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## Impact of Advertising on Liquidity Risk

Manoj K. Agarwal

Srinivasan Krishnamurthy

Ashwin Malshe\*\*

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\*\* Manoj K. Agarwal is Professor of Marketing, Srinivasan Krishnamurthy is Associate Professor of Finance, and Ashwin Malshe is a Doctoral Candidate in Marketing, School of Management, Binghamton University, SUNY.

## Abstract

The extant marketing literature examines the impact of marketing actions on the buying behavior of consumers in product markets and the resultant impact on cash flows. However, marketing also impacts firm value through its effect on investors in capital markets, an aspect that is distinct from the product market effects studied in the prior literature. We draw upon recent literature in finance which suggests that in addition to systematic market risk, investors are also concerned about liquidity risk, and that this risk affects firm value. We explore the role of marketing, and more specifically advertising, in reducing liquidity risk through its impact on investor behavior. We find that advertising reduces liquidity risk and increases firm value.

Liquidity is the ability of investors to easily buy and sell stocks at a low cost. Liquidity risk represents the risk that an investor may not be able to trade when needed. We argue that marketing has an important role in enhancing the liquidity of the firm's stock. Investors trade in stocks that they are aware of, and by improving the firm's visibility in capital markets, product advertising can increase the pool of investors that are willing to trade in the firm's stock. This reduces the firm's liquidity risk and cost of capital, resulting in higher firm value.

We examine data from more than 1700 firms over a thirty-five year period from 1971 to 2005 and report three main findings. We show that compared to firms that use advertising, firms that do not report any significant advertising expense have higher liquidity risk. Furthermore, we document an inverse relationship between advertising and liquidity risk. We also simulate the potential impact of increasing advertising expenditures by 25% on firm value through the lowering of liquidity risk. Firms in both the highest and lowest advertising quartiles do not see any benefits. The main impact is felt by firms in the middle two quartiles, whose value can increase by up to 1.25% just due to a reduction in liquidity risk. Overall, our results suggest that researchers and managers should consider the valuation impact of marketing activities via its effect on investors in capital markets, in addition to its product market impact.

## **Impact of Advertising on Liquidity Risk**

The marketing profession is being challenged to demonstrate the impact of marketing actions on shareholder value (e.g., Lehman 2004, MSI 2004). Most of the current marketing studies posit that marketing actions affect consumers' buying behavior, which impacts the magnitude and variability of future cash flows, thus affecting firm value. However, in addition to the valuation impact through consumers in product markets, marketing can also impact firm value through its effect on investors in capital markets. We rely on recent literature in finance, which suggests that in addition to systematic market risk, investors are also concerned about and price liquidity risk. In this paper, we explore the role of marketing, and more specifically advertising, in reducing liquidity risk through its impact on investor behavior in capital markets.

Liquidity is the ability of investors to easily buy and sell stocks at a low cost. Liquidity risk represents the risk that an investor may not be able to trade when needed. Acharya and Pedersen (2005) argue that when the broad market is relatively illiquid, investors would be willing to pay a premium for stocks of well known firms that are easy to trade (e.g., IBM, GE). Additionally, when the stock market declines, investors may need to liquidate some of their assets quickly to meet consumption or other needs. Hence, investors would be willing to accept lower expected returns on a stock that is liquid in a down market. This view suggests that stocks that are liquid and easy to sell will have lower liquidity risk and will sell at a higher value, all else equal. Acharya and Pedersen (2005) find that liquid stocks command a return premium of about a 0.9% per year.

We argue that marketing plays an important role in enhancing the liquidity of the firm's stock. If investors prefer to trade in stocks that they are aware of (e.g., Merton 1987), liquidity will be higher for stocks that have a larger pool of investors (Amihud, Mendelson, and Uno

1999). In addition to its impact on consumers in product markets, advertising can also improve the firm's visibility with investors in capital markets (e.g., Lovett and MacDonald 2005). This will lower liquidity risk, reduce the cost of capital and increase firm value. Anecdotal evidence is also consistent with this observation, indicating that managers realize the importance of investor awareness. Recently, Federated Department Stores changed its corporate name to Macy's, and stated that "By aligning our corporate name with our largest brand, we will increase the visibility of the company with customers, leverage the world-famous Macy's brand name, *and get more credit for our accomplishments in the marketplace*" (Lundgren 27 Feb 2007, italics added). Similarly, Sun Microsystems changed its trading symbol from SUNW to JAVA to make the firm more visible to investors (Schwartz 2007).

The analysis in the paper proceeds along three related lines of inquiry. First, we examine whether advertising affects liquidity risk. We do so by comparing liquidity risk for firms that do not advertise with firms that report advertising expenses for a given year. Using data on more than 1,700 publicly traded US firms over a thirty-five year period from 1971 to 2005, we find that firms that do not advertise significantly are subject to higher liquidity risk, compared to firms that report advertising expenses after controlling for the effects of other risk factors that may affect returns. We obtain qualitatively similar results when we use size-matched firms, suggesting that our results are not an artifact of firm size – i.e., small firms may both not advertise and have higher liquidity risk. Second, we investigate whether the level of advertising affects the level of liquidity risk. We document that liquidity risk declines monotonically across quartiles when firms are grouped annually based on the reported advertising expense. The results are similar when we use alternative model specifications. Taken together, these results support the notion that product advertising also improves the firm's visibility among investors in capital

markets, lowering liquidity risk. Third, we assess the economic significance of this result by simulating the valuation impact of potentially increasing advertising expenditures by 25%. We find that firms in the highest advertising quartile (mean annual advertising \$114 million) do not see any further decreases in their liquidity risks, possibly because these firms are already well known and have high levels of liquidity. Firms in the lowest quartile of advertising expenditures (mean annual advertising \$.13 million) also do not see any benefits, likely because even after a 25% increase in advertising, the absolute amounts of advertising would still be extremely low to affect investor recognition appreciably. The main impact is felt by firms in the middle two quartiles with moderate levels of advertising expenditures, whose value can increase by up to 1.25% solely due to the reduction in liquidity risk. The value change comprises between 2.5% to 15.5% of the total value created by to advertising, and is a substantial economic impact.

The results in this paper make the following contributions to the marketing literature. First, we introduce liquidity risk as a hitherto unexplored but important driver of firm value and suggest that marketing efforts such as product advertising can lower liquidity risk by affecting investor perception and behavior. While advertising has been shown to influence a firm's liquidity (e.g., Grullon, Kanatas and Weston 2004), the impact of advertising on liquidity risk and firm value has not been studied before. Second, we show that it is important to study the impact of marketing activities on not only product markets but also capital markets. For example, our finding that advertising affects liquidity risk indicates that the returns to advertising have probably been underestimated in the prior literature. Third, we suggest that methodologically, the portfolio method is better and more robust than the commonly used firm-level approach when studying the impact of marketing actions on firm value. Finally, we contribute to the increasingly important literature studying the impact of marketing actions on firm value.

The rest of the paper is organized as follows. We first provide the conceptual background and introduce the idea of liquidity and liquidity risk, and how marketing actions such as advertising can lower liquidity risk. We then describe the data and the methodology used to estimate liquidity risk and conduct a variety of robustness checks. Finally, we examine the impact of the reduction in liquidity risk on firm values and conclude by discussing the implications of our findings.

### **Conceptual Background**

Firm value is determined both by the level and timing of cash flows, as well as its vulnerability to market and economy wide conditions. A diversified investor only cares about the incremental risk added to the overall portfolio when investing in a firm and is not concerned with the firm-specific risk that can be diversified away. Under this framework, investors will only price those systematic risks that cannot be diversified away. The most common systematic risk factors used in the finance literature are those suggested by Fama and French (1992, 1996) and Carhart (1997). These economy wide factors are termed the market, size, value and momentum factors and the sensitivity of the firm's returns to these factors (covariance risk or 'beta') determines the investors' expected returns from investing in that stock. While the market factor is theoretically grounded in the Capital Asset Pricing Model (CAPM), the other three factors are empirically determined. Fama and French (2004) succinctly state that the other factors "are not motivated by predictions about state variables of concern to investors. Instead they are brute force constructs meant to capture the patterns uncovered by previous work on how average stock returns vary with size and the book-to-market equity ratio".

Researchers in finance are increasingly suggesting that besides market risk, an additional *theoretically* supportable risk that investors need to be compensated for is liquidity risk (Pástor and Stambaugh 2003, Acharya and Pederson 2005, Korajczyk and Sadka 2008). The CAPM assumes that the market is perfectly liquid or frictionless. But in practice, all assets cannot be costlessly bought or sold when the investors want to trade. These illiquidity costs affect stock prices because investors would require compensation for the risk that they may not be able to trade a particular stock when they want to. We discuss liquidity risk and how marketing actions can help reduce these costs in more detail below.

### Liquidity and Liquidity Risk

Liquidity represents the ease of trading a security. Not all securities trade every day. For example, of the about 5000 stocks available in CRSP, only 80% traded on each of the approximately 250 trading days in 2007. About 2% of the firms did not trade on 75 days or more, and 5% did not trade on 40 days or more. Further, the liquidity of individual stocks as well as the overall market varies over time (Chordia et al 2000, Hasbrouck and Seppi 2001). For example the overall market was very illiquid during the 1972-1974 recessions and the crash of 1987 (Liu 2006). In more recent times, the overall market liquidity declined from 2007 to 2008. The number of stocks that traded every day in 2008 declined to 77%. About 3% did not trade on 75 days or more, and 7% did not trade on 40 days or more, indicating that more individual stocks were illiquid in 2008 compared to 2007. Thus, investors would be concerned with the liquidity of the stocks in their portfolio.

One factor that impacts stock liquidity is the number of buyers and sellers who are willing to trade in the stock. If there are enough investors willing to buy and sell a stock at any

given time, then the stock will be very liquid and investors will find it easy to find counterparties to trade with. The literature in finance has examined several factors that affect liquidity. Corporate financial policies such as being publicly listed, having limited liability for stockholders, and better information transparency to the investors, among others, can improve liquidity and make the stock more attractive to investors (e.g., Amihud and Mendelson 1986).

The number of buyers and sellers is also related to the overall size of the investor pool (Amihud, Mendelson, and Uno 1999). In the finance literature, it is accepted that investors prefer to trade in stocks that they are aware of (Merton 1987). Under this scenario, stocks with high awareness levels among investors will tend to have higher levels of liquidity. As an anecdotal example, if one examines three similar firms of similar size in the telecommunications industry – Qwest Communication, Sprint and KT Corporation, their trading volumes are quite different. In 2007, the annual turnover for the two better known firms - Sprint and Qwest - is about 1.5 times the number of outstanding shares, while this ratio is about 0.78 for KT Corporation.

Marketing actions can increase the size of the investor pool both directly and indirectly. Direct marketing to the investor community of course helps in this process. For example, if a firm markets itself to financial analysts, it can increase the number of analysts following a firm, which in turn can affect the size of investor pool (Chung and Jo 1996). Most firms have an investor relations department that is responsible for communicating with the investment community. Importantly, even indirect marketing actions such as advertising to consumers in the product market can have a spillover impact on the investor community, resulting in higher overall awareness about the firm and its products (Lovett and MacDonald 2005). Firms may advertise their products in the financial press (e.g., Wall Street Journal) or in media that are commonly perused by investors (e.g., CNBC, local print media etc.). For example, Kodak has

advertised their ink saving inkjet printers and Sony advertised its ebook reader using full page advertisements in the Wall Street Journal (WSJ March 30, 2009). Empirically, Grullon, Kanatas and Weston (2004) show that firms with higher product market advertising expenditures have a larger number of both individual and institutional investors. They also show that firms with higher advertising expenditures also have higher liquidity due to the larger investor base.

