An Empirical Test of the Relationship between Gains/Losses on Disposal of Discontinued Operations Arising from Spin-offs and Stock Prices Based on the Extended Functional Fixation Hypothesis

By

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Signature redacted

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MIT Sloan School of Management
May 8, 2015

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Thesis supervisor

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Abstract

Under the Korean equivalents of International Financial Reporting Standards (K-IFRS), which was adopted in 2011, companies are allowed to recognize gains/losses on disposal of discontinued operations (GDDO) when they spin off part of their operations. GDDO reflects the gap between the fair value and the book value of the spun-off operations. However, the fair value is not based on the fair value of the assets classified as held for sale but based on the valuation of the operation by using the Free Cash Flow to the Firm (FCFF) method. Since the FCFF method estimates the value of the operation by discounting all future free cash flows from the operation, it is not accurate but varies remarkably with a small change in the discount factor. Furthermore, only spun-off operations are evaluated, but sustained operations are not. Lastly, shareholders of the parent company receive equivalent shares in the new company in order to compensate for the loss of equity in the original stocks. This implies that there should be no gains/losses from the division of the company unless there is a huge quantifiable impact from spinning off. For these reasons, it is improper to see GDDO as a real gain; rather, it is proper to see it as a paper gain.

According to the extended functional fixation view, unsophisticated investors improperly implement a wrong analysis of such complicated accounting information into their investment decision making. Herein I attempt to test whether unsophisticated investors are affected by GDDO with an assumption that there are some unsophisticated marginal investors who see GDDO as a real gain and they impound this information in price. My hypothesis is tested by examining the stock price reaction to quarterly earnings announcements of firms which have undergone spin-offs since K-IFRS was adopted. On the financial performance announcement date, the firm’s stock price is theoretically affected by the difference between the real earnings and the expected earnings (earnings surprise: ES). In a case in which the firm announced earnings including GDDO, only the real earnings, excluding GDDO, less the expected earnings should be reflected in the stock price movement—if all investors are sophisticated enough not to regard GDDO as real earnings. However, I test whether GDDO also affects the stock price movement in this situation separately from the impact from the earnings surprise, which implies that there are unsophisticated investors and the extended functional fixation hypothesis holds in the GDDO case.

Eleven Korean companies that are traded on the Korean stock market and listed on the Korea Composite Stock Price Index (KOSPI) were subjected to the test. These companies meet the following constraints: (1) They have undergone spin-offs, and (2) They recognized GDDO on their income statement but do not directly add or deduct the amount from equity items on the balance sheet.

I run a regression test on the excess stock return which is calculated by using historical two-day return, historical beta, the impact from earning surprise (ES), and the impact from GDDO. The result shows higher $R^2$ and lower p-value for the case when both the ES and GDDO are chosen as x-variables than the case when the earnings surprise is solely chosen as an x-variable. The p-values for x-variables in both cases were smaller than 0.01. The test result implies that the extended functional fixation hypothesis might hold in this case. I conclude that including GDDO as an item on the income statement can affect some investors’ decision making and demand for the stock.

Thesis supervisor: Joseph P. Weber
Title: George Maverick Bunker Professor of Management
I. Introduction

Korea announced a 'roadmap' for the adoption of Korean equivalents of International Financial Reporting Standards (K-IFRS) in 2007. Under the roadmap, all listed companies were required to prepare their annual financial statements under K-IFRS beginning in 2011. In addition, listed companies other than financial institutions were permitted to apply K-IFRS starting from 2009.

One of the major changes from adopting K-IFRS was the provision on the accounting for non-current assets held for sale and the presentation and disclosure of discontinued operations, a provision which did not exist under Korea Generally Accepted Accounting Principles (K-GAAP). In addition, Financial Accounting Standards Interpretation 2117 by the Korea Accounting Standards Board (KASB)\(^1\) addresses the accounting for distributions of non-cash assets to owners. This is only applied to spin-off cases in which shareholders of the parent company receive equivalent shares in the new company in order to compensate for the loss of equity in the original stocks.

In accordance with this provision, many companies which have spun off their business units had recognized non-current assets held for sale or non-current assets classified as held for distribution to owners before the spin-off. The companies can present non-current assets held for sale at the book value, or, if lower, the fair value less estimated point-of-sale costs.

