The Impact of Macroeconomic Context on the Likelihood of an Earnings Torpedo

David Jenkins*
Gregory Kane*
Katy Berkow*

*All authors are affiliated with the University of Delaware

ABSTRACT

Earnings torpedoes are large adverse price movements associated with narrow misses of consensus earnings thresholds. In this research, we examine factors affecting the likelihood of earnings torpedoes across different macroeconomic contexts. We find that the likelihood of earnings torpedoes increases when the VIX is high, during economic recession, and in the post-2007 period in which central bank intervention has been significantly elevated. The macroeconomic factors are shown to have incremental explanatory power over firm-specific factors such as market-to-book ratio. The findings have implications for policymakers in the application of fiscal and monetary policy with regard to the stability of securities markets during such periods of high economic uncertainty.

KEYWORDS: Torpedo effect, analyst forecast, macroeconomic uncertainty

INTRODUCTION

An earnings torpedo is defined as a significant, adverse pricing event in response to a relatively small earnings miss. Seminal research has primarily focused on whether the earnings torpedo phenomenon exists, and if it does, whether expectation errors with respect to anticipated future cash flows are the cause (Skinner and Sloan 2002). Skinner and Sloan (2002) document evidence of the existence of a torpedo effect for a portfolio of growth stocks and attribute the effect to market corrections of expectation errors, with respect to optimistic cash flow forecasts. In subsequent work, however, Payne and Thomas (2011) document that when the size of the misses is controlled, and only narrow misses are considered, the torpedo effect seems to vanish.

Whatever the findings of prior research may imply, earnings torpedoes are a well-accepted phenomenon in the analyst and investment community, as evidenced anecdotally by the extensive academic and business media coverage devoted to such events. For example, within the University of Michigan’s Ross School of Business, the Tozzi Financial Center currently maintains a website devoted entirely to tracking potential earnings torpedo targets.1 This website is commonly cited by popular investing websites and blogs such as TheStreet.com, SeekingAlpha, etc.

In this paper, we extend prior research on earnings torpedoes by examining potential trading contexts associated with recessionary macroeconomic conditions that may increase the likelihood of earnings torpedoes. This topic is of public interest since monetary policy decisions made by the Federal Reserve are often initiated by the prospect of recessionary macroeconomic conditions and typically have a significant impact on the economy at large. We assert that the frequency of occurrence of earnings torpedoes is sensitive to changes in macroeconomic context. As such, the observed frequency of occurrence of earnings torpedoes may serve as one indication of the impact that fiscal and monetary policies conducted in the public interest are having on the economy.

We examine different trading contexts that are generally associated with recessionary macroeconomic conditions. First, we examine VIX, a popular indicator of implied volatility. VIX is the square root of the risk-neutral expectation of the S&P 500 variance over the next 30 days. It is colloquially known in the media as the “fear index”. Because it is an indicator of expected variance, and investment risk concerns the likelihood of a loss of capital, the VIX may be interpreted as an indicator that “risk-off” trading conditions have arisen as the result of a perceived recessionary economic threat, which may affect torpedo likelihood.

Second, we examine periods of occurrence of economic recession as defined by the National Bureau of Economic Research, which identifies periods of economic expansion and contraction based on post-hoc analysis. It can be argued that during recession investors should be more risk-adverse, and thus more sensitive to negative news, which could also affect torpedo likelihood.

Third, we examine the effect on torpedo likelihood of the onset of the financial crisis in 2008, together with the prolonged, anemic recovery period that followed. Monetary policy changes, when provoked by recessionary conditions, arguably drive increases in the frequency of occurrence of earnings torpedoes as macroeconomic effects are translated by markets into firm-specific valuation effects. The Great Recession and the associated global financial crisis was without precedent with respect to magnitude.