However, the link between advertising on the one hand and *liquidity risk* and firm value on the other, has not been explored in the extant literature. Liquidity risk represents the risk that the investor may not be able to trade a particular asset when they want to do so (Acharya and Pederson 2005). Investors hold a portfolio of assets, taking into consideration both their current and future consumption needs. As the investment opportunities change in the marketplace, investors will trade and readjust their portfolios. In addition, higher consumption needs (e.g., buy a home or finance a child's education) may cause them to liquidate some of the assets in their portfolio. Thus investors will also consider an asset's liquidity as part of their investment decision-making and will require compensation for being exposed to liquidity risk.

Investors face at least two types of liquidity risks that they are willing to pay a premium for (Acharya and Pederson 2005). First, when the broader market is illiquid, stocks of well known firms may continue to be easily traded, while the trading activity in smaller and less known firms may be adversely affected. For example, in 2008 when the overall stock market liquidity dropped by about 44%, the stock of Kellogg Company traded everyday with around 2.6 million shares trading on average, suggesting that the liquidity risk would be small. Investors would be willing to pay a premium for stocks that will be easy to trade even when the overall market is illiquid, resulting in a lower cost of capital. Conversely, investors would require a higher return when investing in stocks where liquidity dries up during periods of market

illiquidity. Acharya and Pedersen (2005) report that the average return premium for this facet of liquidity risk is about 0.08% per year. The second component of liquidity risk for which investors are willing to pay a premium is the ability to quickly sell a stock when the market return is low. In a down market, investors may need to sell assets and the ability to sell easily is valuable. For example, in 2008, the stock of Bridgford Food Corporation did not trade on 113 (out of 253) days. Acharya and Pedersen (2005) estimate the premium for this type of liquidity risk to be about 0.82% per year. In sum, to compensate for the risk of holding an illiquid stock when the overall market is illiquid or when the market declined in value, investors demand an additional risk premium of about 0.9% per annum. This increase in expected return will increase the cost of capital of the firm, and thus reduce its firm value.<sup>1</sup>

We argue that advertising has an important role to play in reducing liquidity risk. High levels of advertising will enlarge the size of the investor base, and the larger pool of potential investors will make trading relatively easier, thus lowering liquidity risk. On the other hand, firms with no or low levels of advertising will have to contend with a smaller pool of investors. If investors desire to liquidate their investments in the firm, they would face difficulties in executing their trades in firms that have a smaller pool of investors, especially when the market is illiquid or when the market return is low. Thus, we expect that the liquidity risk will decline monotonically with advertising expenditures.

Firms include their advertising expenditures in the Selling, General and Administrative expenses (SG&A). The cost of media advertising (radio, television, newspapers and periodicals) and promotional expenses, excluding selling and marketing expenses, have to be reported as a

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<sup>1</sup> Acharya and Pedersen (2005) also discuss a third component of liquidity risk premium. When the market is illiquid, investors prefer stocks with higher stock returns. This risk premium is estimated to be 0.16% per year. But since this risk premium does not relate to stock liquidity that marketing actions can affect, we do not elaborate on this here.

separate item in the annual reports, if the amount is material. We expect that if firms advertise at all and that expenditure is material, then:

H1: Firms with zero advertising expenditure will have a higher liquidity risk than firms with some positive advertising.

We contend that the magnitude of advertising is related to the level of liquidity risk. All else equal, firms that advertise more heavily will be able to create awareness among a larger pool of investors and reduce liquidity risk to a greater extent than firms that have limited advertising budgets. As the magnitude of advertising expenditures increases, the investor pool will be larger, leading to a lower liquidity risk. We thus expect that,

H2: Firms that spend more (less) in total advertising dollars will experience a lower (higher) liquidity risk.

We also assess the economic effect of advertising on firm value using simplified valuation estimates. While the impact of advertising on firm value through the product-market impact on consumer behavior (e.g., due to increased sales) has been widely investigated in the prior literature (e.g., Leone 1995), the impact of advertising on firm value through reducing liquidity risk has not been studied as yet.

## **Data and Methodology**

### Sample selection:

We use data for US based firms available in the merged CRSP COMPUSTAT file from Wharton Research Data Services (WRDS) during the 35 years from 1971 through 2005. We

limit our analysis to this period as only a small number of firms reported advertising expenditure before 1971 and the market liquidity factor is only available till 2005. We exclude foreign firms that are traded as American Depository Receipts (ADR), closed end funds and other securities, retaining only common stocks of domestic US firms with a share code of 10 or 11. On average, about 62% of the firms have missing advertising data per year. Because we cannot reliably determine whether these firms actually had significant advertising expenditure but failed to report it or they did not spend any material amount advertising, we delete these firms from the sample. Finally, we retain only those firms in our sample that have monthly stock returns data available on CRSP. This results in an average sample size of 1,812 firms per year (63,429 firm years). Our model estimation requires monthly data on stock returns, returns on U.S Treasury bills (the risk free rate), data on the three factors proposed by Fama and French (1993) and the momentum factor proposed by Carhart (1997), all obtained from WRDS. We also use a liquidity factor to estimate the liquidity risk. We require a measure of liquidity which captures both the ease and speed of trading a stock as well as the quantity of trading. While several measures of individual stock and market liquidity have been proposed (Amihud 2002, Pástor and Stanmaugh 2003), we use Liu's (2006) liquidity measure, LIQ, as it places emphasis on ease and speed of trading (Lin, Singh, and Yu Forthcoming JFE, Liu 2006) and more fully captures the non-trading risk to the investor. The details of the LIQ measure are provided in Appendix A.<sup>2</sup>

In comparison to the other studies in marketing using financial data, our sample is broader including both large and small firms, larger in size and with spans a considerably larger time period of 35 years. For example, McAlister, Srinivasan, and Kim (2007) analyze 3,450 firm years over a period of 22 years (1979-2001). They limit their sample to the firms listed on New

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<sup>2</sup> We thank Weimin Liu for sharing his monthly liquidity factors with us.

York Stock Exchange (NYSE). In contrast, our sample firm may be listed on any of the three stock exchanges – NYSE, AMEX, and Nasdaq.

#### Methodology to estimate liquidity risk:

In order to estimate the linkage between advertising and liquidity risk, we use the calendar-time portfolio method (Fama 1998). This method is commonly utilized in the finance literature and has also been used in prior studies in marketing (e.g., Sorescu, Shankar and Kushwaha 2007). We first rank all the stocks based on their advertising expenditures during the ‘portfolio formation period’ of one year or based on the average advertising expense during the prior three years. We then either divide all the stocks into two portfolios (zero-advertising and positive-advertising, to test H1) or divide all stocks with positive advertising expenses into four equal sized portfolios (to test H2). We reassign firms to portfolios at the end of every portfolio formation period and repeat this process over the entire duration covered by the study (1971-2005). We invest equal amounts in all stocks in a given portfolio during the ‘model estimation period’, which is either one- or three-years, and calculate the monthly return on the portfolio. In calculating the portfolio return, we also account for firms that delist over time.<sup>3</sup> The model estimation periods are always non-overlapping periods, to ensure that there is no correlation in the estimated betas. We thus generate a time-series of monthly portfolio returns for every portfolio. We regress the portfolio excess return (in excess of the risk free rate) on the selected risk factors, and the slope coefficients give us the estimated betas.

We illustrate this calendar-time portfolio procedure for the one year portfolio formation and one-year model estimation period, using all firms with positive advertising expenses. We

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<sup>3</sup> If delisting is not accounted for in the portfolio returns calculation, it can introduce a bias. The details of how we adjust portfolio returns for delisted firms are provided in Appendix B.

start with the year 1971. We sort the firms into quartiles, P1 to P4, based on the advertising expenditures in year 1971. P1 consists of all the firms in the lowest advertising quartile; P4 consists of all the firms in the highest advertising quartile. The corresponding model estimation period is 1972. The equal-weighted portfolio returns are calculated for every month in 1972 using the monthly returns for individual stocks in the portfolio. This procedure yields 12 monthly returns for each of the P1 to P4 portfolios, which are used to estimate the regression models for each portfolio (see also Figure 1).

We repeat this procedure for the next portfolio formation period, 1972. Specifically, we reassign firms to the four portfolios P1 to P4 portfolios, based on advertising expenses in 1972. We calculate the monthly portfolio returns and estimate the regression model using the 12 monthly returns for this portfolio in the model estimation period 1973. We continue this procedure until 2005 and end up with 34 non-overlapping model estimation periods, i.e., 1972 to 2005. As shown in Table 2, each portfolio, on average, consists of 426 firms per year.

We estimate liquidity risk as the slope coefficient on the liquidity factor in an OLS regression of the monthly portfolio excess returns on the liquidity factor and other risk factors. In the first model (liquidity-augmented CAPM), we include the excess market return and the liquidity factor as the two risk factors that explain the cross-section of returns (eq. 1). We include these factors because they have strong theoretical underpinnings (e.g., Sharpe 1964, Lintner 1964, and Mossin, 1966 for the market factor and Pastor and Stambaugh 2003, Acharya and Pedersen 2005, and Korajczyk and Sadka 2008 for the liquidity factor). However, research in finance has empirically shown that cross-sectional differences in stock returns can empirically be more fully explained by adding three additional factors – size, book-to-market, and momentum factors (Fama and French 1992, Carhart 1997). Even though Fama and French (2004) argue that

these additional risk factors are “brute force” constructs, with little theoretical justification, the literature in finance commonly includes additional risk factors. Hence, we estimate a second model that includes these three additional risk factors, in addition to the market factor and the liquidity factor (eq. 2).

$$R_{pt} - R_{ft} = \alpha_p + \beta_{mp}MKTRF_t + \beta_{lp}LIQ_t + \varepsilon_{pt} \quad (1)$$

$$R_{pt} - R_{ft} = \alpha_p + \beta_{mp}MKTRF_t + s_p SMB_t + h_p HML_t + u_p UMD_t + \beta_{lp}LIQ_t + \varepsilon_{pt} \quad (2)$$

where  $R_{pt}$  is the return on portfolio  $p$  during month  $t$  and  $R_{ft}$  is the rate of return on a U.S. Treasury bill during the same period;  $MKTRF_t$  is the excess return on the market portfolio ( $R_{mt} - R_{ft}$ ) and  $R_{mt}$  is market return in month  $t$ ,  $SMB_t$  is the size factor in month  $t$  and is calculated as the difference between the rate of returns of a portfolio of small vs. large firms,  $HML_t$  is the difference in returns between high and low book-to-market stocks,  $UMD_t$  is the difference in average returns of between portfolio of winner stocks with high prior returns and loser stocks with low prior returns,  $LIQ_t$  is return difference between low and high liquidity portfolios, and  $\varepsilon_{pt}$  is the error term. The main variable of interest is the liquidity beta, the estimated slope coefficient  $\beta_{lp}$ .

We estimate both models for each of the model estimation periods from 1972 to 2005 and report the mean of these “time-series” parameter estimates. We assume that the parameters estimated in one time period are independent of the parameters estimated in any other time period. In addition, if markets efficiently incorporate the available information into stock prices, monthly stock returns would be serially uncorrelated (Kothari and Warner 2006). Thus, our regressions follow a procedure similar to that suggested by Fama and Macbeth (1973).

### Summary statistics:

Table 1 reports the summary statistics for firms that do not advertise and firms that reported positive advertising expense.<sup>4</sup> We first compute the averages of all the variables across all the firms for each year and each portfolio, resulting in 35 mean values for each variable. We then report the descriptive statistics of these 35 values for each variable. Panel A in Table 1 reports the descriptive statistics for firms with positive advertising expenses. On average, this portfolio consists of 1706 firms each year. The mean (median) market value of equity for is \$1,158 (\$539) million. The mean (median) advertising expenditure is substantial at \$30 (\$25) million. These firms, on average, spent 7% of their sales on advertising every year. Panel B reports the summary statistics for the firms with zero (or insignificant) advertising expenses. The sample in Panel B, with an average of 107 firms per year, is considerably smaller than that in Panel A, indicating that most firms use some form of advertising. We find that these firms are primarily the smaller or medium sized firms. The mean (median) market value of equity is \$224 (\$55) million. Although their average total assets are \$952 million, the median total assets is just \$62 million.

