1.69)	(2.29)	(1.50)
Median	4.54%	9.90%	26.25%	14.95%
<i>p</i> -value	(0.1769)	(0.1327)	(0.0362)	(0.1327)
Min	-25.76%	-42.58%	-66.48%	-46.91%
Max	80.68%	185.38%	155.47%	48.72%
Stdev	26.64%	52.79%	55.86%	25.55%
# of wealth increase cases	12	14	14	15
	[60%]	[70%]	[70%]	[75%]

Table 8. Decomposition of Changes in Wealth

This table presents decomposition of changes in wealth (in KRW billion) reported in table 7. Changes in wealth for the controlling families are decomposed into the following four components; those due to changes in (1) holding company's price, (2) number of shares held in holding company, (3) changes in subsidiary's price, and (4) number of shares held in the subsidiary. Appendix C provides the details of the wealth gain decomposition. Panel A reports the decomposition from re-listing to new share issue date. Panels B and C split the period in panel A into those before and after the exchange ratio fix date. The sample period is from 2000 to 2010.

(Unit: KRW billion)				
	Holding Company		Subsidiary	
	Changes in price	Changes in shares	Changes in price	Changes in shares
Panel A: Re-listing to new shares issue date				
Mean	-0.45	161.17	23.34	-149.10
Median	-0.34	67.28	17.99	-84.22
Min	-53.87	3.41	-127.88	-584.90
Max	41.97	666.92	302.73	-2.94
Stdev.	19.61	206.01	78.13	178.67
Panel B: Re-listing to exchange ratio fix date				
Mean	-3.06		26.72	
Median	-2.58		10.87	
Min	-45.67		-42.00	
Max	42.71		210.89	
Stdev.	18.16		59.83	
Panel C: Exchange ratio fix date to new share issue date				
Mean	2.61	161.17	-3.39	-149.10
Median	1.77	67.28	3.22	-84.22
Min	-44.93	3.41	-266.14	-584.90
Max	33.93	666.92	91.84	-2.94
Stdev.	17.53	206.01	66.48	178.67

Table 9. Arbitrage Opportunities During the Subscription Period

This table presents potential arbitrage opportunities during the subscription period. Fixed exchange ratio is the number of new holding company's shares to be issued in exchange for one subsidiary share tendered. Market exchange ratio is the market price differential between holding company and subsidiary company, defined as daily closing price of subsidiary company divided by closing price of holding company. Arbitrage possible period is the period from exchange ratio fixed day to the end of subscription period. Narrower days are the number of days when fixed exchange ratio is larger than market exchange ratio. Wider days are the number of days that fixed exchange ratio is smaller than market exchange ratio. We categorize a tender offer as narrower when the number of narrower days is more than 5. Otherwise, a tender offer is categorized as wider. The sample period is from 2000 to 2010.

pair	Fixed exchange ratio	market exchange ratio from exchange fixed date to the last day of subscription			Arbitrage possible period	narrower days	wider days	price differential
		Mean	min	max				
1	4.39	4.00	3.58	4.48	20	18	2	narrower
2	2.47	2.63	2.47	2.85	20	1	19	wider
3	2.84	2.48	2.33	2.61	19	19	0	narrower
4	3.81	4.02	3.78	4.28	18	1	17	wider
5	2.09	2.45	2.25	2.64	20	0	20	wider
6	0.93	0.84	0.77	0.92	20	20	0	narrower
7	3.78	3.72	3.60	3.92	20	17	3	narrower
8	0.94	1.03	0.95	1.11	18	0	18	wider
9	0.76	0.76	0.72	0.85	19	12	7	narrower
10	4.14	3.82	3.67	4.02	16	16	0	narrower
11	1.50	1.71	1.48	1.90	19	1	18	wider
12	3.69	3.65	3.54	3.74	18	13	5	narrower
13	5.81	5.17	4.67	5.92	19	18	1	narrower
14	1.41	1.46	1.30	1.77	19	8	11	narrower
15	0.92	0.92	0.85	0.98	19	8	11	narrower
16	1.75	2.11	1.67	2.38	20	3	17	wider
17	1.59	1.68	1.60	1.76	17	0	17	wider
18	0.80	0.81	0.80	0.86	17	3	14	wider
19	4.48	4.26	4.11	4.38	17	17	0	narrower
20	1.99	2.03	1.89	2.16	19	8	11	narrower
21	2.92	2.90	2.72	3.11	14	9	5	narrower