Additionally, the firms had also recognized a dividend payable based on the fair value of the assets held for distribution to owners, and the value was based on a valuation method such as the free-cash-flow-to-the-firm (FCFF) method. Although K-IFRS does not specifically address how a firm should measure a dividend payable, it requires a firm to present the measurement

\(^1\) This is an interpretation corresponding to IFRIC Interpretation 17, Distributions of Non-cash Assets to Owners.
basis which is used in estimation of the fair value. After the spin-off, the firms announced the
difference between the non-current assets held for sale or distribution to owners and the unpaid
dividends less costs to sell as gains/losses on disposal of discontinued operations (GDDO).

It is not appropriate to see GDDO as a real gain/loss for the following reasons:

(1) The fair value estimated by a valuation method such as FCFF fluctuates seriously
with a small change of the assumptions on variables.

(2) Only spun-off operations are evaluated but retained operations are not. Managements
can spin off profitable business in order to recognize huge GDDO, while remaining the parent
company with little ability to generate free cash flows.

(3) Although there would be a positive effect from enhanced efficacy from the business
simplification, the positive effect is not quantifiable or measurable. Moreover, even if it is
measurable, the investors’ expectation of the positive effect would be reflected in the stock price
within several days after the spin-off, not on the financial performance announcement date.

Since all the positive effects were already reflected in the stock price and GDDO is a
paper gain, there should be no effect from the spin-off on the stock return on the day of financial
performance announcement for the period that the firm undergoes the spin-off, and thus
recognizes GDDO, if all investors correctly see GDDO as a paper gain/loss.

I test whether there is a significant impact of GDDO from spin-offs on stock prices. If
there is any, it implies that there are unsophisticated investors who incorrectly process GDDO as
a real gain and also that the extended functional fixation view holds in this case. If so,
gains/losses on disposal of discontinued operations should not be reported as an item which
affects net income when it occurs as a result of distribution to owners (spin-off), because it can
distract the investors from making the right investment decision.
II. Hypotheses

This empirical test is based on the extended functional fixation hypothesis proposed by Hand (1990)\(^2\). The hypothesis stochastically allows either sophisticated or unsophisticated investors to determine a firm's stock price and it assumes that (1) a firm's stock price is determined by a marginal investor, and (2) as of time \(t-1\), the probability that the marginal investor at \(t\) will be an unsophisticated investor is positive but less than one. This view assumes that investors have heterogeneous ability to obtain and use accounting information.

With differing abilities to process accounting information, unsophisticated investors might perceive some accounting information as relevant to the firm's value, while a sophisticated investor sees it as a number to be disregarded. GDDO from a spin-off case is one representative example of such information. To determine whether GDDO is processed differently by investors with different abilities, we need to divide the stock return into several parts.

At time \(t\), the firm-specific, market-adjusted portion \(\tilde{A}_{it}\) of the percentage change in firm \(i\)'s stock has two components of abnormal stock return \(\tilde{\delta}_{it}\) and exogenous liquidity demand shocks \(\tilde{\epsilon}_{it}\) ~ \(\text{indep } N(0, \sigma_i^2)\).

\[
\tilde{A}_{it} = \tilde{\delta}_{it} + \tilde{\epsilon}_{it}.
\] (1)

\(\tilde{\delta}_{it}\) is a function of the change in sophisticated investors’ demand for firm \(i\)'s stock arising from the change in their information and the corresponding change in unsophisticated investors’ demand. I assume that the information regarding the firm \(i\)'s earnings is equally shared

\(^2\) My work is largely based on the extended functional fixation hypothesis (EFFH). To learn more about the EFFH, see Hand, J. R. 1990. A Test of the Extended Functional Fixation Hypothesis. The Accounting Review 65 (October): 740-763.
between these two investor groups but the ability to process it is different. As of time $t-1$, both
groups would have the same information about the expected earnings of the firm $i$. At time $t$, the
firm $i$ announces its quarterly financial performance which includes GDDO. In a case of positive
GDDO, unsophisticated investors might interpret it as real earnings, and thus have higher
demand than do sophisticated investors. Therefore, $\delta_{it}$ on time $t$ can be redefined as the function
of the change in all investors’ demand for the stock arising from the earnings surprise, which is
real earnings less the expected earnings, and the change in unsophisticated investors’ demand
arising from misinterpretation of GDDO as real gains/losses. Therefore, the interaction of these
factors is given by:

$$\hat{A}_{it} = \Delta x_i \left(\frac{EPS-E(P_{E})}{P_{i,t-1}}\right) + \Delta x_i^u \left(\frac{GDDO\ per\ share}{P_{i,t-1}}\right) + \bar{\epsilon}_{it}, \tag{2}$$

where EPS is the earnings less GDDO per share, $P_{i,t-1}$ is the stock $i$’s price at time $t-1$, and $\Delta x_i^u$
represents how much marginal unsophisticated investors’ misperception of GDDO as real gain
affects the firm’s stock return.