Table 2 reports similar statistics for four quartile portfolios formed by sorting firms on their annual advertising expenditures. Each portfolio consists of an average of approximately 426 firms every year. Portfolio P1 consists of the firms with the lowest amount of advertising expenses. The mean (median) annual advertising expenditure is only \$0.13 (\$0.11) million. The mean (median) annual advertising expenditure for Portfolio P2, the second quartile, is \$0.73 (\$0.64) million while for the third quartile, portfolio P3, it is \$3.86 (\$3.28) million. Finally, for the highest advertising quartile, portfolio P4, the mean (median) annual advertising expenditure

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<sup>4</sup> All variable definitions are in Appendix C.

is \$113.61 (\$95.99) million. For brevity, in the rest of this section we discuss summary statistics only for portfolio P1 (lowest advertising) and portfolio P4 (highest advertising).

The firms in P1 are significantly smaller than the firms in P4. The average market value of equity of P1 is only \$45 million and is only about 1% of the mean market value of equity of the firms in portfolio P4. We find a similar pattern in both total assets and sales, indicating that the firms in P1 are much smaller than the firms in P4. In spite of the size differences, the average advertising-to-sales ratio for both the portfolios is about 7%, suggesting that firms in both portfolios have equal advertising intensity. However, given the small absolute level of annual advertising expenditures in P1 (\$0.13 million), any visibility generated due to advertising will likely be very small. On the other hand, with the same advertising intensity, the firms in P4 are likely to have a very high visibility due to their much higher level of average advertising expenditures (\$113.61 million).

## **Results**

In this section, we present the results of the models estimated using the liquidity-augmented CAPM model (model 1) and the liquidity-augmented Carhart 4-factor model (model 2). We focus mainly on liquidity risk (coefficient of the liquidity factor), because the other risk-factors are used to control for the other systematic risks and we do not develop any specific hypotheses about them.

### Comparison of zero- and positive-advertising portfolios:

In Table 3, we report the estimates of the two models for zero- and positive-advertising portfolios. The stocks are sorted into portfolios based on the advertising expense (the portfolio

formation period) every year and the regression models eqs. 1 and 2 are estimated using returns over the subsequent 12 months (model estimation period). In both models, the liquidity beta is highly statistically significant for both firms with zero advertising and for firms that report positive advertising expenses. Consistent with hypothesis H1, we find that firms that do not advertise are subject to significantly higher liquidity risk than firms that use advertising. Specifically, using the liquidity-augmented CAPM (model 1), the liquidity risk for firms in the positive-advertising portfolio averages 0.41, which is significantly lower than the mean of 0.87 for firms that are in the zero-advertising portfolio at the one-percent significance level. The results are similar using the liquidity-augmented Carhart 4-factor model. The corresponding estimates of the liquidity beta are 0.41 and 0.91, and the mean difference is statistically significant at the five-percent level. The results are not driven by outliers. Figure 2 shows the difference in liquidity betas (beta for the zero-advertising portfolio – beta for the positive-advertising portfolio, for model 2) for each year. As can be seen, the difference is positive in most of the years, as expected. These results indicate that the firms that do not advertise are subject to higher liquidity risk, and support hypothesis H1.

We conduct four additional tests to assess the robustness of our results. First, we assign firms to the zero- and positive-advertising portfolios based on the average advertising expense over the prior three years rather than just the advertising expense in the prior year. This is more likely to accurately capture whether the firm advertises its products or not. Further, when we use a one year portfolio formation period, we are assuming that most of the effects of advertising on the investor markets occur during the next year. However if advertising has a longer term effect, then the impact on investors in period  $t+1$  could be due to advertising expenditures in periods  $t$ ,  $t-1$ ,  $t-2$  etc. To test the sensitivity of the results to this assumption, we re-estimate both models

using a three-year portfolio formation period and a one-year estimation period. In this case, we take the average advertising expenditure over the three years portfolio formation period as a proxy for firm's advertising policy. Since the first estimation period is 1974, we have 31 estimation periods in this procedure (compared to 34 when we use a one year formation period). The results, reported in Table 3A, are similar.

Second, we retain the portfolio formation period as one year, but extend the model estimation period to include the subsequent 36 months. Since a one year window only provides 12 monthly observations for model estimation, the beta estimates may have high standard errors. As a robustness check we use a one year portfolio formation and a three year estimation window for the entire estimation period (1972-2005). In each 3-years estimation period we use 36 monthly returns to estimate our models. We use non overlapping estimation periods which reduces the time series of betas to 11 observations. The results, reported in Table 3B, again indicate that firms that use advertising are subject to lower liquidity risk.

Third, we pool all the observations and estimate the liquidity betas. Thus, we combine all the 34 period monthly returns (resulting in 408 observations), and estimate one regression equation for each of the two models. Due to the large number of observations, we expect the beta estimates to be much more precise. We find that our results continue to hold (Table 3C).

Finally, we control for firm size because generally, there is a positive correlation between firm size and advertising expenditures. Large firms spend more on advertising as compared to small firms. One possible objection to forming portfolios based on advertising expenditure is that it could be equivalent to sorting them on firm size. Although we do control for size effects in model 2 by including the size factor SMB, we conduct an additional check to ensure that the differences in liquidity betas are primarily due to advertising expenditure differences. For each

firm in the zero-advertising sample, we select a matching firm of similar size from the positive-advertising sample that has total assets within 70-130% of the total assets of zero-advertising firm. We use the one year portfolio formation period and one-year model estimation period and report the results in Table 4. We continue to find that the liquidity beta for the zero-advertising portfolio is significantly higher than that for the positive-advertising portfolio. We obtain similar results in Tables 4A and 4C where we either use a one-year portfolio formation period and three-year model estimation period, or use the pooled sample, even though only the results in Table 4C are statistically significant. This is a stronger test of our main hypothesis, suggesting that even after explicitly controlling for firm size, advertising reduces liquidity risk.

#### Comparison of the four positive-advertising quartile portfolios:

In Table 5 we report the estimates of the models for the four positive-advertising portfolios (P1 to P4). The first four columns show the values of the beta coefficients for the four portfolios. Several important observations about the estimates of liquidity beta emerge. First, using both estimation models, the liquidity beta of the low advertising portfolio P1 is always the highest and that of the highest advertising portfolio P4 is always the lowest. Second, the liquidity betas decrease monotonically as we move from the lowest advertising to the highest advertising portfolio. Both these observations strongly support our hypothesis H2 that higher levels of advertising reduce liquidity risk. Third, the liquidity beta of P4 is marginally significant in model 1 ( $p < 0.1$ ) and is not significantly different from zero in model 2. Firms spending large amounts on advertising are extremely visible to investors and will have large investor pools, and thus face very low or no liquidity risk.

The last three columns in the table show the difference between the liquidity beta of P1 firms and liquidity betas of firms in portfolios P2, P3, and P4 are monotonically increasing. For example, for model 2 the mean differences in the liquidity betas for P1-P2, P1-P3, and P1-P4 are respectively 0.450 (t-statistic = 5.07), 0.630 (t-statistic = 6.70) and 0.876 (t-statistic = 9.33), and these differences are significantly distinct from zero at 1% level of significance. Thus, higher advertising significantly reduces liquidity risk. For model 2, these are graphed in Figure 3 and confirm that in the majority of the years, the differences in liquidity beta (P1 – P2), (P1 – P3), and (P1 – P4) are positive in the overwhelming majority of the years. The consistently significant differences between liquidity betas of the lowest (P1) and higher advertising portfolios (P2, P3, and P4) in both the models indicate that our results are robust and not sensitive to the model specifications.

We conduct three additional tests to assess the robustness of our results. First, we assign firms to the zero- and positive-advertising portfolios based on the average advertising expense over the prior three years rather than just the advertising expense in the prior year. Second, we retain the portfolio formation period as one year, but extend the model estimation period to include the subsequent 36 months. Third, we pool all the observations and estimate the liquidity betas. We find that our results continue to hold (Tables 5A, 5B, and 5C).

### Economic Impact

Advertising can impact firm value in two ways. By making customers aware of its products, creating brand loyalty etc., advertising can increase the magnitude and reduce the variability of future cash flows, thus increasing firm value. Second, advertising can impact value via its impact on capital markets and investor awareness and the associated reduction in

liquidity risk. In this section, we estimate the economic impact on firm risk due to reduction in liquidity risk as compared with the direct product market impact. We make some simplifying valuation assumptions in order to make these estimates.

For each of the four positive advertising portfolios, we estimate the impact of a 25% increase in advertising expenditures. Advertising can create value by 1) increasing sales (product market impact), 2) increasing brand loyalty and reducing cash flow variability and market risk (product market impact), and 3) reducing liquidity risk (capital market impact). We assume that the advertising elasticity of demand is 0.2 for all the firms in our sample (Leone 1995). Later we replicate the simulation by assuming the advertising demand elasticity of 0.1. The cash flows of the average firm in the portfolio are calculated as operating margin net of advertising expenditure and taxes. We assume that the tax rate of all the firms is 35%. The average firm's cost of capital is determined by using average betas of the portfolio and average risk premiums of each risk factor (Market, Liquidity, SMB, HML, and UMD). The firm value is then estimated assuming that the cash flows are perpetual, and dividing the cash flows by the estimated cost of capital.

To assess the impact of advertising on market and liquidity risks, we use the liquidity-augmented CAPM model. We use this model in preference to model 2 as the other systematic risk terms in model 2 are not theoretically based. We first estimate the market and liquidity betas using cross-sectional firm level regressions. The monthly firm stock returns are regressed on market and liquidity factors over non-overlapping 3 year periods (from 1971 to 2004). We then regress the firm specific market and liquidity betas on log of firm's advertising expenditure and control variables.<sup>5</sup> The coefficients of log of advertising in the two regressions estimate the

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<sup>5</sup> For market beta regressions, the control variables were R&D intensity, profitability, and book-to-market ratio. For liquidity beta regression the control variable was just the book-to-market ratio. In both regressions we also included 10 time-dummy variables for the 11 estimation periods.

sensitivities of market and liquidity betas to advertising. We run separate sets of regressions for each advertising portfolio.

We report the results in Table 6. Panel A in Table 5 shows our calculations with an assumed demand elasticity of .2 whereas Panel B shows similar calculations assuming a demand elasticity of 0.1. In all the four portfolios the major impact of advertising on firm value is through increased cash flows. This is expected since the first order impact of advertising on firm value is via increased sales. For the average firm in the lowest (highest) advertising portfolio, the total increase in firm value is 18.57% (6.21%). In both cases, there is no change in firm value due to reduction in liquidity risk. This result is not surprising when we consider that the reduction in firm risk is due to increased visibility of the firm to stock market investors. The firms in the lowest advertising portfolio may not get any additional visibility in capital markets by increasing their advertising spending by 25% because the magnitude of the increase is small. Thus, there may not be any impact of increased advertising on liquidity risk for such firms. Similarly, firms in the highest advertising quartile are already likely to be extremely visible to the investors. Any increase in such firms' advertising expenditure is unlikely to increase their visibility to investors any further. Hence, for these firms also there may not be any marginal reduction in liquidity risk by increased advertising.

The mean increase in total firm value due to advertising for firms in the second and third quartile advertising portfolios (P2, and P3) is 14.99% and 11.53% respectively. For P2, the increase in firm value due to reduction in liquidity risk is 1.25% and constitutes 8.33% of the total increase in firm value due to increased advertising. For firms in P3, the increase in value due to the reduction in liquidity risk constitutes a smaller percentage, 2.46% of the total increase in firm value due to increased advertising. This indicates that out of the four advertising

portfolios, the firms in portfolio P2 gain the most due to the reduction in liquidity risk followed by the firms in portfolio P3. Based on P2's original valuations of \$38.35 million an increase of 1.25% corresponds to an increase in market value of around \$479,000. Similarly, from the base value of \$151.98 million, the increase in P3's market value is around \$426,000. Considering P2 and P3's incremental advertising expenditure of \$180,000 and \$970,000 respectively, the increase in value due to reduced liquidity risk is substantial.