Table 10. Subscription Ratio for Narrower and Wider Cases

The table presents subscription ratio of narrower and wider price differential for each investors groups. Fixed exchange ratio is the number of new holding company's shares to be issued in exchange for one subsidiary share tendered. Market exchange ratio is the market price differential between holding company and subsidiary company, defined as daily closing price of subsidiary company divided by closing price of holding company. If the fixed exchange ratio is greater than then the market exchange ratio for more than 5 days during the possible arbitrage period, then we assign these tender-offers as narrower. Otherwise, tender offers are assigned as wider. Family (affiliated) subscription is defined as the number of tendered shares of controlling families (affiliated firms) divided by total tendered shares. Outsider subscription is defined as the number of tendered shares of minority shareholders divided by total tendered shares. *t*-statistics are reported in the third column. Superscript \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% levels, respectively. The sample period is from 2000 to 2010.

	narrower	wider	<i>t</i> -value
Fixed exchange ratio	2.93	1.87	1.88 <sup>*</sup>
Family subscription (%)	57.05	63.63	-0.53
Affiliated subscription (%)	10.52	5.11	0.74
Outsider subscription (%)	12.73	7.67	0.82

Table 11. Short Selling Activity by Different Type of Investors

The table shows short-selling activity by investor type and whether arbitrage is feasible or not.  $relss(\%)$  is the daily number of shorted shares divided by the daily number of traded shares of holding company for possible arbitrage period. We classify investors into three types: domestic individual investors, domestic institutional investors and foreign investors, denoted as individual, institution and foreigner, respectively. If the fixed exchange ratio is greater than the market exchange ratio for more than 5 days during the possible arbitrage period, then we assign these tender-offers as narrower. Otherwise, tender offers are assigned as wider. Fixed exchange ratio is the number of new holding company shares to be issued in exchange for one subsidiary share tendered. Market exchange ratio is market price differential between holding company and subsidiary company, defined as daily closing price of subsidiary company divided by closing price of holding company. The sample period is from 2000 to 2010.

	$relss(\%)$	
	narrower	wider
All	3.34	1.86
Individual	1.45	0.68
Institution	0.53	1.12
Foreigner	1.35	0.06



Figure 1. Time Line of Spin-Off and Tender Offer Process

This figure shows the time line of a spin-off followed by a stock- for- stock tender offer. Spin-offs announce is the date the company announces a spin-off. Spin off is the actual spin-off date. Re-listing after spin off is the date when spun-off (to be) holding company and (to be) subsidiary starts to trade again. Exchange ratio fixed is the date when the number of new holding company's shares to be issued in exchange for one subsidiary share tendered is determined.

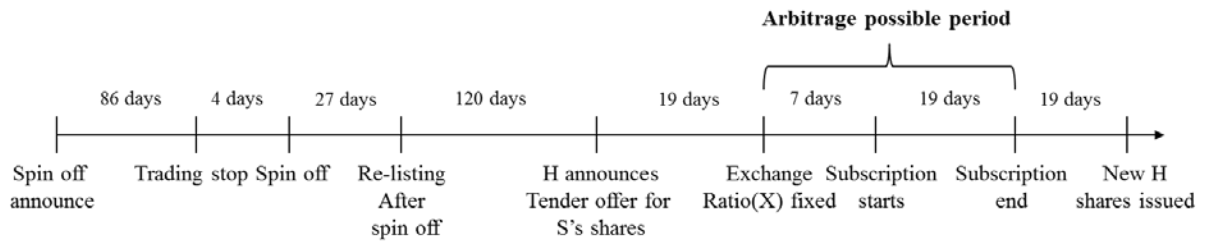


Figure 2. Cumulative Return Since Re-listing: Holding Company vs. Subsidiary

The figure presents cumulative returns from the re-listing date of (to be) holding company and (to be) subsidiary. Day 0 is the re-listing date after spin-off if complete. There are 19 pairs up to day 23, since we drop one pair due to short time from re-listing to tender offer announcement (five trading days). From day 24 to day 29, we have on average 15 pairs. From day 30 to day 36, 12 pairs. From day 37 to day 44, we have 11 pairs and from day 44 to day 60, 10 pairs. The sample period is from 2000 to 2010.