I assume that the extended functional fixation hypothesis holds in this case; if so,
$\Delta x_i^u > 0$, and $\Delta x_i^u < \Delta x_i$ since unsophisticated investors are a part of all marginal investors.
III. Spin-off cases in Korea

From 2011 to the third quarter of 2014, 71 companies divided part of their operations into a new company. Among these, 29 cases were spin-off cases and others were physical divisions which do not recognize gains/losses on disposal of discontinued operations (GDDO). In eighteen spin-off cases among all 29 spin-offs, the companies did not record GDDO on their income statement since either the amount was not significant enough to be obligatorily announced or the companies directly deducted the amount of loss from an item under the “Other Equity Interest” on the balance sheet in a case where they experienced loss from disposal of a discontinued operation. Only one company among the companies with negative GDDO recognized it on the income statement and, even in this case, the amount was small enough to be covered by its quarterly earnings.

Table 1
List of Companies Which Recognized Gains/Losses on Disposal of Discontinued Operation from a Spin-off (2011 - 2014. 3Q)

<table>
<thead>
<tr>
<th>Spin-off Date</th>
<th>Company Code</th>
<th>Company name (Korean)</th>
<th>Company name (English)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-05-01</td>
<td>004170</td>
<td>신세계</td>
<td>SHINSEGAE</td>
</tr>
<tr>
<td>2011-11-01</td>
<td>000070</td>
<td>삼양홀딩스</td>
<td>Samyang Holdings</td>
</tr>
<tr>
<td>2012-09-01</td>
<td>006840</td>
<td>AK 홀딩스</td>
<td>AK Holdings</td>
</tr>
<tr>
<td>2012-09-01</td>
<td>000240</td>
<td>한국타이어월드와이드</td>
<td>HANKOOK TIRE WORLDWIDE</td>
</tr>
<tr>
<td>2013-03-01</td>
<td>000640</td>
<td>동아보시오홀딩스</td>
<td>Donga Socio Holdings</td>
</tr>
<tr>
<td>2013-08-01</td>
<td>035420</td>
<td>NAVER</td>
<td>NAVER</td>
</tr>
<tr>
<td>2013-08-01</td>
<td>003490</td>
<td>대한항공</td>
<td>KAL</td>
</tr>
<tr>
<td>2013-11-02</td>
<td>001630</td>
<td>중근동홀딩스</td>
<td>CHONGKUNDANG HOLDINGS</td>
</tr>
<tr>
<td>2013-12-31</td>
<td>010520</td>
<td>현대하이스코</td>
<td>HYUNDAI HYSCO</td>
</tr>
<tr>
<td>2014-07-01</td>
<td>007860</td>
<td>서울</td>
<td>SEOYEON</td>
</tr>
<tr>
<td>2014-09-01</td>
<td>060980</td>
<td>한라홀딩스</td>
<td>HALLA HOLDINGS</td>
</tr>
</tbody>
</table>

Source: Financial Supervisory Service DART System

3 To find the companies which underwent a corporate divestiture, I searched the corporate divestitures reports from DART (Data Analysis, Retrieval and Transfer System), which is operated by Financial Supervisory Service in Korea. The targets are restricted to companies which are traded on the KOSPI.
Table 1 provides a list of 11 companies which recognized GDDO as a result of a spin-off, and are thus the subjects of analysis in our test.

**IV. Earnings Surprise**

The change in the firm $i$’s stock price caused by earnings surprise is expressed as

$$\Delta x_i \left( \frac{E_{PS} - E(E_{PS})}{P_{t-1}} \right).$$

The important factors prior to analyzing the effect from earnings surprise and that from GDDO are finding out an appropriate expected earnings data and the date when the firm first announced its real earnings of the quarter.