1 http://webuser.bus.umich.edu/tradingfloor/earningstorpedo/default.htm
scope and duration. Moreover, the adverse impact of recession lingered long after the Great Recession itself ended. In response, the Federal Reserve took aggressive and unprecedented monetary actions for almost a decade subsequent to the onset of the crisis. These included emergency funding to major financial entities, “quantitative easing” programs, “operation twist”, “ZIRP”, and the payment of interest on excess reserves held by financial institutions.2

As a result of the measures taken by the Federal Reserve, interest rates reached historically low levels (even zero or negative in some countries) and stayed low throughout the anemic recovery period that followed. Inflation also remained well below the central bank’s targeted levels, while labor participation rates remained low, and wage growth remained flat. Consequently, beginning with the onset of crisis in 2008, and continuing subsequently, investors were arguably on heightened alert to any negative news. However, the apparent widespread belief during this period that central banks would prevent any serious downturn from arising, combined with the greater demand for yield in the chronically low interest rate environment resulting from prolonged aggressive monetary stimulus, set up historically high valuations and an associated greater risk of disappointment should revenue and earnings numbers miss analysts’ thresholds. Such an environment could potentially increase the likelihood of earnings torpedoes as markets struggle to reconcile monetary policy dynamics with actual earnings results occurring at the firm level.

In summary, we address two primary questions in this paper. First, we examine whether recessionary macroeconomic conditions and risk have an incremental effect on the likelihood of earnings torpedoes. Our underlying premise is that when recessionary concerns are heightened, investors are relatively more sensitive to negative firm-specific news, which could result in increased likelihood of torpedoes. Of course, an alternative argument is that earnings torpedoes are no more likely (or even less likely) during the macro events we examine. To the extent that earnings innovations are (a) macro-related, and (b) already discounted, e.g., via redundancy (similar macro news already disseminated through other channels to the market), earnings misses occurring during a macro event should not increase the likelihood of an earnings torpedo. Thus, we the issue of the recession sensitivity of earnings torpedoes is ultimately an empirical question.

Second, given the increased, positive impact of Federal Reserve intervention in the period subsequent to onset of the Crisis, we investigate whether torpedo likelihood increased as adverse firm-specific earnings signals called into question the firm-specific relevancy of such a positive macro-induced view.

The results of our empirical tests support our priors. Elevated VIX and the occurrence of NBER contraction/recession each result in greater torpedo likelihood. In addition, the period from 2008-2016 is also associated with greater torpedo likelihood. The results are robust to inclusion of controls for other risk factors, including growth and the level of intangibles, firm size, earnings volatility and industry.

Our research contributes to at least three streams of existing literature. First, we extend research on the torpedo effect. We document evidence which suggests that disproportionate, and adverse, price responses to earnings misses may vary in occurrence as a function of macro contexts associated with recession, and its aftermath.

Second, our research contributes to capital markets research in accounting that has looked at the relation between earnings and stock returns, in particular, the ability of earnings to be a value-relevant indicator. It is well known that the relation between earnings and returns is quite low over short trading horizons, particularly in unconditional models. Our research suggests that one reason why this may be the case is that market responses to earnings information may be conditioned on macroeconomic conditions. These may require modeling to make standard earnings response models better specified.

Finally, our research has implications for policymakers with regard to measures taken to support the markets during recessionary periods. While the actions of the Federal Reserve seem to have had a significant effect in supporting equity markets during the recovery period, the likelihood of earnings torpedoes simultaneously increased, possibly indicating an increased role for earnings signals during periods such as this, that are so heavily influenced by monetary policy actions and triggers.

The rest of the paper is organized as follows. In the section, background, theoretical development, and hypotheses are provided. The section that follows describes our design and methodology. Next, the results are presented. Finally, we provide conclusions and suggestions for future research.