### **Discussion and Conclusion**

The extant marketing literature examines the impact of marketing actions on the buying behavior of consumers in product markets and the resultant impact on cash flows. However, marketing also impacts firm value through its effect on investors in capital markets, an aspect that is distinct from the product market effects studied in the prior literature. We draw upon recent literature in finance which suggests that in addition to systematic market risk, investors are also concerned about liquidity risk, and that this risk affects firm value. We suggest that marketing, and more specifically advertising, can reduce liquidity risk through its impact on investor behavior. We find that advertising reduces liquidity risk. While the main impact of advertising is on cash-flow to the firm through its impact on customer behavior, there is a smaller but economically significant effect on firm value through the investor and capital market. Advertising increases the pool of investors, increasing the stock liquidity, reducing the liquidity risk, decreasing cost of capital, and thus increasing firm value.

Recent literature in marketing has increased its focus on studying the link between marketing assets and actions on firm value. These include brand equity (Mizik and Jacobsen 2007), branding strategy (Rao, Agarwal and Dahloff 2004), customer satisfaction (Gupta and

Zeithaml 2006), advertising (Joshi and Hanssens 2008) and new products (Sorescu, Shankar and Kushwaha 2007). None of these studies account for the potential impact of these activities on investor behavior through the liquidity enhancing effect. Our main contribution to the marketing literature is to introduce liquidity risk as an important driver of firm value and to suggest that researchers in the future should include this priced systematic risk in their models.

Several recent studies suggest that advertising expenditures directly affects stock returns (Frieder and Subrahmanyam 2005, Grullon, Kanatas and Weston 2004, Joshi and Hanssens 2008), over and above the product- market effects. Citing these and other studies, Srinivasan and Hanssens (2009) conclude that advertising creates intangible firm value. We show that one of the important ways through which this intangible effect is created is by increasing investor awareness and consequently decreasing liquidity risk. Our study explicates one potential pathway, the capital market, through which the “spillover” of product market advertising can increase firm value. This is our second contribution.

A drawback of the calendar-time portfolio method is that it does not allow an estimation of the firm level estimates of the risk coefficients. Several studies in marketing estimate risk betas for individual firms by regressing stock returns on the systematic risk factors. They then use the estimates of the betas as the dependent variable and relate it to other firm specific variables in cross-sectional regressions. One of the major problems with this approach is that the standard errors of the individual firm betas are not taken into account. The betas estimated through these methods are highly unreliable with large standard errors. For example, in order to estimate the economic impact of a change in advertising, we estimated the market and liquidity betas for the individual firms. A large proportion of both the estimated betas were statistically

insignificant (41% to 85% and 82% to 89%, respectively, Table 7). The portfolio approach provides a more robust method to estimate the risk coefficients.

Our results indicate that researchers in the future should examine the impact of marketing on capital markets more closely. A number of marketing strategies can impact investor awareness besides advertising. The branding strategy of the firm can make the firm more or less visible to investors, similar to its impact in the product markets. A firm targeting a broader market segment is also more likely to be more visible to investors. The distribution intensity of the firm can also impact investor visibility. The CSR actions of a firm may increase the likelihood that socially responsible investors would be willing to invest in the firm. Future research should examine how these and other marketing actions impact firm value.

## Appendix A

In order to compute LIQ, Liu (2005) first calculates the individual stock liquidity factor LM12, and then uses LM12 to develop the market liquidity factor LIQ.

**Liu's liquidity measure (LM12):** LM12 is computed for each stock based on the data from the previous 12 months.

$$LM12 = \left[ \text{Number of zero trading days in prior 12 months} + \frac{1/(12 \text{ month turnover})}{\text{Deflator}} \right] * \frac{21 * 12}{TD}$$

The 12-month turnover is the stock's turnover calculated as the sum of daily turnover over the prior 12 months. Daily turnover is the ratio of number of shares traded on a day to the number of shares outstanding at the end of the day. 21 represents the average number of trading days in a month. TD is the total number of the trading days in the market over the prior 12 months.

Deflator is a number chosen such that  $0 < \frac{1/(12 \text{ month turnover})}{\text{Deflator}} < 1$ , for all sample stocks. Liu chooses a deflator value of 11,000 for constructing LM12.

**Liu's liquidity factor (LIQ):** The market-wide liquidity factor, LIQ, is constructed using mimicking portfolio approach similar to that of Fama and French (1993). Each year, the stocks are sorted on their LM12 value. Liu then creates ten equal-weighted portfolios. LIQ is then computed as the difference between the monthly stock returns of the most illiquid and liquid portfolios. The values of LIQ are available on a monthly basis.

**Comparison with other liquidity factors:** Several other liquidity measures have been proposed in the finance literature (Amihud 2002, Pástor and Stambaugh 2003). Both these measures do not fully account for zero trading volumes, since they are based on measures derived from actual trading data. Amihud (2002) estimates the ratio of daily absolute return to daily dollar trading volume averaged over a 12 month period. If there is no trading, then this ratio cannot be calculated. Pástor and Stambaugh (2003) derive their measure based on daily trading data over a month with a minimum of 16 trading days. If a stock does not trade or trades on less than 16 days in a month, then its liquidity measure cannot be estimated. Thus we feel that Liu's (2006) measure captures more fully the non-trading risk to an investor.

## Appendix B

**Accounting for delisted firms:** Many firms delist each year for various reasons.<sup>6</sup> Once a firm delists, it stops trading on the stock exchange. CRSP sets the firm's subsequent stock returns to missing values. If delisting is not accounted for in the portfolio returns calculation, it can introduce bias in the portfolio returns and hence the beta estimates.

For delisted firms, CRSP reports the delisting code and, if available, delisting returns. Delisting code contains information about the reason for delisting. Delisting return is the return in the time period between the firm's delisting from its current stock exchange and its relisting on another stock exchange or OTC (over the counter) markets. CRSP does its own research to find the delisting returns. When the delisting return is unavailable, CRSP sets the delisting return to missing. Ignoring the missing delisting returns in the portfolio returns estimates amounts to setting firm's delisting returns to -100%. Shumway (1997) showed that ignoring missing delisting returns biases the portfolio returns downwards. It should be noted that a missing delisting return does not necessarily mean that the firm liquidated and shareholders lost their entire investment. The following is an example of the downward bias created due to ignored missing delisting return.

Consider a portfolio consisting of two NYSE firms, A and B. Firm B delists in the month t and it started trading on OTC markets. It has a delisting return of -30% which was not available on CRSP. Thus, CRSP has set the delisting return for firm B to missing.

Example 1: Actual portfolio return

	Price		Return
	Month t	Month t+1	
Firm A	100	110	10%
Firm B	100	70	-30%
<b>Portfolio of A and B</b>	<b>200</b>	<b>180</b>	<b>-10%</b>

Example 1: Biased portfolio return

	Price		Return
	Month t	Month t+1	
Firm A	100	110	10%
Firm B	100	0	-100%
<b>Portfolio of A and B</b>	<b>200</b>	<b>110</b>	<b>-45%</b>

The actual portfolio return is -10%. But, as the return for firm B is missing on CRSP, it is mistakenly taken as -100%. Thus, the biased portfolio return is -45%. The ignored missing delisting return resulted in a downward bias of 35% (-10% + 45%) in the portfolio return. It is, thus, critical to treat missing delisting carefully. Researchers in finance have treated missing delisting returns in different ways.<sup>7</sup> We follow Shumway (1997) and Shumway and Warther

<sup>6</sup> Shumway(1997) and Shumway and Warther (1999) report that on average 1.2% NYSE and AMEX firms and 5.6% NASDAQ firms delist each year for performance related reasons.

<sup>7</sup> See Beaver, McNichols, and Price (2007) for a brief review.

(1999) to adjust the missing delisting returns. We now describe our method briefly. We consider two cases of missing delisting returns.

**Case 1:** *Delisting return is not available and reason for delisting is performance related (delisting code between 500 and 599).* In such cases, we set the missing delisting returns of NYSE and AMEX firms to -30% and of NASDAQ firms to -55%.<sup>8</sup> Since the investment in the delisted stock is non zero, we need to reinvest the residual amount after the stock is delisted. We reinvest the residual amount in equal weighted market portfolio.

**Case 2:** *Delisting return is not available and delisting is due to any other reason (delisting code <500 or > 599).* In such cases we set the delisting return of the stock to -100%.

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<sup>8</sup> Shumway (1997) and Shumway and Warther (1999) obtained the average delisting returns by studying the prices of the firms on OTC (over the counter) markets. -30% and -55% are the average returns of the firms delisted due to performance related reasons.

## Appendix C

### Variable definitions

These variables are used in the firm level regressions for estimating the impact of advertising increase on firm value.

Compustat variable names are in the parentheses.

Total assets (AT), sales (SALE), advertising expenditure (XAD)<sup>9</sup>, and R&D expenditure (XRD) are directly from Compustat. The remaining variables are defined as follows.

1. Market value of equity (MVE): MVE is the market value of equity at the end of the calendar year. It is obtained by multiplying the year-end share price (PRCC\_C) by the number of shares outstanding as of the reporting date (CSHO).
2. Leverage: Leverage is computed as the ratio of the total debt to firm value. Total debt is the sum of long-term debt (DLTT) and debt in current liabilities (DLC). Firm value is the sum of total debt and MVE.
3. Book-to-Market: Book-to-market ratio is computed as the ratio of book value of equity (CEQ) to the MVE.
4. Advertising/Sales: It is the ratio of firm's advertising expenditure to the firm's sales when the sales are positive.
5. Advertising/Assets: It is the ratio of firm's advertising expenditure to the firm's total assets
6. R&D/Sales: It is the ratio of firm's R&D expenditure to the firm's sales when the sales are positive.
7. R&D/Assets: It is the ratio of firm's R&D expenditure to the firm's total assets

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<sup>9</sup> In Compustat SAS dataset, insignificant advertising expenditure is denoted by the missing code “.I “. We treat any non-zero and non-missing advertising expenditure as significant.

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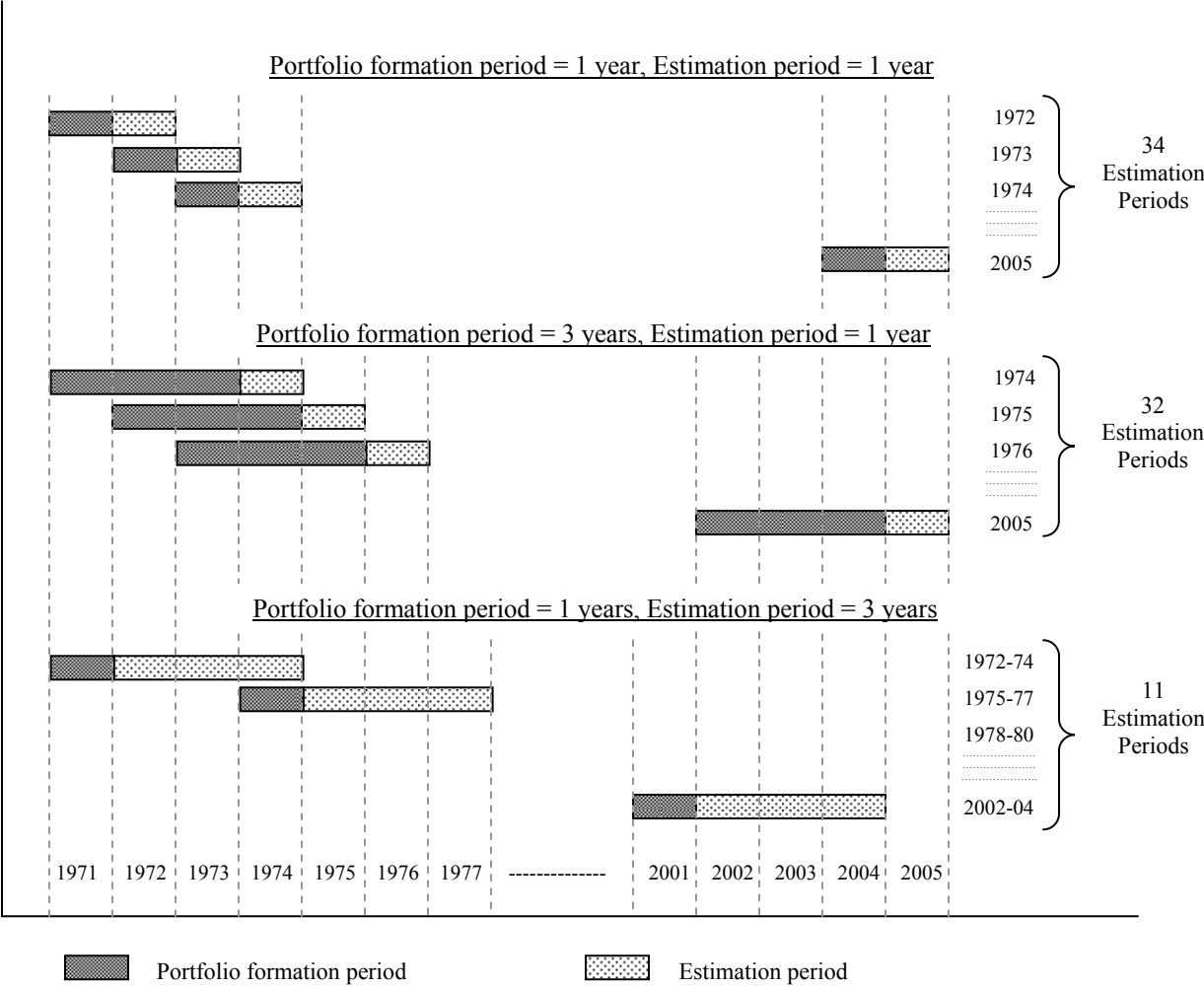
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**FIGURE 1**  
**Portfolio Formation and Estimation**