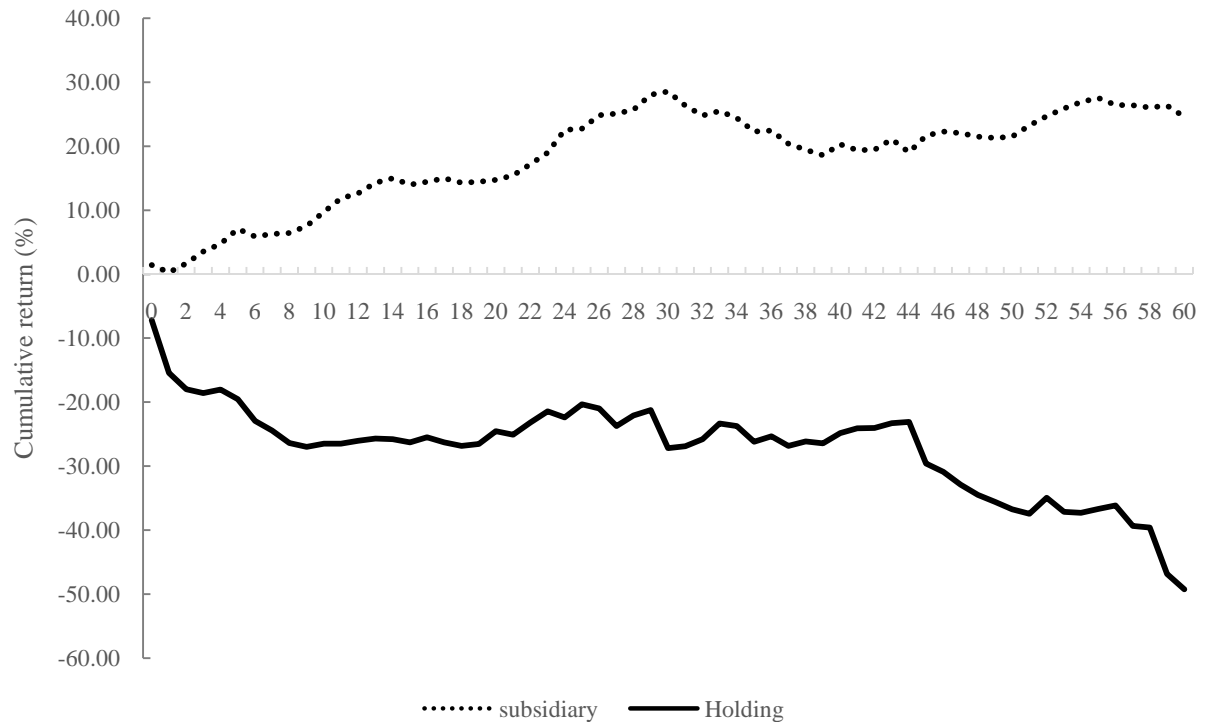


Figure 3. Cumulative Return around the Exchange Ratio Fix Date: Holding Company vs. Subsidiary

The figure presents the cumulative returns for the two pun-off firms around the exchange ratio fix date. Exchange ratio is the number of new shares to be issued by the holding company in exchange for one subsidiary share tendered. The thick dark line represents cumulative returns for the (to be) holding companies and the dotted line represents those for the (to be) subsidiaries. The sample period is from 2000 to 2010.