BACKGROUND AND HYPOTHESIS DEVELOPMENT
Earnings Torpedoes and Macroeconomic Conditions

Large, and rapid, equity price reactions to earnings announcements have been documented for quite some time (e.g. Ball and Brown 1968; Beaver 1968; Patell and Wolfsion 1984). One subgroup of these events disproportionate price drops in reaction to the missing of an earnings target have been labeled in prior research as “earnings torpedoes” (e.g. Skinner and Sloan 2002). Most of this prior research has focused on whether the torpedo phenomenon actually exists. The presumption was that if it did exist it must reflect correction of expectational errors concerning future earnings performance. In seminal research on this topic, Skinner and Sloan (2002) document that the phenomena does occur in the case of growth stocks, where the prospect of expectational errors are greatest. Payne and Thomas (2011), however, show that when the size of miss is controlled for, the phenomenon goes away (Payne and Thomas 2011). Other causes of the torpedo effect have been investigated. Mashruwala and Mashruwala (2014) identify market imperfections, such as short-selling constraints and investor disagreement, as playing a role in the occurrence of earnings torpedoes. Investor sentiment has also been examined as a determinant of returns for different categories of stock (Baker and Wurgler 2006). Sentiment also has been identified as a possible determinant of stock price reaction to earnings news. These findings suggest that earnings torpedoes, if they exist at all, may not occur in market-wide fashion, but instead may be clustered into certain

2 Quantitative easing refers to an unconventional monetary action in which a large amount of newly created money is used to purchase bonds and other financial assets; operation twist was a policy designed to manipulate the yield curve; ZIRP is a policy of setting key interest rates, such as the Fed Funds rate, at zero. Colloquial terms such as these are commonly used to describe various public policies of monetary authorities.
industries and time periods, as a function of sentiment. The prospect and/or occurrence of recession is presumably an important factor in sentiment, as sentiment will be lowest when recession is anticipated or feared, and highest when markets see only blue skies and clear sailing, without the likely occurrence of any adverse macroeconomic event like recession. As such, the existence of torpedoes may be closely related to the concept of market sentiment, but the relationship is not clear.

Given that torpedo likelihood is related to factors such as investor expectations and sentiment, which are in turn likely affected by recessionary macroeconomic conditions, it follows torpedo likelihood should be related to macroeconomic conditions. Further, when significant recessionary conditions, such as the financial crisis of 2008, are acute enough to actuate significant and ongoing central bank intervention, it also follows that torpedo likelihood should increase, as markets seek firm-specific signals of the impact of this macro-change.

**Hypothesis Development**

In developing our hypotheses, we examine the relation between torpedo likelihood and recessionary macroeconomic conditions using three different but related market contexts. First, there may be trading periods in which investors sense increased fear and uncertainty concerning the macroeconomic environment. This increased uncertainty can precipitate a trading environment commonly known as “risk-off” in which investors are more likely to favor safer asset classes such as low beta assets such as gold, movement into “safe” currencies such as Yen, and buying indexed, implied volatility. To capture this risk-off posture, we examine VIX, a popular indicator of implied volatility, VIX is the square root of the risk-neutral expectation of the S&P 500 variance over the next 30 days. It is colloquially known in the media as the “fear index”. Following Fishburn (1977), when VIX is elevated, the likelihood of a torpedo event in response to a narrow miss of an earnings threshold should increase. We hypothesize as follows (stated in the alternative):

**H1: The likelihood of an earnings torpedo occurring at the time of a small earnings miss is positively and significantly associated with VIX.**

Second, we examine recessionary economic conditions as defined by the National Bureau of Economic Research (hereafter, NBER). The NBER defines recession by identifying the peaks and troughs of economic activity using a number of data series known to be accurate indicators of economic activity. Although the designation is necessarily binary (recession or expansion) since it is defined by peak and trough points, recessions themselves are not static events. That is to say, recessionary conditions change across time, thus implying that assessments of non-diversifiable risk are likely to change during recession, as more and more information becomes available about the likely duration and severity of recession. When firms narrowly miss their earnings targets during recession, they may be contributing new information investors need to make such assessments. Following Fishburn (1977), they may also be providing new information about changes in non-diversifiable risk with respect to recession, for a specific firm.