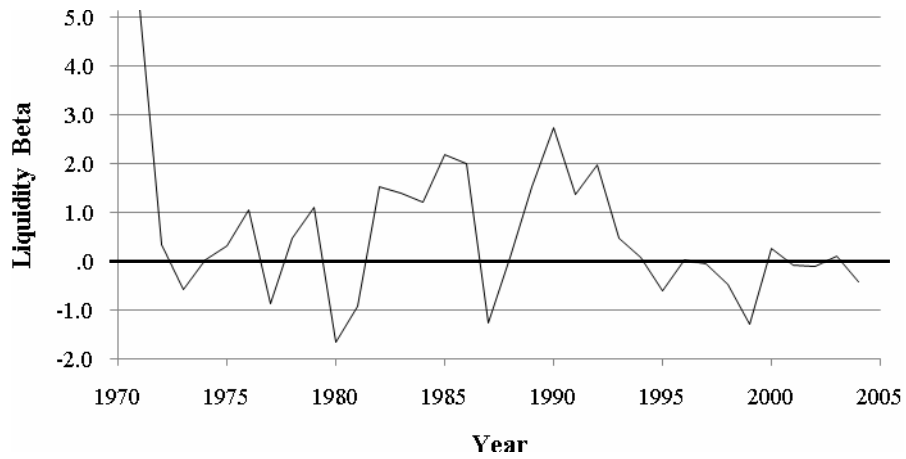


**FIGURE 2**  
**Difference in Liquidity Betas of Advertising Portfolios**  
**(One-Year Advertising Portfolio – One-Year Estimation Period)**

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**Liquidity Beta of Zero Advertising Portfolio (Z1) – Liquidity Beta of Positive Advertising Portfolio (Z2)**

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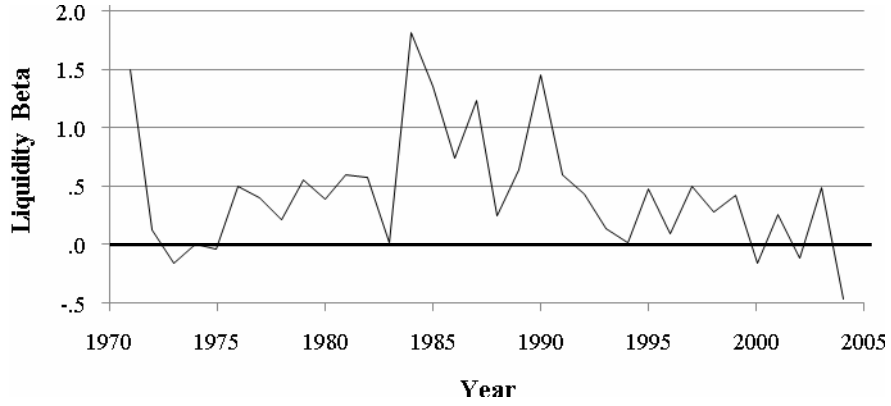


**FIGURE 3**  
**Difference in Liquidity Betas of Advertising Portfolios**  
**(One-Year Advertising Portfolio – One-Year Estimation Period)**

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**Liquidity Beta of Portfolio 1 (P1) – Liquidity Beta of Portfolio 2 (P2)**

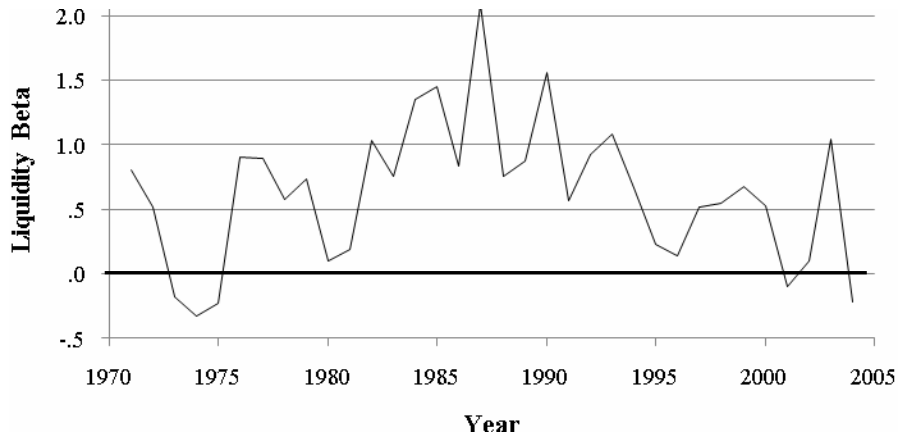
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**Liquidity Beta of Portfolio 1 (P1) – Liquidity Beta of Portfolio 3 (P3)**

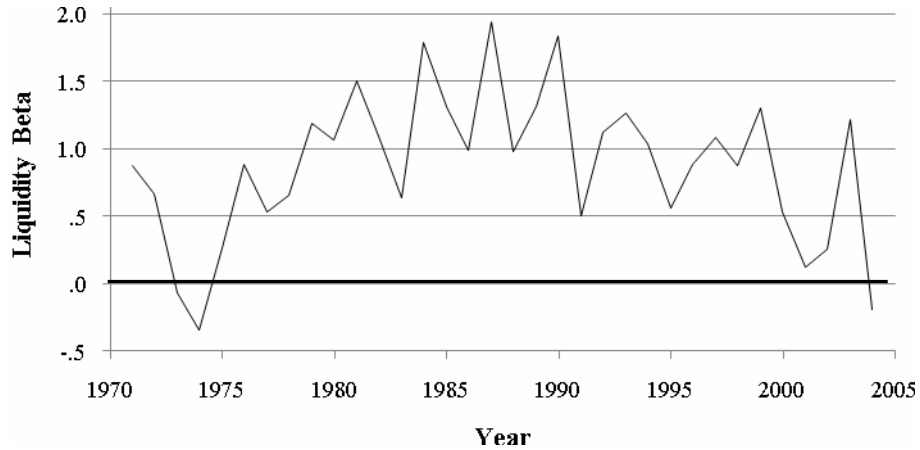
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**Liquidity Beta of Portfolio 1 (P1) – Liquidity Beta of Portfolio 4 (P4)**

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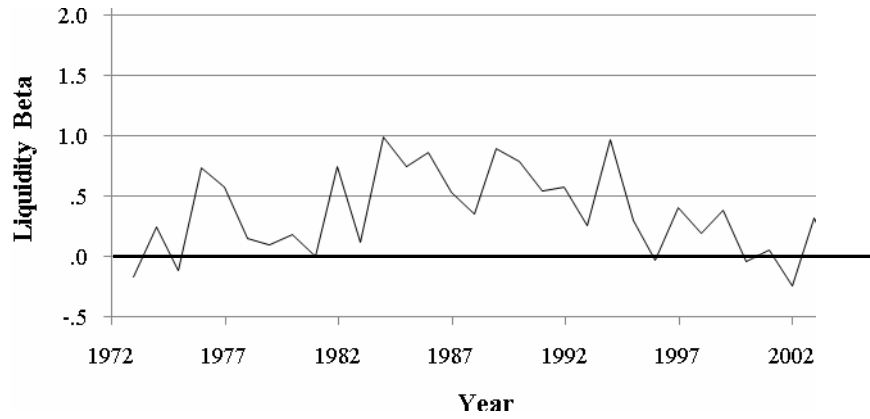


**FIGURE 3A**  
**Difference in Liquidity Betas of Advertising Portfolios**  
**(Three-Year Advertising Portfolio – One-Year Estimation Period)**

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**Liquidity Beta of Portfolio 1 (P1) – Liquidity Beta of Portfolio 2 (P2)**

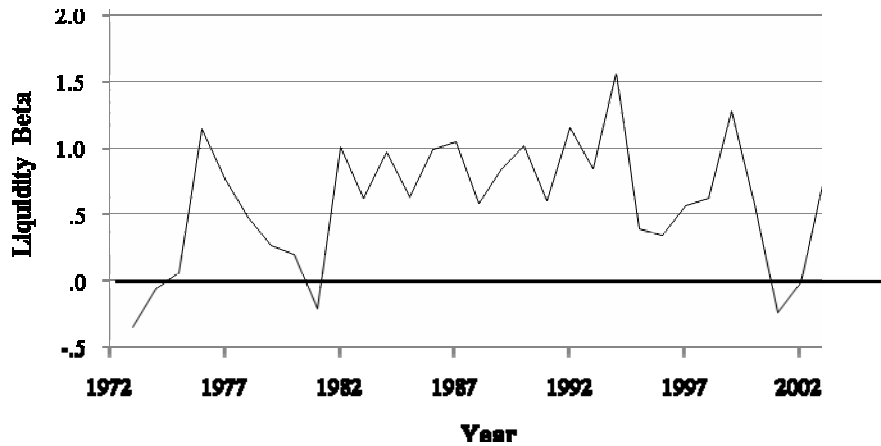
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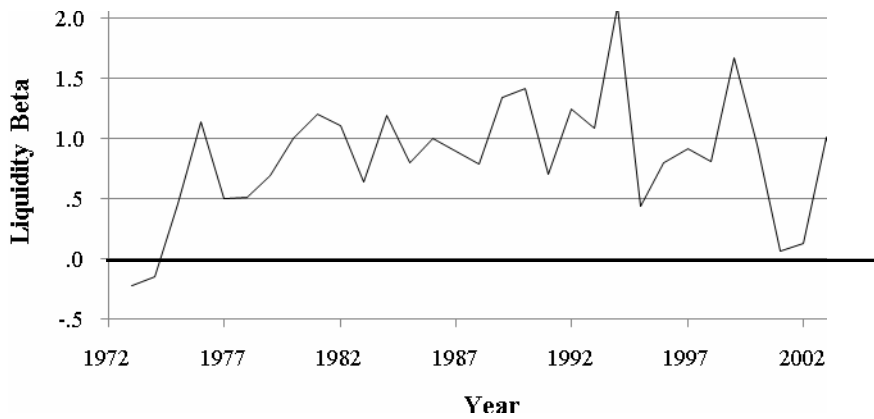
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**Liquidity Beta of Portfolio 1 (P1) – Liquidity Beta of Portfolio 4 (P4)**