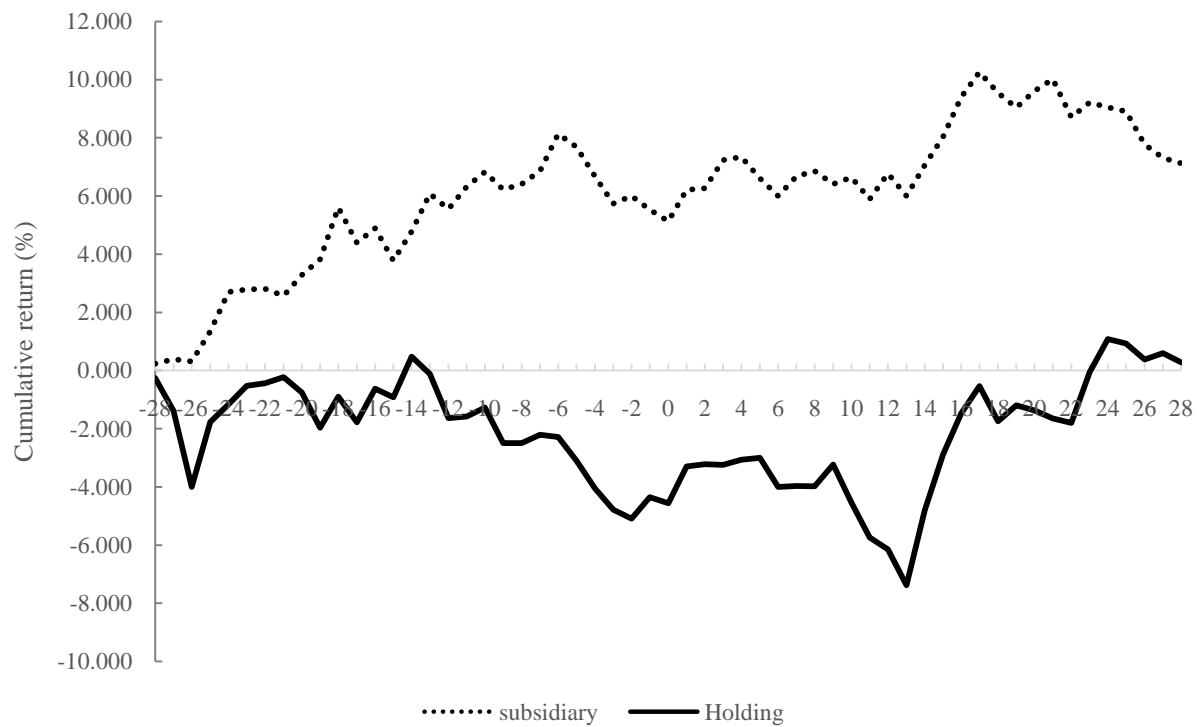


Figure 4. Prices Changes around Exchange Ratio Fix Date

This figure reports the price changes around the date when exchange ratio in the tender offer is fixed. In panel A, we simulate hypothetical fixed exchange ratios as if the exchange ratio was fixed one day (two, three and so on) prior to the actual fix date. That is, we move the board decision date to launch a tender offer a day at a time and recalculate the fixed exchange ratio for each day. The reference price for the subsidiary (i.e. numerator used to calculate fixed exchange ratio) is determined by the arithmetic average of the following three prices; (1) volume weighted average closing price for the past one month, (2) volume weighted average closing price for the past one week (3) the most recent closing price, all of which are as of the day before the board's decision to launch the tender offer. If this average price is higher than the most recent closing price, then the most recent closing price becomes the reference price. The reference price for the holding company (i.e. denominator used to calculate fixed exchange ratio) is determined as the highest price among the following three prices; (1) volume weighted average closing price for the past one month, (2) volume weighted average closing price for the past one week (3) the most recent closing price, all of which are as of the 5<sup>th</sup> trading day before the subscription starts. Issuing firms may apply additional discount or premium to the holding company's reference price which is disclosed in the filings. From 2010 onward, holding company reference price is simply determined as the volume weighted average closing price between 3<sup>rd</sup> and 5<sup>th</sup> day before the subscription starts, without any discounts or premiums. If this average is lower than the par value, then par value becomes the reference price. In panel B, we report the average prices of both the holding company and the subsidiary normalized to 100 as of the exchange ratio fix date. The sample period is from 2000 to 2010.