For both reasons, we hypothesize as follows:

**H2: The likelihood of an earnings torpedo occurring at the time of a small earnings miss is positively and significantly associated with recession.**

Finally, we examine the period from 2008 to 2016, wherein the recovery was weak relative to other recovery periods as it was marked by significant levels of ongoing Central Bank intervention designed to prevent another crisis from occurring. What makes this intervention extraordinary is not only the amount of stimulus, but also how long it was maintained subsequent to the crisis and end of recessionary conditions. Specifically, the period from 2008 to 2016 was associated with at least four ongoing monetary policy interventions, including QE1, QE2, QE3, and Operation twist. As a result of these programs, assets held by The Federal Reserve, and reported on its balance sheet, increased from just under $750 million in early 2008 to peak just north of $5 trillion dollars in late 2014. Total assets then flattened at those elevated levels throughout 2015. Monetary policy is well known to have a lagged macroeconomic economic effect. Accordingly, we study the period 2008-2016, allowing one year for the effect of these unprecedented monetary policy interventions to fully materialize.

Along with unprecedented central bank activity, the period from 2008-2016 was marked by very low top-line growth, very low inflation, near-zero interest rates, low labor participation rates, and sluggish wage growth. For this reason, the perceived risk of “bad news” arguably remained elevated throughout this period. Because the macroeconomic conditions of the period represented uncharted territory, and the perceived risk of bad news was arguably elevated, it follows that markets should have been relatively more sensitive to negative earnings events, as compared to better understood, and more predictable, conditions that prevailed in the past. For this reason, we argue that a narrow earnings miss occurring in this period was more likely to be associated with earnings torpedoes because it signaled increased earnings uncertainty during such an uncertain period. We thus hypothesize as follows:

**H3: The likelihood of an earnings torpedo occurring at the time of a small earnings miss is positively and significantly associated with the period 2008-2016, when central bank intervention was higher.**

Finally, we examine changes in the association of macroeconomic conditions (VIX and NBER) with the likelihood of torpedo during the period, from 2008 to 2016, versus the period prior (in our sample, 1990-2007). The great recession of 2008–2009 was monumental in severity, relative to most, if not all, macroeconomic events that have occurred in the post-WWII period. Moreover, an anemic recovery followed, and in response, an unprecedented central bank intervention as well. Accordingly, markets
should have been acutely sensitive to the firm-specific impact of macroeconomic conditions during 2008-2016, as compared to the period before. It follows that narrow misses occurring during the period 2008-2016, during risk-off trading conditions, should have been positively and incrementally associated with the likelihood of a torpedo event, relative to the period before. The risk-off indicators we focus on herein include the occurrence of recession (NBER) and increased volatility (VIX). We thus hypothesize as follows (stated in the alternative):

**H4a(b):** The likelihood of an earnings torpedo occurring at the time of a small earnings miss is more positively and significantly associated with VIX (NBER) during the period 2008-2016 when central bank intervention was higher.

### DESIGN AND METHODOLOGY

As previously stated, our focus is to study the conditions under which disproportionately large price decreases as a result of small earnings misses (i.e. torpedoes) are most likely to occur. Our approach to defining and identifying torpedoes first involves defining a small earnings miss (unexpected earnings) as follows: \(-0.02 \leq UE < 0\), where UE is reported quarterly earnings minus analysts’ consensus earnings forecast. The two-cent per share miss threshold is consistent with Payne and Thomas (2011) in defining small misses. Next, from the sample of small miss observations we define disproportionate price decreases as the bottom 20% of the firm-quarters with regard to quarterly post-announcement stock returns. This results in a final sample of firm-quarter observations that report small misses and have the largest negative price reactions. Inclusion in this sample results in a dichotomous variable set to 1 (torpedo sample) and zero otherwise (non-torpedo sample).