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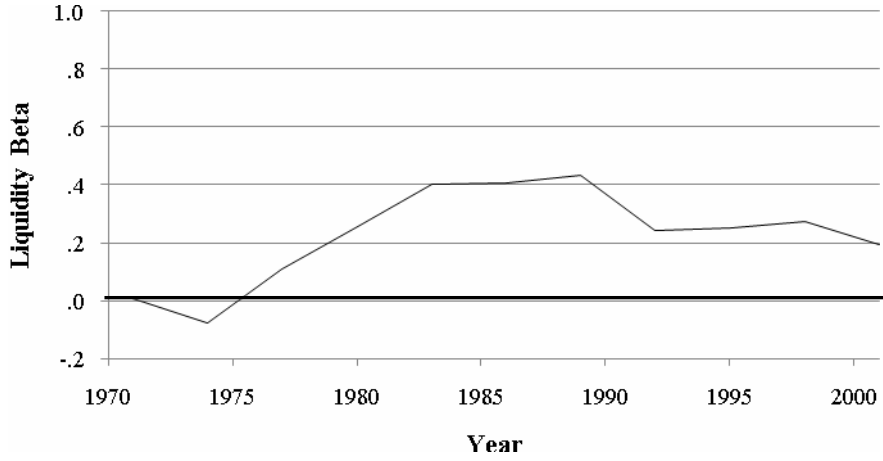


**FIGURE 3B**  
**Difference in Liquidity Betas of Advertising Portfolios**  
**(One-Year Advertising Portfolio – Three-Year Estimation Period)**

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**Liquidity Beta of Portfolio 1 (P1) – Liquidity Beta of Portfolio 2 (P2)**

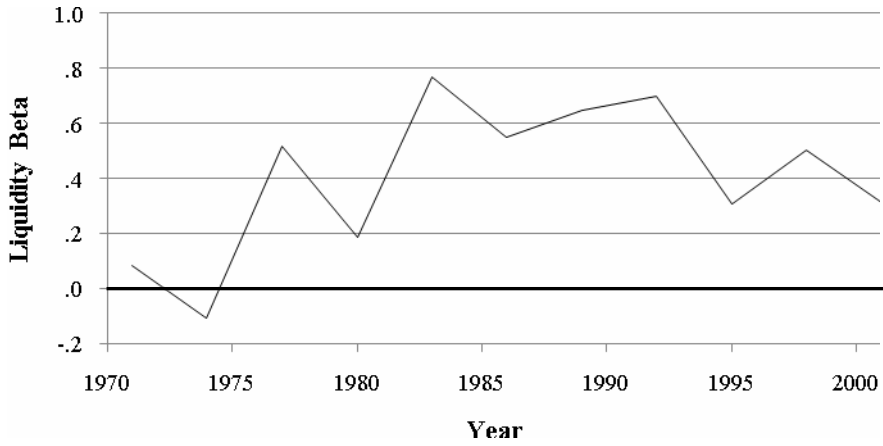
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**Liquidity Beta of Portfolio 1 (P1) – Liquidity Beta of Portfolio 3 (P3)**

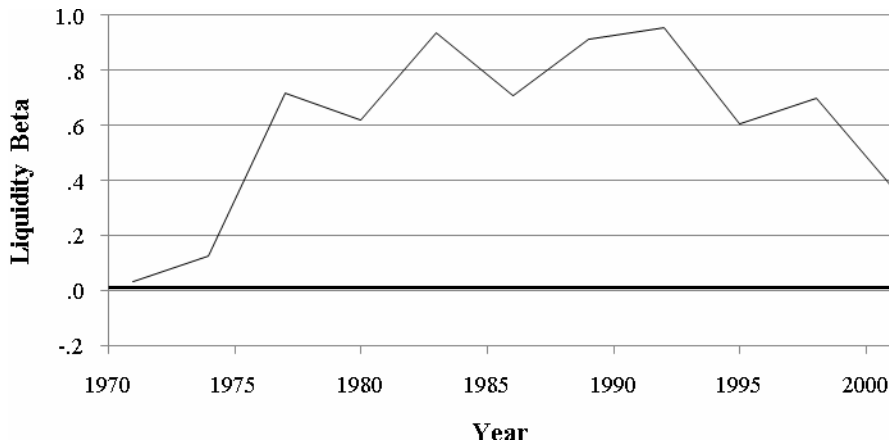
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**Liquidity Beta of Portfolio 1 (P1) – Liquidity Beta of Portfolio 4 (P4)**

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**TABLE 1**  
**Descriptive Statistics of the Sample Firms (1971 through 2005)**

Variable	Statistics of 35 Annual Averages				Sample Size
	Mean	Q1	Median	Q3	
<b>Panel A: Firms with Positive Advertising</b>					
Total Assets (million \$)	1671.00	419.50	984.64	1784.15	1705.69
Sales (million \$)	987.72	569.62	794.29	1401.95	1705.69
MVE (million \$)	1157.95	255.40	538.64	1756.63	1705.69
Leverage	.30	.25	.28	.33	1705.54
Book-to-Market	.93	.67	.78	1.18	1652.03
Advertising (million \$)	29.58	14.25	24.90	48.42	1705.69
Advertising/Sales	.07	.03	.04	.07	1705.69
Advertising/Assets	.04	.04	.04	.05	1705.69
R&D (million \$)	55.31	17.56	38.13	101.70	740.80
R&D/Sales	.58	.05	.23	.57	740.80
R&D/Assets	.08	.04	.09	.10	740.80
<b>Panel B: Firms with Zero Advertising</b>					
Total Assets (million \$)	951.77	42.09	62.23	1366.18	106.57
Sales (million \$)	88.39	21.62	30.92	108.27	106.57
MVE (million \$)	224.34	35.44	54.87	270.19	106.57
Leverage	.30	.22	.30	.38	106.51
Book-to-Market	.88	.71	.83	.98	105.20
Advertising (million \$)	.00	.00	.00	.00	106.57
Advertising/Sales	.00	.00	.00	.00	106.57
Advertising/Assets	.00	.00	.00	.00	106.57
R&D (million \$)	4.03	.83	1.89	3.72	7.54
R&D/Sales	2.48	.05	.61	3.26	7.54
R&D/Assets	.13	.05	.10	.18	7.54

Note: Each year we compute sample average of each variable. In the above table we report the time series mean, quartile1, median, quartile2, and sample size of each variable average computed over 35 years period.

**TABLE 2**  
**Descriptive Statistics of Positive Advertising Portfolios (1971 through 2005)**

Variable	Statistics of 35 Annual Averages				Sample Size
	Mean	Q1	Median	Q3	
<b>Panel A: Firms in the First Advertising Quartile (Lowest Advertising): Portfolio P1</b>					
Total Assets (million \$)	74.25	12.78	34.36	138.86	426.03
Sales (million \$)	28.50	11.33	29.74	36.29	426.03
MVE (million \$)	44.75	15.40	20.82	54.17	426.03
Leverage	.26	.20	.24	.30	425.91
Book-to-Market	.96	.72	.83	1.05	410.06
Advertising (million \$)	.13	.09	.11	.17	426.03
Advertising/Sales	.07	.01	.04	.06	426.03
Advertising/Assets	.01	.01	.01	.02	426.03
R&D (million \$)	2.54	.56	.84	2.51	206.86
R&D/Sales	1.45	.11	.53	1.47	206.86
R&D/Assets	.10	.06	.12	.13	206.86
<b>Panel B: Firms in the Second Advertising Quartile: Portfolio P2</b>					
Total Assets (million \$)	205.91	50.08	62.99	408.75	426.49
Sales (million \$)	77.33	50.51	64.66	94.85	426.49
MVE (million \$)	111.60	37.94	53.93	162.08	426.49
Leverage	.30	.25	.29	.33	426.46
Book-to-Market	.98	.70	.83	1.18	414.00
Advertising (million \$)	.73	.51	.64	.93	426.49
Advertising/Sales	.09	.02	.04	.07	426.49
Advertising/Assets	.03	.02	.03	.03	426.49
R&D (million \$)	5.41	1.76	2.47	7.54	198.37
R&D/Sales	.59	.03	.16	.39	198.37
R&D/Assets	.09	.04	.09	.11	198.37

Variable	Statistics of 35 Annual Averages				Sample Size
	Mean	Q1	Median	Q3	
<b>Panel C: Firms in the Third Advertising Quartile: Portfolio P3</b>					
Total Assets (million \$)	555.48	155.47	210.02	761.68	426.89
Sales (million \$)	262.77	168.91	215.19	254.99	426.89
MVE (million \$)	316.81	108.91	146.65	340.59	426.89
Leverage	.32	.27	.30	.38	426.89
Book-to-Market	.96	.66	.82	1.19	414.77
Advertising (million \$)	3.86	2.92	3.28	4.62	426.89
Advertising/Sales	.05	.03	.04	.05	426.89
Advertising/Assets	.05	.04	.05	.05	426.89
R&D (million \$)	16.40	5.00	9.30	17.01	163.03
R&D/Sales	.13	.02	.07	.16	163.03
R&D/Assets	.07	.03	.07	.09	163.03
<b>Panel D: Firms in the Fourth Advertising Quartile (Highest Advertising): Portfolio P4</b>					
Total Assets (million \$)	5850.13	1387.27	3736.12	5963.56	426.29
Sales (million \$)	3583.23	1924.68	2979.04	5324.54	426.29
MVE (million \$)	4159.98	848.71	1983.68	6465.77	426.29
Leverage	.30	.26	.29	.33	426.29
Book-to-Market	.81	.54	.71	1.12	413.20
Advertising (million \$)	113.61	53.08	95.99	188.38	426.29
Advertising/Sales	.07	.05	.05	.06	426.29
Advertising/Assets	.08	.07	.08	.08	426.29
R&D (million \$)	217.18	60.36	167.95	370.81	172.54
R&D/Sales	.05	.03	.04	.06	172.54
R&D/Assets	.04	.03	.05	.05	172.54

Note: Each year we compute sample average of each variable. In the above table we report the time series mean, quartile1, median, quartile2, and sample size of each variable average computed over 35 years period.

**TABLE 3**  
**Regression Estimates for Zero and Positive Advertising Portfolios**  
**(One-Year Advertising Portfolio – One-Year Estimation Period)**

	Advertising Portfolios		Difference in Betas (Z1-Z2)
	Zero Advertising (Z1)	Positive Advertising (Z2)	
<b>Model 1</b>			
Market	1.328 <sup>a</sup> (9.87)	1.279 <sup>a</sup> (18.32)	.049 (.45)
Liquidity	.875 <sup>a</sup> (5.23)	.410 <sup>a</sup> (4.44)	.466 <sup>a</sup> (2.91)
Adj. R <sup>2</sup>	.43	.70	
<b>Model 2</b>			
Market	1.294 <sup>a</sup> (9.08)	1.112 <sup>a</sup> (28.85)	.183 (1.37)
Liquidity	.914 <sup>a</sup> (4.04)	.409 <sup>a</sup> (7.67)	.505 <sup>b</sup> (2.19)
SMB	.752 <sup>a</sup> (4.36)	.986 <sup>a</sup> (19.17)	-.234 (-1.36)
HML	-.094 (-.54)	-.106 (-1.54)	.012 (.07)
UMD	-.313 <sup>b</sup> (-2.04)	-.230 <sup>a</sup> (-4.86)	-.083 (-.52)
Adj. R <sup>2</sup>	.65	.95	

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided).  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 3A**  
**Regression Estimates for Zero and Positive Advertising Portfolios**  
**(Three-Year Advertising Portfolio – One-Year Estimation Period)**