Firms may have a tentative performance announcement prior to the formal announcement which is settled by the posting regulations of the stock exchange (See Figure 1). Some firms have an accurate number on the tentative announcement date, but some may not. In a case where the earnings which are announced tentatively are equal to the earnings on the actual announcement date, I regard the tentative announcement date as the effective date to be analyzed.

**Figure 1**

_Calendar Time Positioning of the Earnings Estimates and the Quarter’s Earnings Announcement_
Otherwise, there would be no source for the earnings surprise on the announcement date since the earnings estimates by the firm replace the existing best available earnings estimates. However, if the gap between the tentatively announced earnings and the actual earnings is significantly big (i.e., when it cannot be seen as a rounding error), I regard the actual announcement date as the effective date, while using the tentative data as the best available expected earnings before the announcement. By doing so, (1) I can use the best available earnings estimates to calculate the earnings surprise and (2) I can attain more samples to conduct the regression test. If I regard the tentative announcement date as a date to be analyzed and calculate ES by subtracting the existing best available estimated earnings from the earnings from the tentative announcement\(^4\), I would fail to minimize the noise from earnings estimates. On the other hand, if I use only the actual announcement date as a date to be analyzed and calculate ES by subtracting the earnings from the tentative announcement from the actual earnings, I would have fewer samples to analyze and control the impact from ES.

In a case where there is no tentative performance announcement from the firm \(i\), the actual announcement date is used as the effective date. I use the post-event consensus as expected earnings, rather than using the market consensus for the entire period, since some investment companies do not renew the estimates, regardless of the changes in their information\(^5\). If there is no consensus for the period and no other source which can be used to predict the earnings, I use the simple extrapolation of earnings from the same quarter of the previous year as the expected earnings, considering the seasonal effect.

For the earnings data, to calculate the gap between the real earnings and expected earnings, I give priority to profit (loss) attributable to owners of the parent company on the

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\(^4\) This is the method used by Bloomberg ERN data.

\(^5\) The source of the consensus data for each company is Bloomberg.
consolidated income statement, rather than to net income on the separate income statement. The reason is that, unlike the stand-alone income statement under Korea Generally Accepted Accounting Principles (K-GAAP), the separate income statement does not recognize the earnings from the firm’s subsidiaries at all. However, in a case where the firm does not have a consolidated financial statement due to nonexistence of subsidiaries, or if there is no consensus for a consolidated earnings but a separate earnings, I use net income from the separate financial statement and related earnings estimates, such as a consensus for separate earnings from Bloomberg and earnings on the separate income statement from the same quarter of the previous year.

When I use the previous year’s earnings for the period before the spin-off as earnings estimates for the period after the spin-off, I use the previous year’s earnings from continuing operations only since the earnings from discontinued operations can be attributed to the spun-off company.

V. Empirical Methods and Test Results

Empirical Methods

Let \( w \) be the two-day event window \(<0, +1>\), where \(<0>\) is the day that the financial reports which contain Gains/Losses on Disposal of Discontinued Operations arising from a spin-off are announced publicly. Day \(<+1>\) is included in the event period to fully capture any stock price reaction due to making announcements close to 3:00 p.m. or infrequent trading by smaller firms.

I assume that the two-day, continuously compounded return \( \bar{R}_{it} \) for the common stock of a firm \( i \) at event time \( t \) after and on \( w \) is well described as follows:
for \( t > w \), \( \tilde{R}_{it} = \alpha_i + \beta_i \tilde{R}_{mt} + \tilde{\epsilon}_{it} \), \( \tilde{\epsilon}_{it} \sim \text{indep } N(0, \sigma_i^2); \text{cov} (\tilde{\epsilon}_{it}, \tilde{R}_{mt}) = \text{cov} (\tilde{\delta}_{it}, \tilde{R}_{mt}) = 0 \ \forall \ i, t. \)

The firm-specific, market-adjusted portion \( \tilde{A}_{it} \) (the excess stock return) of the percentage change in firm \( i \)'s stock has two components of \( \tilde{\delta}_{it} \) and exogenous liquidity demand shocks \( \tilde{\epsilon}_{it} \sim \text{indep } N(0, \sigma_i^2). \)

\[ \tilde{A}_{it} = \tilde{\delta}_{it} + \tilde{\epsilon}_{it} \text{ and } E(\tilde{A}_{it}) = E(\tilde{\delta}_{it}). \]