Panel A: Simulated Fixed Exchange Ratio Prior to the Exchange Ratio Fix Date

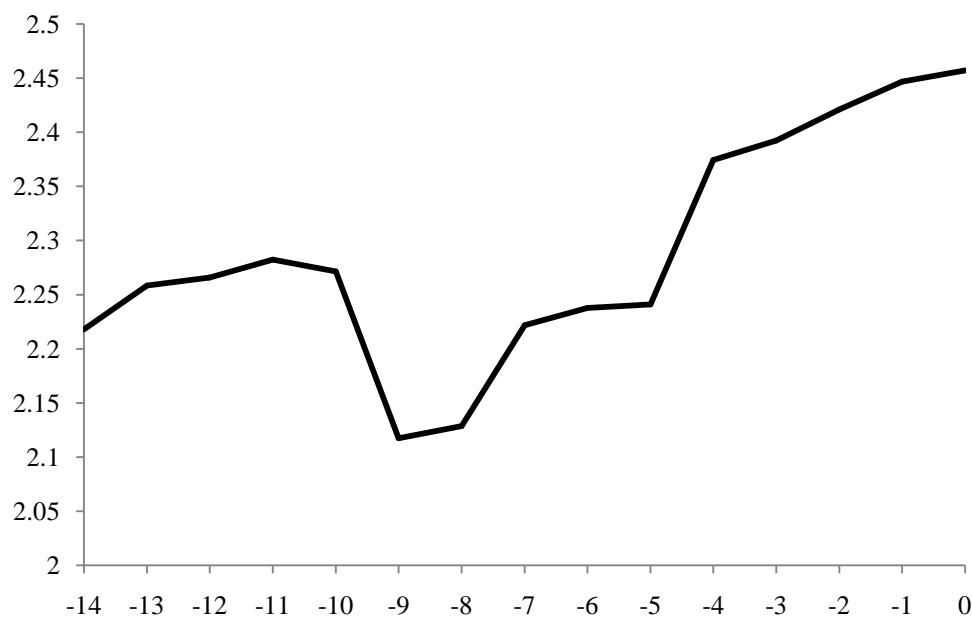


Figure 4- *continued*

Panel B: Price Changes Subsequent to the Exchange Ratio Fix Date

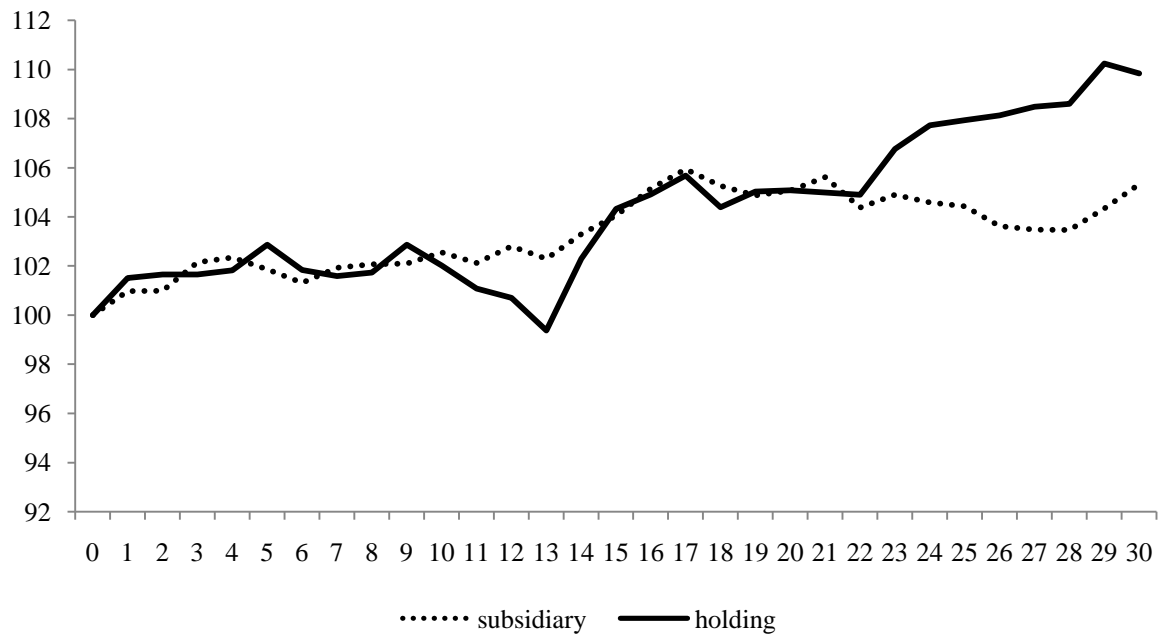
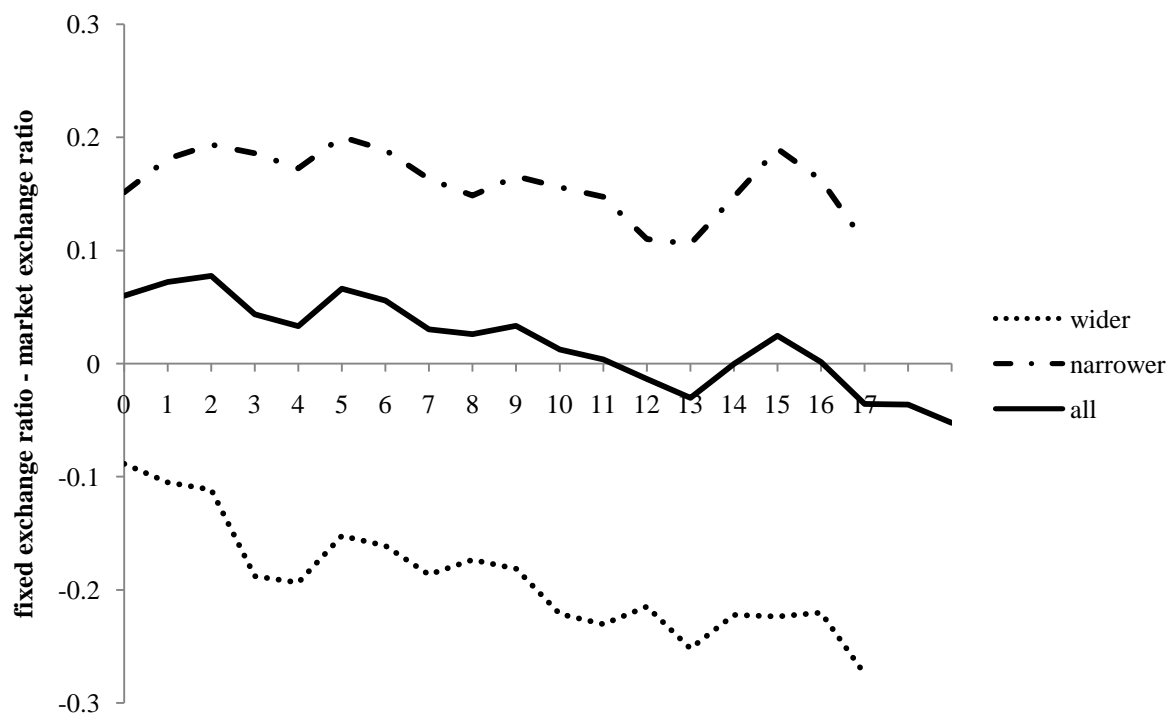