Next, we incorporate a logit model in which the dichotomous torpedo variable is regressed on the firm-specific and macroeconomic explanatory variables introduced in prior sections. To test H1, the following model is employed:

\[
TORPEDO_{it} = \beta_0 + \beta_1 \times SIZE_{it} + \beta_2 \times FD_{it} + \beta_3 \times MB_{it} + \beta_4 \times VIX_{it} \tag{1}
\]

Where, TORPEDO is a dichotomous variable set to 1 if the observation meets the torpedo criteria outlined above and set to zero otherwise; SIZE is the natural log of total revenues; FD is forecast dispersion, measured as the standard deviation of analyst forecasts of earnings for the quarter; MB is the ratio of market value of equity to book value of equity; and VIX is the Chicago Board of Exchange Volatility Index. From model (1), a positive and significant coefficient on VIX ($\beta_4$) would support H1.

To test H2, the following model is employed:

\[
TORPEDO_{it} = \beta_0 + \beta_1 \times SIZE_{it} + \beta_2 \times FD_{it} + \beta_3 \times MB_{it} + \beta_4 \times NBER_{it} + \beta_5 \times \epsilon_{it} \tag{2}
\]

Where NBER is a dichotomous variable set to 1 if the earnings announcement falls in a period classified by the National Bureau of Economic Research (NBER) as a contraction and set to 0 otherwise. All other variables are as previously defined. A positive and significant coefficient on NBER ($\beta_4$) would support H2.

To test H3, the following model is employed:

\[
TORPEDO_{it} = \beta_0 + \beta_1 \times SIZE_{it} + \beta_2 \times FD_{it} + \beta_3 \times MB_{it} + \beta_4 \times post2007_{it} + \epsilon_{it} \tag{3}
\]

Where post2007 is a dichotomous variable set to 1 if the earnings announcement falls in year 2008 or later and set to 0 otherwise. All other variables are as previously defined. A positive and significant coefficient on post2007 ($\beta_4$) would support H3.

To test H4a and H4b, the models (1) and (2) are run after partitioning the sample data between the pre-2008 and post-2008 periods. From models (1) and (2), a more positive and significant coefficient for VIX (NBER) in the post-2007 period would support H4a (H4b).

### SAMPLE SELECTION AND RESULTS

#### Sample Selection

We use several data sources to collect our sample containing data from 1990 to 2016—CRSP for daily price data, the CRSP/Compustat Merged dataset for quarterly accounting information, and I/B/E/S for quarterly earnings estimates from analysts. We have collected and aggregated this data for all available firm-quarter combinations for which there is at least one estimate of earnings. We begin with 153,763 firm-quarter observations and end with a total of 103,120 observations after deleting observations with missing variables and outliers are trimmed for all continuous variables (top and bottom 1% for each).

#### Results

Descriptive statistics for model variables are provided in Panel A of Table 1. Panel B of Table 1 provides difference of means for model variables across the Torpedo and Non-torpedo subsamples. Results from Panel B indicate that relative to Non-torpedo observations, Torpedoes are on average smaller in size (p < 0.0001), have lower analyst forecast dispersion (p = 0.023), have higher market-to-book ratios (p = 0.013), occur in periods with higher VIX (p = 0.012), are more likely during economic contractions (p = 0.027) and became more frequent in the post-2007 period (p = 0.012). All of these indications are consistent with prior research, as well as our priors, as stated herein.

Panel C of Table 1 provides difference of means for model variables across the pre-and post-2007 subsamples. In general, Panel C demonstrates that the post-2007 period on average is associated with larger firms (p < 0.0001), smaller market-to-book ratios (p = 0.060), higher VIX (p < 0.0001), and greater likelihood of contractionary macroeconomic conditions (p < 0.0001). There is no difference in average analyst forecast dispersion (FD) between the periods. In general, these descriptives are consistent with a business environment more acutely sensitive, and exposed, to downside risk, relative to conditions that existed prior to 2008.