Therefore, the excess stock return at \( w \) is calculated as:

\[ \tilde{A}_{iw} = \tilde{R}_{iw} - \alpha_i - \beta_i \tilde{R}_{mw}. \]

Since \( w \) is a two-day period and \( \alpha_i \) is on a daily basis, we can rewrite the formula as:

\[ \tilde{A}_{iw} = \tilde{R}_{iw} - [(\alpha_i + 1)^2 - 1] - \beta_i \tilde{R}_{mw}. \]

Also, we can define the abnormal stock return \( \tilde{\delta}_{iw} \) as a function of two components, the gains/losses on disposal of discontinued operations (GDDO), and earnings surprise (ES) (which is equal to the gap between actual earnings and expected earnings).
With an assumption that ES is not correlated with GDDO, I run a regression and see whether I can find a significant correlation between the two-day excess stock return at the spin-off quarter’s earnings announcement ($\tilde{A}_{tw}$) and GDDO.

I assume that the investors see the ES as a real and regular amount of gain so that
\[
\Delta x_i\{ES\} = \lambda_i^{p/e}\{ES\} \quad \text{where} \quad \lambda_i^{p/e} \gg 1
\]

is the parameter mapping unexpected earnings into abnormal stock return for firm $i$. Also, I assume that the sophisticated investors see GDDO as a paper gain and the unsophisticated investors incorrectly see GDDO as a one-time gain, then
\[
\Delta x_i^u\{GDDO\} = \hat{p}_{iw} \cdot \lambda_i^u\{GDDO\}
\]

where $\hat{p}_{iw}$ is a proportion of unsophisticated individual investors who regard GDDO as the real earnings at time $w$, and $\lambda_i^u = 1$. I use the proportion of trading amount practiced by individual investors on the day $w$ as a proxy for $\hat{p}_{iw}$. However, if all investors correctly see GDDO as a paper gain, $\Delta x_i^u\{GDDO\} = 0$.

Substituting the preceding proxies into equation (2) yields the prediction that:

\[
\tilde{A}_{it} = \Delta x_i\left\{\frac{EPS-E(EPS)}{P_{t-1}}\right\} + \Delta x_i^u\left\{\frac{GDDO \text{ per share}}{P_{t-1}}\right\} + \tilde{\epsilon}_{it} \\
= \lambda_i^{p/e}\left\{\frac{EPS-E(EPS)}{P_{t-1}}\right\} + \hat{p}_{iw} \cdot \lambda_i^u\left\{\frac{GDDO \text{ per share}}{P_{t-1}}\right\} + \tilde{\epsilon}_{it} \quad (7)
\]

We test this prediction by running the following regression:

\[
\tilde{A}_{it} = a_1 + a_2\left\{\frac{EPS-E(EPS)}{P_{t-1}}\right\} + a_3\left\{\frac{GDDO \text{ per share}}{P_{t-1}}\right\} + \tilde{\epsilon}_{it} \quad (8)
\]

or

\[
\tilde{A}_{it} = a_1 + a_2\left\{\frac{EPS-E(EPS)}{P_{t-1}}\right\} + a_4 \cdot \hat{p}_{iw}\left\{\frac{GDDO \text{ per share}}{P_{t-1}}\right\} + \tilde{\epsilon}_{it} \quad (9)
\]
Comparison between the results from equation (8) and (9) gives us the information whether the proportion of trading amount done by individual investors on the day \( w \) is an appropriate proxy for the proportion of unsophisticated investors who see GDDO as a real gain.

In this regression setting, the following coefficient is predicted:

\[
\begin{align*}
a_1 &= 0 \\
1 < a_2 < \lambda_i^{p/e} \\
0 < a_3 < \hat{p}_w \text{ or } a_3 = 0 \\
0 < a_4 < \lambda_i^u = 1 \text{ or } a_4 = 0
\end{align*}
\]

In order to run the regression, I calculate the excess stock return by using equation (6). \( \alpha_i \) and \( \beta_i \) are calculated on a daily basis for the period from the beginning of 2011 to the end of