Figure 5. Differences between Fixed Exchange Ratio and Market Exchange Ratio

This figure presents the differences between fixed exchange ratio and market exchange ratio from the date that tender offer exchange ratio is fixed to the end of the subscription period. Fixed exchange ratio is the number of new holding company's shares to be issued in exchange for one subsidiary share tendered. Market exchange ratio is the market price differential between holding company and subsidiary company, defined as daily closing price of the subsidiary company divided by the closing price of the holding company. A positive value indicates that fixed exchange ratio is larger than the market exchange ratio, which is equivalent to the market price differential being narrower. If the fixed exchange ratio is greater than then the market exchange ratio for more than 5 days during the possible arbitrage period, then we assign these tender-offers as narrower. Otherwise, tender offers are assigned as wider. Day 0 refers to the date when exchange ratio is fixed. The sample period is from 2000 to 2010.



# Appendix A.

This appendix provides a detailed list of all firms and dates of relevant events in our sample. The sample period is from 2000 to 2010.

Holding	Subsidiary	Spin off announce	Trading stop	Spin off	H announce tender offer	Exchange Ratio fixed	Subscription starts	Subscription end	New H shares issue
LG	LG Household & Health Care	2000-11-15	2001-03-29	2001-04-03	2001-11-08	2001-11-19	2001-11-26	2001-12-14	2001-12-26
LG	LG Chem	2000-11-15	2001-03-29	2001-04-03	2001-11-08	2001-11-19	2001-11-26	2001-12-14	2001-12-26
Dae Woong	Daewoong Pharmaceutical	2002-07-23	2002-09-27	2002-10-02	2003-10-09	2003-10-29	2003-11-05	2003-11-24	2003-12-19
Nongshim Holdings	NongShim	2003-03-24	2003-06-17	2003-07-01	2003-08-20	2003-09-09	2003-09-19	2003-10-08	2003-10-23
Daesang Holdings	Daesang	2005-05-02	2005-07-19	2005-08-01	2005-09-27	2005-10-18	2005-10-25	2005-11-14	2005-12-28
Pyung Hwa Holdings	Pyung Hwa Industrial	2006-02-06	2006-04-20	2006-05-01	2007-05-04	2007-05-31	2007-06-08	2007-06-28	2007-07-16
AMOREPACIFIC Group	Amorepacific	2006-03-15	2006-05-26	2006-06-01	2006-10-09	2006-11-14	2006-11-21	2006-12-11	2006-12-27
WoongJin Holdings	Woongjin Thinkbig	2007-02-15	2007-04-27	2007-05-01	2007-08-02	2007-09-03	2007-09-10	2007-10-01	2007-10-23
SK Holdings	SK Innovation	2007-04-11	2007-06-28	2007-07-01	2007-08-29	2007-09-21	2007-10-04	2007-10-23	2007-11-08
JW Holdings	JW Pharmaceutical	2007-04-02	2007-06-28	2007-07-01	2007-08-06	2007-09-14	2007-09-21	2007-10-11	2007-10-30
Hanjin Heavy Industries & Construction. Holdings	Hanjin Heayy Industries & Construction	2007-05-15	2007-07-30	2007-08-01	2007-10-08	2007-11-02	2007-11-09	2007-11-28	2007-12-18
CJ	CJ Cheiljedang	2007-06-12	2007-08-30	2007-09-01	2007-11-08	2007-11-29	2007-12-06	2007-12-26	2008-01-22
S&T Holdings	S&TC	2007-11-14	2008-01-30	2008-02-01	2008-08-18	2008-09-08	2008-09-16	2008-10-06	2008-10-24
Dong Sung Holdings	Dong Sung Chemical	2008-02-11	2008-04-29	2008-05-01	2008-09-17	2008-10-10	2008-10-17	2008-11-05	2008-11-21
KISCO Holdings.	KISCO	2008-06-18	2008-08-28	2008-09-01	2009-04-08	2009-04-12	2009-04-20	2009-05-11	2009-05-27
HansaeYes24 Holdings	Hansae	2008-08-07	2008-12-29	2009-01-01	2009-04-22	2009-05-14	2009-05-21	2009-06-10	2009-07-01
Hanjin Shipping Holdings	Hanjin Shipping	2009-09-16	2009-11-27	2009-12-01	2010-02-04	2010-02-11	2010-02-17	2010-03-09	2010-04-01
CS Holdings	Chosun Welding Pohang	2009-10-14	2009-12-29	2010-01-01	2010-09-30	2010-10-08	2010-10-13	2010-11-01	2010-11-18
KC Green Holdings	KC Cottrell	2009-09-28	2009-12-29	2010-01-01	2010-05-14	2010-05-28	2010-06-03	2010-06-22	2010-07-09
Kolon	Kolon Industries	2009-10-15	2009-12-29	2009-12-31	2010-05-24	2010-06-01	2010-06-07	2010-06-28	2010-07-13
Hanmi Science	Hanmi Pharm.	2010-03-26	2010-06-29	2010-07-01	2010-09-02	2010-09-10	2010-09-15	2010-10-04	2010-10-21