	Advertising Portfolios		Difference in Betas (Z1-Z2)
	Zero Advertising (Z1)	Positive Advertising (Z2)	
<b>Model 1</b>			
Market	1.228 <sup>a</sup> (6.67)	1.230 <sup>a</sup> (17.20)	-.002 (-.01)
Liquidity	.759 <sup>a</sup> (3.68)	.370 <sup>a</sup> (4.06)	.389 <sup>c</sup> (1.87)
Adj. R <sup>2</sup>	.32	.70	
<b>Model 2</b>			
Market	1.242 <sup>a</sup> (6.41)	1.106 <sup>a</sup> (26.60)	.136 (.67)
Liquidity	.969 <sup>a</sup> (4.13)	.386 <sup>a</sup> (7.11)	.583 <sup>b</sup> (2.61)
SMB	.387 <sup>c</sup> (1.82)	.970 <sup>a</sup> (17.54)	-.583 <sup>a</sup> (-2.74)
HML	-.110 (-.30)	-.093 (-1.48)	-.018 (-.05)
UMD	-.560 <sup>b</sup> (-2.51)	-.229 <sup>a</sup> (-5.29)	-.331 (-1.51)
Adj. R <sup>2</sup>	.51	.95	

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided).  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 3B**  
**Regression Estimates for Zero and Positive Advertising Portfolios**  
**(One-Year Advertising Portfolio – Three-Year Estimation Period)**

	Advertising Portfolios		Difference in Betas (Z1-Z2)
	Zero Advertising (Z1)	Positive Advertising (Z2)	
<b>Model 1</b>			
Market	1.252 <sup>a</sup> (7.73)	1.230 <sup>a</sup> (13.53)	.022 (.19)
Liquidity	.700 <sup>a</sup> (4.51)	.370 <sup>b</sup> (2.79)	.330 <sup>c</sup> (1.94)
Adj. R <sup>2</sup>	.45	.75	
<b>Model 2</b>			
Market	1.223 <sup>a</sup> (7.71)	1.130 <sup>a</sup> (34.64)	.093 (.61)
Liquidity	.763 <sup>a</sup> (3.03)	.332 <sup>a</sup> (6.18)	.431 <sup>c</sup> (1.87)
SMB	.807 <sup>a</sup> (5.44)	.919 <sup>a</sup> (15.65)	-.112 (-.87)
HML	-.062 (-.25)	-.017 (-.32)	-.045 (-.19)
UMD	-.058 (-.49)	-.163 <sup>a</sup> (-4.33)	.106 (.92)
Adj. R <sup>2</sup>	.64	.95	

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided).  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 3C**  
**Regression Estimates for Zero and Positive Advertising Portfolios**  
**(Pooled Estimation)**

	Advertising Portfolios		Difference in Betas (Z1-Z2)
	Zero Advertising (Z1)	Positive Advertising (Z2)	
<b>Model 1</b>			
Market	1.254 <sup>a</sup> (17.98)	1.305 <sup>a</sup> (27.15)	-.051 (-.75)
Liquidity	.736 <sup>a</sup> (8.69)	.339 <sup>a</sup> (5.80)	.397 <sup>a</sup> (4.78)
Adj. R <sup>2</sup>	.45	.70	
<b>Model 2</b>			
Market	1.159 <sup>a</sup> (17.20)	1.140 <sup>a</sup> (45.21)	.019 (.28)
Liquidity	.675 <sup>a</sup> (7.07)	.343 <sup>a</sup> (9.60)	.332 <sup>a</sup> (3.49)
SMB	.525 <sup>a</sup> (7.08)	.855 <sup>a</sup> (30.85)	-.330 <sup>a</sup> (-4.48)
HML	.128 (1.26)	.041 (1.07)	.088 (.86)
UMD	-.037 (-.65)	-.266 <sup>a</sup> (-12.72)	.230 <sup>a</sup> (4.13)
Adj. R <sup>2</sup>	.51	.92	

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided).  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 4**  
**Regression Estimates for Size-Matched Portfolios**  
**(One-Year Advertising Portfolios – One-Year Estimation Period)**

	Advertising Portfolios		Difference in Betas (M1-M2)
	Zero Advertising (M1)	Positive Advertising (M2)	
<b>Model 1</b>			
Market	1.322 <sup>a</sup> (9.80)	1.328 <sup>a</sup> (16.98)	-.007 (-.07)
Liquidity	.867 <sup>a</sup> (5.15)	.508 <sup>a</sup> (4.62)	.359 <sup>b</sup> (2.32)
Adj. R <sup>2</sup>	.43	.68	
<b>Model 2</b>			
Market	1.283 <sup>a</sup> (9.01)	1.124 <sup>a</sup> (26.13)	.160 (1.29)
Liquidity	.916 <sup>a</sup> (4.08)	.445 <sup>a</sup> (8.17)	.471 <sup>b</sup> (2.15)
SMB	.751 <sup>a</sup> (4.37)	1.070 <sup>a</sup> (17.58)	-.318 <sup>c</sup> (-1.86)
HML	-.122 (-.69)	-.083 (-1.12)	-.040 (-.21)
UMD	-.301 <sup>c</sup> (-1.97)	-.214 <sup>a</sup> (-3.93)	-.087 (-.55)
Adj. R <sup>2</sup>	.65	.95	

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided)  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 4A**  
**Regression Estimates for Positive Advertising Portfolios**  
**(Three-Year Advertising Portfolio – One-Year Estimation Period)**

	Advertising Portfolios		Difference in Betas (M1-M2)
	Zero Advertising (M1)	Positive Advertising (M2)	
<b>Model 1</b>			
Market	1.230 <sup>a</sup> (6.69)	1.242 <sup>a</sup> (17.20)	-.011 (-.07)
Liquidity	.759 <sup>a</sup> (3.68)	.430 <sup>a</sup> (4.29)	.329 (1.59)
Adj. R <sup>2</sup>	.32	.68	
<b>Model 2</b>			
Market	1.240 <sup>a</sup> (6.38)	1.093 <sup>a</sup> (28.20)	.147 (.74)
Liquidity	.960 <sup>a</sup> (4.11)	.366 <sup>a</sup> (6.21)	.594 <sup>a</sup> (2.73)
SMB	.390 <sup>c</sup> (1.82)	1.060 <sup>a</sup> (14.93)	-.669 <sup>a</sup> (-3.01)
HML	-.112 (-.31)	-.076 (-1.17)	-.036 (-.10)
UMD	-.551 <sup>b</sup> (-2.46)	-.188 <sup>a</sup> (-5.19)	-.362 <sup>c</sup> (-1.69)
Adj. R <sup>2</sup>	.51	.94	

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided)  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 4B**  
**Regression Estimates for Size-Matched Portfolios**  
**(One-Year Advertising Portfolios – Three-Year Estimation Period)**

	Advertising Portfolios		Difference in Betas (M1-M2)
	Zero Advertising (M1)	Positive Advertising (M2)	
<b>Model 1</b>			
Market	1.245 <sup>a</sup> (7.65)	1.255 <sup>a</sup> (13.08)	-.009 (-.08)
Liquidity	.680 <sup>a</sup> (4.38)	.451 <sup>a</sup> (3.10)	.229 (1.31)
Adj. R <sup>2</sup>	.45	.71	
<b>Model 2</b>			
Market	1.217 <sup>a</sup> (7.68)	1.141 <sup>a</sup> (29.13)	.076 (.52)
Liquidity	.750 <sup>a</sup> (3.02)	.393 <sup>a</sup> (7.19)	.356 (1.64)
SMB	.811 <sup>a</sup> (5.47)	1.023 <sup>a</sup> (13.30)	-.212 <sup>c</sup> (-1.83)
HML	-.068 (-.28)	-.018 (-.27)	-.051 (-.22)
UMD	-.057 (-.48)	-.151 <sup>a</sup> (-3.18)	.094 (.89)
Adj. R <sup>2</sup>	.65	.94	

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided)  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 4C**  
**Regression Estimates for Size-Matched Portfolios**  
**(Pooled Estimation)**

	<b>Advertising Portfolios</b>		<b>Difference in Betas (M1-M2)</b>
	<b>Zero Advertising (M1)</b>	<b>Positive Advertising (M2)</b>	
<b>Model 1</b>			
Market	1.249 <sup>a</sup> (17.90)	1.338 <sup>a</sup> (26.34)	-.089 (-1.31)
Liquidity	.726 <sup>a</sup> (8.56)	.406 <sup>a</sup> (6.57)	.320 <sup>a</sup> (3.89)
Adj. R <sup>2</sup>	.45	.68	
<b>Model 2</b>			
Market	1.156 <sup>a</sup> (17.10)	1.165 <sup>a</sup> (42.66)	-.009 (-.14)
Liquidity	.666 <sup>a</sup> (6.95)	.396 <sup>a</sup> (10.23)	.270 <sup>a</sup> (2.90)
SMB	.517 <sup>a</sup> (6.95)	.903 <sup>a</sup> (30.06)	-.386 <sup>a</sup> (-5.34)
HML	.125 (1.23)	.070 <sup>c</sup> (1.71)	.055 (.56)
UMD	-.037 (-.66)	-.268 <sup>a</sup> (-11.83)	.232 <sup>a</sup> (4.24)
Adj. R <sup>2</sup>	.51	.91	

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided)  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 5**  
**Regression Estimates Positive Advertising Portfolios**  
**(One-Year Advertising Portfolio – One-Year Estimation Period)**

	Advertising Portfolios				Difference in Betas		
	Lowest Advertising (P1)	(P2)	(P3)	Highest Advertising (P4)			
<b>Model 1</b>							
Market	1.438 <sup>a</sup> (14.16)	1.294 <sup>a</sup> (14.72)	1.226 <sup>a</sup> (17.02)	1.157 <sup>a</sup> (26.46)	.144 <sup>b</sup> (2.44)	.213 <sup>a</sup> (3.43)	.281 <sup>a</sup> (3.25)
Liquidity	.829 <sup>a</sup> (6.39)	.454 <sup>a</sup> (4.03)	.249 <sup>b</sup> (2.38)	.106 <sup>c</sup> (1.72)	.374 <sup>a</sup> (4.95)	.579 <sup>a</sup> (6.57)	.722 <sup>a</sup> (6.27)
Adj. R <sup>2</sup>	.55	.63	.71	.81			
<b>Model 2</b>							
Market	1.182 <sup>a</sup> (14.84)	1.079 <sup>a</sup> (24.01)	1.110 <sup>a</sup> (28.36)	1.076 <sup>a</sup> (39.50)	.104 (1.62)	.072 (1.15)	.106 (1.37)
Liquidity	.898 <sup>a</sup> (9.33)	.448 <sup>a</sup> (5.69)	.268 <sup>a</sup> (5.02)	.022 (.43)	.450 <sup>a</sup> (5.07)	.630 <sup>a</sup> (6.70)	.876 <sup>a</sup> (9.33)
SMB	1.160 <sup>a</sup> (14.48)	1.159 <sup>a</sup> (17.08)	1.021 <sup>a</sup> (20.57)	.604 <sup>a</sup> (11.68)	.001 (.02)	.140 <sup>c</sup> (1.98)	.556 <sup>a</sup> (7.33)
HML	-.202 <sup>c</sup> (-1.74)	-.181 <sup>b</sup> (-2.01)	-.102 (-1.52)	.060 (1.11)	-.021 (-.26)	-.099 (-1.06)	-.261 <sup>b</sup> (-2.36)
UMD	-.298 <sup>a</sup> (-3.66)	-.217 <sup>a</sup> (-3.10)	-.237 <sup>a</sup> (-5.16)	-.167 <sup>a</sup> (-3.47)	-.081 (-1.38)	-.061 (-.82)	-.131 (-1.38)
Adj. R <sup>2</sup>	.86	.92	.94	.94			

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided).  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 5A**  
**Regression Estimates for Positive Advertising Portfolios**  
**(Three-Year Advertising Portfolio – One-Year Estimation Period)**