<table>
<thead>
<tr>
<th>Company Code</th>
<th>Company name (English)</th>
<th>pre-alpha</th>
<th>pre-beta</th>
<th>post-alpha</th>
<th>post-beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>004170</td>
<td>SHINSEGAE</td>
<td>-0.214</td>
<td>0.807</td>
<td>-0.071</td>
<td>0.728</td>
</tr>
<tr>
<td>000070</td>
<td>Samyang Holdings</td>
<td>0.160</td>
<td>1.008</td>
<td>0.028</td>
<td>0.631</td>
</tr>
<tr>
<td>006840</td>
<td>AK Holdings</td>
<td>0.094</td>
<td>0.905</td>
<td>0.262</td>
<td>0.498</td>
</tr>
<tr>
<td>000240</td>
<td>HANKOOK TIRE WORLDWIDE</td>
<td>0.098</td>
<td>0.781</td>
<td>0.072</td>
<td>0.694</td>
</tr>
<tr>
<td>000640</td>
<td>Donga Socio Holdings</td>
<td>0.018</td>
<td>0.190</td>
<td>0.063</td>
<td>0.384</td>
</tr>
<tr>
<td>035420</td>
<td>NAVER</td>
<td>0.078</td>
<td>0.525</td>
<td>0.147</td>
<td>1.428</td>
</tr>
<tr>
<td>003490</td>
<td>KAL</td>
<td>-0.107</td>
<td>1.059</td>
<td>0.122</td>
<td>0.957</td>
</tr>
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<td>001630</td>
<td>CHONGKUNDANG HOLDINGS</td>
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<td>0.495</td>
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<td>010520</td>
<td>HYUNDAI HYSCO</td>
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<td>1.106</td>
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</tr>
<tr>
<td>007860</td>
<td>SEOYEON</td>
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<td>0.136</td>
<td>0.784</td>
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<tr>
<td>060980</td>
<td>HALLA HOLDINGS</td>
<td>0.028</td>
<td>1.017</td>
<td>0.403</td>
<td>0.060</td>
</tr>
</tbody>
</table>

Source: Bloomberg
2014. I separate the 4 year period into two periods, pre-spinoff and post-spinoff period, and then derive the \( \alpha \) and \( \beta \) for each period and for each company. The rationale behind this is that the firms have separated some of their operations by the spin-off, and thus \( \alpha \) and \( \beta \) also can change after the spin-off along with the changes in the companies’ business units. Table 2 provides pre- and post- \( \alpha \) and \( \beta \) of 11 companies.

**Empirical Results**

The results of various regressions run on the complete data set are reported in Table 3. From the table, the following points are noted.

**Table 3**

Regressions of the Two-Day Excess Stock Return at the Quarter’s Earnings Announcement (\( \tilde{A}_{it} \)) on:

Measures of Earning Surprise \( \left( \frac{EPS-E(EPS)}{P_{it-1}} \right) \), and the Impact of Mispricing from Unsophisticated Investors’ Misinterpretation of GDDO \( \left( \frac{GDDO\ \text{per share}}{P_{it-1}} \right) \).

<table>
<thead>
<tr>
<th>Regression on:</th>
<th>( \tilde{A}<em>{it} ) = ( a_1 + a_2 \left( \frac{EPS-E(EPS)}{P</em>{it-1}} \right) + a_3 \left( \frac{GDDO\ \text{per share}}{P_{it-1}} \right) + \tilde{\epsilon}_{it} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \tilde{A}<em>{it} ) = ( a_1 + a_2 \left( \frac{EPS-E(EPS)}{P</em>{it-1}} \right) + a_4 \cdot \tilde{p}<em>{iw} \left( \frac{GDDO\ \text{per share}}{P</em>{it-1}} \right) + \tilde{\epsilon}_{it} )</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>h: Null Hypothesis</th>
<th>( a_1 ) (%)</th>
<th>( a_2 )</th>
<th>( a_3 )</th>
<th>( a_4 )</th>
<th>( R^2 )</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta x_t^i[GDDO] = 0 )</td>
<td>0.192</td>
<td>0.406</td>
<td></td>
<td></td>
<td>0.045</td>
<td>161</td>
</tr>
<tr>
<td>( \Delta x_t^i[GDDO] = \tilde{p}_{iw}[GDDO] )</td>
<td>( \text{Inappropriate proxy for } \tilde{p}_{iw} )</td>
<td>0.038</td>
<td>0.457</td>
<td>0.018</td>
<td>0.105</td>
<td>161</td>
</tr>
<tr>
<td>( \Delta x_t^i[GDDO] = \tilde{p}_{iw}[GDDO] )</td>
<td>( \text{Appropriate proxy for } \tilde{p}_{iw} )</td>
<td>0.064</td>
<td>0.431</td>
<td>0.022</td>
<td>0.100</td>
<td>161</td>
</tr>
</tbody>
</table>