## Appendix B.

This appendix provides proofs of proposition 1.

Assumption

$\alpha$  : controlling family's proportional ownership (assume 100% tender)

$k$  : minority's subscription ratio

$V_0^H (V_0^S)$ : value of Holding (Subsidiary) prior to the tender offer

$N_0^H (N_0^S)$ : number of H(S) shares prior to tender offer

$P_0^H (P_0^S)$ : price of H(S) prior to tender offer

$P_x^H$  : temporarily pushed down price of H, so that  $P_x^H < P_0^H$

$x$  : exchange ratio,  $\frac{P_0^S}{P_x^H} > \frac{P_0^S}{P_0^H}$

$P_*^H$  : long term equilibrium price

$$P_*^H = \frac{V_0^H + [\alpha + (1 - \alpha) \cdot k] \cdot V_0^S}{N_0^H + [\alpha + (1 - \alpha) \cdot k] \cdot N_0^S \cdot x} < P_0^H$$

$$P_x^H < P_*^H < P_0^H$$

$W_0$ : controlling shareholder's wealth before tender offer

$W_*$ : controlling shareholder's wealth after tender offer

$$W_0 = \alpha(V_0^H + V_0^S)$$

$$W_* = [\alpha N_0^H + \alpha N_0^S \cdot x] P_x^H$$

$$W_* = W_0, \text{ if } k = 1$$

$$\alpha_* = \frac{[\alpha N_0^H + \alpha N_0^S \cdot x]}{N_0^H + [\alpha + (1 - \alpha) \cdot k] \cdot N_0^S \cdot x}$$

$$\alpha_* > \alpha, \text{ if } k < 1$$

$$\alpha_* = \alpha, \text{ if } k = 1$$

$$\Delta W = W_* - W_0 = [\alpha N_0^H (P_x^H - P_0^H)] + [\alpha N_0^S \cdot P_0^S \left( \frac{P_*^H}{P_x^H} - 1 \right)] \quad (1)$$

if  $k \rightarrow 0$ , then  $\Delta W > 0$ , therefore we need to show that  $\frac{\partial \Delta W}{\partial k} < 0$

From eq(1), we know if we verify that  $\frac{\partial P_*^H}{\partial k} < 0$ , then  $\frac{\partial \Delta W}{\partial k} < 0$  hold.