Table 2 presents Pearson Correlation Coefficients among the study variables. The matrix shows that among the firm-specific variables, size is positively correlated with forecast dispersion and negatively correlated with market-to-book. Market-to-
book and forecast dispersion are not significantly correlated. Meanwhile, the matrix shows positive correlation among all of the macroeconomic variables (VIX, NBER, and post2007).

Regression results for models (1), (2) and (3) are presented in Table 3. For the firm-specific variables, results for each of the models show that torpedo likelihood is negatively related to SIZE and positively related to market-to-book ratio (MB). Both of these results are consistent with prior research as well as our priors. First, the larger firms are, the more diversified, thereby reducing non-diversifiable risk sensitivity. Second, market-to-book is typically interpreted as a proxy for growth. Growth firms carry more non-diversifiable risk exposure. Thus, a narrow miss, to the extent it proxies for change in non-diversifiable risk, is likely to be associated with the likelihood of a torpedo event, in the directions we report. While not significant, torpedo likelihood is (marginally) negatively related to forecast dispersion- a finding consistent with prior research.

With regard to the macroeconomic variables, VIX (p = 0.003), NBER (p = 0.009) and post2008 (p = 0.003) are all positively related to torpedo likelihood. The significance of the macroeconomic variables supports H1-H3.

Regression results for models (1) and (2) partitioned for the pre- and post-2007 periods are presented in Table 4, Panels A and B, respectively. For both VIX (panel A) and NBER (panel B) the coefficients are insignificant in the pre-2008 period (p = 0.201 and 0.893, respectively) and positive and significant (p = 0.029 and 0.009, respectively) in the post-2007 period, which supports both H4a and H4b.

Interestingly, the coefficient for MB in both models is positive and significant in the pre-2008 period (p = 0.017) but insignificant in the post-2007 period (p = 0.663). This result, along with those of H4a and H4b, suggests that torpedo likelihood in the post-2007 period may be associated with a shift away from unconditional factors (e.g. market-to-book) ratio and toward more conditional, macroeconomic factors (VIX and NBER).

CONCLUSION

In summary, our research shows that macroeconomic conditions and policy intervention play a significant role in the likelihood of firms experiencing earnings torpedoes (e.g., disproportionate negative returns to relatively small earnings misses) after earnings announcements. Specifically, our results demonstrate that trading conditions in the market, as measured by the VIX, and economic recession, as measured by NBER classification, are both incrementally significant to firm size, analyst forecast dispersion and market-to-book ratio in explaining torpedo likelihood. Additional analysis shows that the VIX and NBER classification are even more informative to torpedo likelihood in the post-2007 period following the Financial Crisis.

Interestingly, the time period results further indicate that market-to-book ratio was significantly more important in explaining torpedo likelihood in the pre-Crisis period than it is in the post-Crisis period. This result highlights an increase in the sensitivity of market participants to macroeconomic indicators of “fear”—such as increased volatility—and reduced focus on the fundamental characteristics of individual stocks when making investment decisions.

Given the established relation between torpedo events and macroeconomic conditions (and significant policy interventions that result) found in the current study, future research in the area could include considering whether the frequency, concentration, and related characteristics of torpedo events provide information about the prospect for changes in macroeconomic conditions.

REFERENCES


32. Wharton Research Data Services (WRDS) was used in preparing this work. This service and the data available thereon constitute valuable intellectual property and trade secrets of WRDS and/or its third-party suppliers.
### TABLE 1

**Descriptive Statistics**

#### Panel A – Full Sample (N = 6,629)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE</td>
<td>4.835</td>
<td>4.817</td>
<td>1.822</td>
</tr>
<tr>
<td>FD</td>
<td>0.039</td>
<td>0.017</td>
<td>0.104</td>
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<tr>
<td>MB</td>
<td>3.311</td>
<td>2.557</td>
<td>2.596</td>
</tr>
<tr>
<td>VIX</td>
<td>20.015</td>
<td>17.890</td>
<td>8.696</td>
</tr>
<tr>
<td>NBER</td>
<td>0.124</td>
<td>0.000</td>
<td>0.330</td>
</tr>
<tr>
<td>post2007</td>
<td>0.382</td>
<td>0.000</td>
<td>0.486</td>
</tr>
</tbody>
</table>