	Advertising Portfolios				Difference in Betas		
	Lowest Advertising (P1)	(P2)	(P3)	Highest Advertising (P4)	(P1-P2)	(P1-P3)	(P1-P4)
<b>Model 1</b>							
Market	1.356 <sup>a</sup> (13.80)	1.257 <sup>a</sup> (13.24)	1.176 <sup>a</sup> (16.34)	1.133 <sup>a</sup> (26.10)	.099 <sup>c</sup> (1.74)	.179 <sup>a</sup> (3.13)	.222 <sup>a</sup> (2.82)
Liquidity	.726 <sup>a</sup> (5.89)	.411 <sup>a</sup> (3.62)	.228 <sup>b</sup> (2.23)	.115 <sup>c</sup> (1.96)	.315 <sup>a</sup> (5.81)	.498 <sup>a</sup> (6.33)	.611 <sup>a</sup> (5.64)
Adj. R <sup>2</sup>	.54	.62	.72	.81			
<b>Model 2</b>							
Market	1.173 <sup>a</sup> (13.81)	1.114 <sup>a</sup> (22.37)	1.076 <sup>a</sup> (28.18)	1.063 <sup>a</sup> (33.21)	.059 (.85)	.097 (1.39)	.110 (1.38)
Liquidity	.825 <sup>a</sup> (8.86)	.473 <sup>a</sup> (6.67)	.247 <sup>a</sup> (5.34)	-.001 (-.02)	.352 <sup>a</sup> (5.59)	.578 <sup>a</sup> (6.88)	.826 <sup>a</sup> (9.26)
SMB	1.192 <sup>a</sup> (13.01)	1.116 <sup>a</sup> (18.34)	1.000 <sup>a</sup> (15.31)	.572 <sup>a</sup> (10.76)	.076 (1.24)	.192 <sup>b</sup> (2.47)	.620 <sup>a</sup> (6.97)
HML	-.213 <sup>b</sup> (-2.14)	-.164 <sup>c</sup> (-1.95)	-.072 (-1.12)	.080 (1.38)	-.049 (-.73)	-.141 (-1.55)	-.293 <sup>a</sup> (-2.75)
UMD	-.260 <sup>a</sup> (-3.46)	-.246 <sup>a</sup> (-3.88)	-.234 <sup>a</sup> (-5.12)	-.174 <sup>a</sup> (-3.39)	-.014 (-.25)	-.026 (-.38)	-.086 (-.88)
Adj. R <sup>2</sup>	.86	.91	.95	.94			

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided).  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 5B**  
**Regression Estimates for Positive Advertising Portfolios**  
**(One-Year Advertising Portfolio – Three-Year Estimation Period)**

	Advertising Portfolios				Difference in Betas		
	Lowest Advertising (P1)	(P2)	(P3)	Highest Advertising (P4)	(P1-P2)	(P1-P3)	(P1-P4)
<b>Model 1</b>							
Market	1.303 <sup>a</sup> (12.38)	1.231 <sup>a</sup> (11.63)	1.213 <sup>a</sup> (11.48)	1.171 <sup>a</sup> (17.59)	.071 (1.75)	.089 (1.53)	.131 (1.62)
Liquidity	.622 <sup>a</sup> (4.12)	.414 <sup>b</sup> (2.53)	.280 <sup>c</sup> (1.85)	.163 <sup>c</sup> (1.96)	.208 <sup>a</sup> (4.53)	.342 <sup>a</sup> (5.00)	.459 <sup>a</sup> (4.46)
Adj. R <sup>2</sup>	.63	.68	.74	.83			
<b>Model 2</b>							
Market	1.200 <sup>a</sup> (17.49)	1.136 <sup>a</sup> (27.76)	1.105 <sup>a</sup> (42.10)	1.080 <sup>a</sup> (42.43)	.064 (1.62)	.095 (1.51)	.120 (1.65)
Liquidity	.643 <sup>a</sup> (6.36)	.416 <sup>a</sup> (5.88)	.236 <sup>a</sup> (5.79)	.035 (1.03)	.227 <sup>a</sup> (4.59)	.407 <sup>a</sup> (4.93)	.608 <sup>a</sup> (6.51)
SMB	1.123 <sup>a</sup> (13.78)	1.056 <sup>a</sup> (15.21)	.931 <sup>a</sup> (16.24)	.567 <sup>a</sup> (8.16)	.067 <sup>c</sup> (1.79)	.191 <sup>a</sup> (2.91)	.555 <sup>a</sup> (5.85)
HML	-.131 <sup>c</sup> (-1.79)	-.064 (-.73)	.015 (.24)	.112 (1.65)	-.067 (-1.18)	-.146 <sup>c</sup> (-2.12)	-.243 <sup>c</sup> (-2.17)
UMD	-.124 <sup>c</sup> (-1.90)	-.157 <sup>a</sup> (-3.38)	-.201 <sup>a</sup> (-5.95)	-.171 <sup>a</sup> (-3.43)	.033 (1.03)	.077 (1.48)	.047 (.56)
Adj. R <sup>2</sup>	.88	.92	.94	.94			

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided).  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 5C**  
**Regression Estimates for Positive Advertising Portfolios**  
**(Pooled Estimation)**

	<b>Advertising Portfolios</b>				<b>Difference in Betas</b>		
	<b>Lowest Advertising (P1)</b>	<b>(P2)</b>	<b>(P3)</b>	<b>Highest Advertising (P4)</b>	<b>(P1-P2)</b>	<b>(P1-P3)</b>	<b>(P1-P4)</b>
<b>Model 1</b>							
Market	1.374 <sup>a</sup> (22.40)	1.334 <sup>a</sup> (22.78)	1.308 <sup>a</sup> (25.89)	1.204 <sup>a</sup> (32.87)	.040 (1.60)	.067 <sup>b</sup> (1.97)	.170 <sup>a</sup> (3.42)
Liquidity	.594 <sup>a</sup> (7.97)	.366 <sup>a</sup> (5.14)	.252 <sup>a</sup> (4.10)	.143 <sup>a</sup> (3.20)	.228 <sup>a</sup> (7.45)	.342 <sup>a</sup> (8.35)	.451 <sup>a</sup> (7.46)
Adj. R <sup>2</sup>	.58	.62	.70	.80			
<b>Model 2</b>							
Market	1.168 <sup>a</sup> (30.83)	1.134 <sup>a</sup> (34.04)	1.138 <sup>a</sup> (43.37)	1.120 <sup>a</sup> (45.60)	.034 (1.36)	.030 (.95)	.048 (1.21)
Liquidity	.663 <sup>a</sup> (12.36)	.415 <sup>a</sup> (8.79)	.229 <sup>a</sup> (6.17)	.065 <sup>c</sup> (1.87)	.248 <sup>a</sup> (6.98)	.434 <sup>a</sup> (9.65)	.598 <sup>a</sup> (10.60)
SMB	1.038 <sup>a</sup> (24.92)	1.014 <sup>a</sup> (34.04)	.893 <sup>a</sup> (30.96)	.475 <sup>a</sup> (17.59)	.024 (.85)	.145 <sup>a</sup> (4.16)	.563 <sup>a</sup> (12.85)
HML	-.107 <sup>c</sup> (-1.87)	-.048 (-.96)	.103 <sup>b</sup> (2.60)	.215 <sup>a</sup> (5.80)	-.059 (-1.55)	-.210 <sup>a</sup> (-4.37)	-.322 <sup>a</sup> (-5.35)
UMD	-.198 <sup>a</sup> (-6.28)	-.280 <sup>a</sup> (-10.12)	-.303 <sup>a</sup> (-13.88)	-.286 <sup>a</sup> (-13.99)	.082 <sup>a</sup> (3.94)	.105 <sup>a</sup> (3.98)	.088 <sup>a</sup> (2.65)
Adj. R <sup>2</sup>	.85	.88	.92	.91			

<sup>a</sup> denotes  $p \leq .01$  (two-sided), <sup>b</sup> denotes  $p \leq .05$  (two-sided), <sup>c</sup> denotes  $p \leq .1$  (two-sided)  
t-values are in parentheses

**Model 1** is liquidity augmented CAPM which comprises market factor (Market) and Liu's liquidity factor (Liquidity)

**Model 2** is Carhart 4-factor model which comprises market factor (Market), size factor (SMB), book-to-market factor (HML), momentum factor (UMD) and liquidity factor (Liquidity)

**TABLE 6**  
**Economic Impact: Increase in Firm Value Due To Liquidity Risk Reduction**

	Advertising Portfolios			
	Lowest Advertising (P1)	(P2)	(P3)	Highest Advertising (P4)
<b>Panel A: Demand Elasticity = 0.2</b>				
Base Advertising (million \$)	.13	.73	3.86	113.61
25% Increase in Advertising (million \$)	.03	.18	.97	28.40
Base Sales (million \$)	28.49	77.33	262.77	3583.25
Increase in Sales (million \$)	1.42	3.87	13.14	179.16
Base Firm Value (million \$)	8.90	38.35	151.98	2939.27
<b>Incremental Firm Value as a Percentage of Base Firm Value</b>				
Total	18.61%	14.99%	11.53%	6.70%
Due to Increase in Cash Flow	18.57%	12.86%	10.59%	6.21%
Due to Decrease in Market Beta	.04%	.88%	.65%	.49%
Due to Decrease in Liquidity Beta	.00%	1.25%	.28%	.00%
<b>Incremental Firm Value as a Percentage of Total Increment in Base Firm Value</b>				
Due to Decrease in Liquidity Beta	.00%	8.33%	2.46%	.00%
<b>Panel B: Demand Elasticity = 0.1</b>				
Base Advertising (million \$)	.13	.73	3.86	113.61
25% Increase in Advertising (million \$)	.03	.18	.97	28.40
Base Sales (million \$)	28.49	77.33	262.77	3583.25
Increase in Sales (million \$)	.71	1.93	6.57	89.58
Base Firm Value (million \$)	8.90	38.35	151.98	2939.27
<b>Incremental Firm Value as a Percentage of Base Firm Value</b>				
Total	8.70%	7.51%	4.79%	1.15%
Due to Increase in Cash Flow	8.66%	5.52%	3.91%	.68%
Due to Decrease in Market Beta	.04%	.82%	.61%	.47%
Due to Decrease in Liquidity Beta	.00%	1.17%	.27%	.00%
<b>Incremental Firm Value as a Percentage of Total Increment in Base Firm Value</b>				
Due to Decrease in Liquidity Beta	.00%	15.55%	5.58%	.00%

**TABLE 7**  
**Statistically Insignificant and Negative Market and Liquidity Betas**  
**(Individual Firm-Level Regressions)**

	<b>Advertising Portfolios</b>			
	<b>Lowest Advertising (P1)</b>	<b>(P2)</b>	<b>(P3)</b>	<b>Highest Advertising (P4)</b>
<b>Panel A: Percentage of Statistically Insignificant Market Beta (<math>p &gt; .10</math>)</b>				
Annual estimation	85%	84%	82%	79%
Three year advertising	84%	83%	82%	79%
Three-year estimation	62%	57%	53%	41%
Pooled sample	69%	63%	57%	40%
<b>Panel B: Percentage of Negative Market Beta</b>				
Annual estimation	32%	30%	27%	23%
Three year advertising	32%	30%	27%	23%
Three-year estimation	14%	12%	10%	6%
Pooled sample	20%	19%	15%	10%
<b>Panel C: Percentage of Statistically Insignificant Liquidity Beta (<math>p &gt; .10</math>)</b>				
Annual estimation	88%	88%	89%	89%
Three year advertising	88%	88%	89%	89%
Three-year estimation	82%	83%	85%	86%
Pooled sample	83%	84%	83%	85%
<b>Panel D: Percentage of Negative Liquidity Beta</b>				
Annual estimation	42%	45%	47%	50%
Three year advertising	42%	45%	48%	50%
Three-year estimation	35%	39%	43%	50%
Pooled sample	35%	38%	43%	46%
<b>Panel E: Average Adjusted R<sup>2</sup></b>				
Annual estimation	15%	19%	23%	28%
Three year advertising	16%	20%	24%	28%
Three-year estimation	19%	23%	25%	32%
Pooled sample	14%	19%	21%	25%

Note: All the regressions are Carhart 4-factor model augmented with liquidity factor.