\( ^6 \) The daily raw beta and alpha from Bloomberg are used.
Table 4
Correlation for Variables Used in Table 3 Regressions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Excess Return ($\tilde{A}_{i:t}$)</th>
<th>Earnings Surprise</th>
<th>GDDO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earnings Surprise</td>
<td>0.212</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{EPS-E(EPS)}{P_{t-1}}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDDO ($\frac{GDDO \text{ per share}}{P_{t-1}}$)</td>
<td>0.221</td>
<td>-0.108</td>
<td></td>
</tr>
<tr>
<td>$\frac{\hat{p}<em>{iw}{GDDO}}{\hat{p}</em>{iw}\left(\frac{GDDO \text{ per share}}{P_{t-1}}\right)}$</td>
<td>0.222</td>
<td>-0.056</td>
<td>0.983</td>
</tr>
</tbody>
</table>

First, in all regressions, the coefficient $a_2$ is positive but less than 1, which violates the prediction that $a_2$ will be between 1 and $\lambda_i^{p/e}$. This implies that many investors see the gap between the real earnings and the expected earnings as not even one-time earnings or that there is substantial measurement error in the earnings surprise. The presence of this measurement error is very likely since the expected earnings are from many different sources that contain considerable noise. However, as we can see from Table 4, the earnings surprise measure does not affect inferences about the coefficient $a_3$ and $a_4$ since it is almost uncorrelated with GDDO and $\hat{p}_{iw}\{GDDO\}$.

Second, in all regressions containing GDDO, $R^2$ is higher than the regression containing the earnings surprise only (p-value for $a_2$: 0.007). Both $a_3$ and $a_4$ are positive but are much smaller than $a_2$. This result is quite reasonable since the unsophisticated investors are a portion of all investors and sophisticated investors play the role of keeping the proper price level, taking an arbitrary position in the market. More importantly, this shows that GDDO has some effect on the stock return positively and only a small number of investors are unsophisticated in interpreting GDDO.
Third, the lower $R^2$ in the regression containing $\hat{p}_{iw}\{\text{GDDO}\}$ (p-value for $a_2$: 0.003; p-value for $a_4$: 0.002), compared to the regression containing simple GDDO (p-value for $a_2$: 0.002; p-value for $a_3$: 0.001), implies that using the proportion of trading amount done by individual investors on the day $w$ as a proxy for $\hat{p}_{iw}$ is inappropriate.

**VI. Conclusions**

This paper tests whether the gains/losses on disposal of discontinued operations (GDDO) recognized on the income statement as a result of spin-off activity have an impact on the stock prices or returns due to functional fixation. The test result implies that (1) there is an impact of GDDO, but it is not significant compared to the impact of the same amount of earnings surprise (ES), and that (2) the extended functional fixation hypothesis (EFFH) holds in this case. The impact of GDDO is just 3.86% of the same amount of earnings surprise. However, I observe that the amount of gains/losses on disposal of discontinued operations recognized is very large compared to earnings surprise in many cases. SHINSEGAE announced a GDDO which is 2,374 times greater than its earnings surprise for the same quarter, HANKOOK TIRE WORLDWIDE announced a 24,184 times greater GDDO, and NAVER announced a 42,392 times greater GDDO.

Considering the test result, which shows validation of EFFH in processing GDDO, a firm may have a strong incentive to spin off operations which are profitable but have a relatively small book net asset value, since they can take advantage of the accounting for GDDO to show a positive financial performance and to affect the stock price. On the other hand, sophisticated investors would try to benefit from mispricing arising from GDDO. Although the test shows the possibility of GDDO impairing investors' rational decision making, it also implies there may be
other possible distraction factors which can induce functional fixation. To avoid the trap of functional fixation, investors will need to have a fuller knowledge of accounting and devote more cognitive resources to information processing.
References