#### Panel B – Difference in Means across Torpedo and Non-torpedo Subsamples

<table>
<thead>
<tr>
<th>Variable</th>
<th>Torpedo (a) N = 4,098</th>
<th>Non-torpedo (b) N = 2,531</th>
<th>Difference (b) – (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE</td>
<td>4.923</td>
<td>4.483</td>
<td>-0.440*** (&lt;0.0001)</td>
</tr>
<tr>
<td>FD</td>
<td>0.040</td>
<td>0.034</td>
<td>-0.007** (0.023)</td>
</tr>
<tr>
<td>MB</td>
<td>3.270</td>
<td>3.477</td>
<td>0.207** (0.013)</td>
</tr>
<tr>
<td>VIX</td>
<td>19.872</td>
<td>20.585</td>
<td>0.713** (0.012)</td>
</tr>
<tr>
<td>NBER</td>
<td>0.120</td>
<td>0.143</td>
<td>0.024** (0.027)</td>
</tr>
<tr>
<td>post2007</td>
<td>0.374</td>
<td>0.412</td>
<td>0.037** (0.012)</td>
</tr>
</tbody>
</table>

***(**) Indicates significance at the 1% (5%) level. P-values in parenthesis.
TABLE 1, cont.
Descriptive Statistics

Panel C – Difference in Means across pre-and post-2007 Subsamples

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-2008 (a)</th>
<th>Post-2007 (b)</th>
<th>Difference (b) – (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 4,098</td>
<td>N = 2,531</td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>4.751</td>
<td>4.972</td>
<td>0.221 (&lt;0.0001)</td>
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<tr>
<td>FD</td>
<td>0.040</td>
<td>0.037</td>
<td>-0.003 (0.220)</td>
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<tr>
<td>MB</td>
<td>3.360</td>
<td>3.233</td>
<td>-0.127 (0.060)</td>
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<tr>
<td>VIX</td>
<td>19.070</td>
<td>21.545</td>
<td>2.475 (&lt;0.0001)</td>
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<tr>
<td>NBER</td>
<td>0.073</td>
<td>0.208</td>
<td>0.135 (&lt;0.001)</td>
</tr>
</tbody>
</table>

***(**) Indicates significance at the 1% (5%) level. P-values in parenthesis.

TABLE 2
Pearson Correlation Coefficients

<table>
<thead>
<tr>
<th></th>
<th>SIZE</th>
<th>FD</th>
<th>MB</th>
<th>VIX</th>
<th>NBER</th>
<th>post2007</th>
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<tr>
<td>SIZE</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>FD</td>
<td>0.079*** (&lt;.0001)</td>
<td>1.000</td>
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<td></td>
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<td></td>
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<tr>
<td>MB</td>
<td>0.074*** (&lt;.0001)</td>
<td>-0.010 (0.435)</td>
<td>1.000</td>
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<tr>
<td>VIX</td>
<td>0.028** (0.023)</td>
<td>0.000 (0.979)</td>
<td>0.040*** (0.001)</td>
<td>1.000</td>
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<td></td>
</tr>
<tr>
<td>NBER</td>
<td>0.024** (0.049)</td>
<td>-0.003 (0.801)</td>
<td>0.051*** (&lt;.0001)</td>
<td>0.480*** (&lt;.0001)</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>post2007</td>
<td>0.059*** (&lt;.0001)</td>
<td>-0.014 (0.242)</td>
<td>-0.024* (0.054)</td>
<td>0.138*** (&lt;.0001)</td>
<td>0.198*** (&lt;.0001)</td>
<td>1.000</td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1%, 5%, 10% level. P-values in parenthesis.