$$\begin{aligned} \frac{\partial P_*^H}{\partial k} &= \frac{(1 - \alpha)V_0^S [N_0^H + [\alpha + (1 - \alpha) \cdot k]] \cdot N_0^S \cdot x - [V_0^H + [\alpha + (1 - \alpha) \cdot k] \cdot V_0^S] \times (1 - \alpha)N_0^S \cdot x}{\{N_0^H + [\alpha + (1 - \alpha) \cdot k]\} \cdot N_0^S \cdot x^2} \\ &= \frac{(1 - \alpha)V_0^S N_0^H - (1 - \alpha)N_0^S V_0^H \cdot \frac{P_0^S}{P_x^H}}{\{N_0^H + [\alpha + (1 - \alpha) \cdot k]\} \cdot N_0^S \cdot x^2} \\ &= \frac{(1 - \alpha)V_0^S N_0^H - (1 - \alpha)V_0^S N_0^H \cdot \frac{P_0^H}{P_x^H}}{\{N_0^H + [\alpha + (1 - \alpha) \cdot k]\} \cdot N_0^S \cdot x^2} \\ &= \frac{(1 - \alpha)V_0^S N_0^H \left[ 1 - \frac{P_0^H}{P_x^H} \right]}{\{N_0^H + [\alpha + (1 - \alpha) \cdot k]\} \cdot N_0^S \cdot x^2} < 0 \end{aligned}$$

From assumption we know,  $P_x^H < P_0^H$ , therefore  $\frac{\partial P_*^H}{\partial k} < 0$  and  $\frac{\partial \Delta W}{\partial k} < 0$



Other things equal, if controlling shareholder temporarily push up price of S, then  $\frac{\partial \Delta W}{\partial k} < 0$  is again hold.

$P_x^S$  : temporarily pushed up price of S, so that  $P_x^S > P_0^S$

$x$  : exchange ratio,  $\frac{P_x^S}{P_0^H} > \frac{P_0^S}{P_0^H}$

$$\begin{aligned}\frac{\partial P_*^H}{\partial k} &= \frac{(1-\alpha)V_0^S[N_0^H + [\alpha + (1-\alpha) \cdot k]] \cdot N_0^S \cdot x - [V_0^H + [\alpha + (1-\alpha) \cdot k]] \cdot V_0^S \times (1-\alpha)N_0^S \cdot x}{\{N_0^H + [\alpha + (1-\alpha) \cdot k]\} \cdot N_0^S \cdot x^2} \\ &= \frac{(1-\alpha)V_0^S N_0^H - (1-\alpha)N_0^S V_0^H \cdot \frac{P_x^S}{P_0^H}}{\{N_0^H + [\alpha + (1-\alpha) \cdot k]\} \cdot N_0^S \cdot x^2} \\ &= \frac{(1-\alpha)N_0^H [N_0^S P_0^S - N_0^S P_x^S]}{\{N_0^H + [\alpha + (1-\alpha) \cdot k]\} \cdot N_0^S \cdot x^2} < 0\end{aligned}$$

From assumption we know,  $P_x^S < P_0^S$ , therefore  $\frac{\partial P_*^H}{\partial k} < 0$  and  $\frac{\partial \Delta W}{\partial k} < 0$

## Appendix C.

This appendix explains how we decompose the controlling family's wealth gains into four components. Specifically, the wealth changes arise from price changes and changes in the number of shares held in both holding company and subsidiary company.

Notations:

$N_0^H (N_0^S)$ : number of H(S) shares prior to tender offer

$P_0^H (P_0^S)$ : price of H(S) prior to tender offer

$N_1^H (N_1^S)$ : number of H(S) shares after tender offer

$P_1^H (P_1^S)$ : price of H(S) after tender offer

$x$ : exchange ratio,  $\frac{P_x^S}{P_x^H}$

$N_T^S$ : number of S shares tendered by controlling shareholders

$W_0$ : controlling shareholder's wealth before tender offer

$W_1$ : controlling shareholder's wealth after tender offer

$$\begin{aligned}
 \Delta W &= W_1 - W_0 \\
 &= P_1^H \times N_1^H + P_1^S \times N_1^S - (P_0^H \times N_0^H + P_0^S \times N_0^S) \\
 &= P_1^H \times \left( N_0^H + N_T^S \times \frac{P_x^S}{P_x^H} \right) + P_1^S \times (N_0^S - N_T^S) - P_0^H \times N_0^H - P_0^S \times N_0^S \\
 &= N_0^H \times (P_1^H - P_0^H) + P_1^H \times (N_1^H - N_0^H) + N_0^S \times (P_1^S - P_0^S) + P_1^S \times (N_0^S - N_1^S)
 \end{aligned}$$

where,  $N_1^H = N_0^H + N_T^S \times \frac{P_x^S}{P_x^H}$  and  $N_1^S = N_0^S - N_T^S$