TABLE 3
Regression Results

Dependent Variable: TORPEDO
N = 6,629

<table>
<thead>
<tr>
<th>Variable</th>
<th>Expected Sign</th>
<th>Equation (1)</th>
<th>Equation (2)</th>
<th>Equation (3)</th>
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<tbody>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Intercept</td>
<td>SIZE</td>
<td>FD</td>
<td>MB</td>
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<td>------</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>-1.038***</td>
<td>-0.129***</td>
<td>-0.532</td>
<td>0.023***</td>
</tr>
<tr>
<td></td>
<td>(&lt;0.0001)</td>
<td>(&lt;0.0001)</td>
<td>(0.160)</td>
<td>(0.046)</td>
</tr>
<tr>
<td></td>
<td>-0.869***</td>
<td>-0.129***</td>
<td>-0.534</td>
<td>0.023***</td>
</tr>
<tr>
<td></td>
<td>(&lt;0.0001)</td>
<td>(&lt;0.0001)</td>
<td>(0.161)</td>
<td>(0.043)</td>
</tr>
<tr>
<td></td>
<td>-0.898***</td>
<td>-0.131***</td>
<td>-0.524</td>
<td>0.022*</td>
</tr>
<tr>
<td></td>
<td>(&lt;0.0001)</td>
<td>(&lt;0.0001)</td>
<td>(0.171)</td>
<td>(0.057)</td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1%, 5%, 10% level. P-values in parenthesis.
### TABLE 4
Regression Results
Pre- and Post-2007

**Panel A - VIX**

Dependent Variable: TORPEDO

<table>
<thead>
<tr>
<th>Variable</th>
<th>Expected Sign</th>
<th>Pre-2008 N = 4,098</th>
<th>Post-2007 N = 2,531</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-1.048*** (&lt;0.0001)</td>
<td>-0.902*** (&lt;0.0001)</td>
<td></td>
</tr>
<tr>
<td>SIZE (-/-)</td>
<td>-0.142*** (&lt;0.0001)</td>
<td>-0.120*** (&lt;0.0001)</td>
<td></td>
</tr>
<tr>
<td>FD (-/-)</td>
<td>-0.363 (0.381)</td>
<td>-0.870 (0.216)</td>
<td></td>
</tr>
<tr>
<td>MB (+/0)</td>
<td>0.036** (0.017)</td>
<td>0.008 (0.663)</td>
<td></td>
</tr>
<tr>
<td>VIX (0/+)</td>
<td>0.008 (0.201)</td>
<td>0.009** (0.029)</td>
<td></td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.012</td>
<td>0.011</td>
<td></td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1%, 5%, 10% level. P-values in parenthesis.
### TABLE 4
Regression Results
Pre- and Post-2007

**Panel B - NBER**

Dependent Variable: TORPEDO

\[ \text{N} = 6,629 \]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Expected Sign</th>
<th>Pre-2008 N = 4,098</th>
<th>Post-2007 N = 2,531</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.909*** (&lt;0.0001)</td>
<td>-0.788*** (&lt;0.0001)</td>
<td></td>
</tr>
<tr>
<td>SIZE (-/-)</td>
<td>-0.141*** (&lt;0.0001)</td>
<td>-0.118*** (&lt;0.0001)</td>
<td></td>
</tr>
<tr>
<td>FD (-/-)</td>
<td>-0.361 (0.384)</td>
<td>-0.843 (0.228)</td>
<td></td>
</tr>
<tr>
<td>MB (+/0)</td>
<td>0.036** (0.017)</td>
<td>0.009 (0.663)</td>
<td></td>
</tr>
<tr>
<td>NBER (0/+</td>
<td>-0.021 (0.893)</td>
<td>0.030*** (0.009)</td>
<td></td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.012</td>
<td>0.012</td>
<td></td>
</tr>
</tbody>
</table>

***, **, * Indicates significance at the 1%, 5%, 10% level. P-values in parenthesis.