Internet Appendix for "The Effects of Securities Class Action Litigation on Corporate Liquidity and Investment Policy"[1]

[1]Matteo Arena and Brandon Julio, Internet Appendix to "The Effects of Securities Class Action Litigation on Corporate Liquidity and Investment Policy," *Journal of Financial and Quantitative Analysis* (Vol. 50, Nos. 1/2, Feb./Apr. 2015).

A. Litigation Risk and the Cross-section of Cash Holdings

In addition to the event-based measure of litigation risk examined in Table 4 and the spillover effects reported in Table 5, we also measure ex ante litigation risk as the predicted probability of litigation for each firm-year using the approach of Gande and Lewis (2009) and Kim and Skinner (2012). The approach estimates the propensity to be sued by employing a probit model to generate the predicted probability of being sued for a firm given various explanatory variables related to the size of potential settlement or damages in the case of a lawsuit, the litigation environment at a given point of time, and firm-specific variables.

The proxy variables for the size of potential damage awards include share turnover, stock return volatility, stock returns, and firm size. High share turnover and return volatility capture the idea that investors are more likely to purchase shares based on incorrect or misleading information and have been found to be positively related to actual damage awards (Dyl (1999)). Jones and Weingram (1996) find evidence that firms with relatively high stock returns are less likely to be sued. We also include the market value of equity to capture the idea that large firms are more likely to be able to pay out large amounts in the case of a successful lawsuit.

To capture the overall litigation environment for a firm, Gande and Lewis (2009) include litigation intensity variables for each industry and firm. To measure past litigation activity, a dummy variable is set equal to one in a given firm-year if that particular firm has been sued in a previous year. We measure litigation intensity in a given industry as the number of lawsuit actions in a given industry in year, where industry membership is given by the 4-digit SIC code. To capture a potential non-linear relationship, Gande and Lewis (2009) also

include litigation intensity squared on the right hand side of the probit regression as well. Since lawsuits tend to cluster in specific industries, we also follow Lowry and Shu (2005) by including dummy variables to indicate whether a firm is classified as a regulated, financial, technology or retail firm.

Firm-specific factors include return on assets, unexpected earnings, discretional accruals, and executive ownership and compensation information. We include ROA to capture the overall performance of a firm as it is hypothesized that firms that perform better tend to be less likely to be sued. Standardized unexpected earnings are thought to be negatively related to the probability of being sued. Discretionary accruals, calculated using the modified Jones model in Dechow, Sloan and Sweeney (1995), are included to capture whether firms are overreporting earnings. Two lags of discretionary accruals are also included. The percentage of total CEO compensation from bonuses, CEO share ownership, and an interaction between bonus compensation and a dummy set equal to one if ROA is negative are included to control for differences in incentives related to performance and reporting.

Table AI reports the parameter estimates of a probit regression model where the dependent variable is set to one if a firm is brought into a lawsuit and zero otherwise. Similar to the findings of Gande and Lewis (2009), we find that the probability of being sued is positively and significantly related with stock turnover, volatility, firm size, litigation intensity, and membership in the financial industry. The probability of being sued is negatively related to ROA and standardized unexpected earnings. The model performs well in predicting actual litigation

events. The pseudo r-squared is 19% and the percent of concordant pairs based on predicted probabilities is 83.2%, with only 15.7% of pairs being discordant.[2]

We use the specification in Table AI and two other variations of the probit model to obtain ex ante measures of litigation risk. The first measure is simply the predicted probabilities from the probit model reported in Table AI. The predicted probability for each firm-year is an in-sample ex ante measure of litigation risk. We also construct two out-of-sample measures. The first out-of-sample measure is obtained by estimating a probit regression each year using data from all previous years and applying the parameter estimates to the following year's explanatory variables to obtain predicted probabilities. For example, to obtain predicted probabilities for firms in 2001, we estimate the probit model over the period 1995 to 2000 and apply the parameter estimates to the information in 2001 and store the predicted probabilities. The second set out-of-sample predicted probabilities are obtained in a similar manner, except that the estimation period is the rolling three-year window just prior to the year for which we are obtaining the predicted probabilities. For example, for the predicted probabilities for firms in 2001, we use data from 1998 to 2000 to estimate the necessary parameter estimates and apply them to the 2001 data.

We then incorporate the ex ante measures of litigation risk into a standard cash holdings regression framework. As before, to control for other potential determinants of a firm's cash holdings, we include other explanatory variables that are known to be correlated with cash holdings (see Bates, Kahle and Stulz (2008)). The main variable of interest is the predicted

[2]A pair of observations with different values of the litigation event indicator are said to be concordant if the observation with the lower ordered response (no litigation event) has a lower predicted mean score than the observation with the higher ordered response (litigation dummy equal to one).

probability of litigation. We also include measures of idiosyncratic and systematic risk based on the methodology of Hoberg and Prabhala (2009) to control for non-litigation risk in the cash regressions.

Table AII reports the estimates of the cash regressions. The first three columns report the results of OLS regressions including the three different proxies of litigation risk with year fixed effects. The litigation risk coefficients are positive and statistically significant at the 1% level. In terms of economic magnitude, a one-standard deviation increase in predicted probability of litigation leads to an expected increase in cash holdings of 0.025 for the in-sample probabilities, representing an expected increases in the cash/assets ratio of 16.5% relative to the unconditional mean cash-to-assets ratio. The out-of-sample measures yield economic magnitudes of 0.018 and 0.017, respectively, representing expected percentage increases of 11.9% and 11.3% given a one-standard deviation increase in these measures. The signs and magnitude of the coefficients of the control variables are consistent with that of Bates, Kahle and Stulz (2008).

To alleviate concerns that some unobserved industry heterogeneity may be explaining the results, we include industry fixed effects in the last three columns of Table AII. The coefficients on the ex-ante measures of litigation risk remain statistically significant and positive. The economic magnitudes of litigation risk are lower when we account for industry fixed effects, dropping to a range of 5.9% to 6.5% increase in the expected cash/assets ratio in response to a one-standard deviation increase in the predicted probability of being sued.

Table AI
Probit Estimation of the Propensity to be Sued

This table reports estimates, marginal effects, and standard errors from a probit estimation of the propensity to be sued. The left hand side variable is an event dummy set equal to one in the year a securities lawsuit is initiated against a firm. The previous litigation dummy is set equal to one for any firm-year observation if that particular firm had been involved in another litigation in a previous year. Litigation intensity is the proportion of firms in a given 4-digit SIC industry that were brought into litigation in a given year. The regulated dummy is set equal to one for firms in regulated industries, while the technology, retail and financial dummies are set equal to one if a firm belongs in one of these respective industries. All other firm characteristics are described in detail in the data appendix. The sample period is 1996 to 2006. *z-statistics* based on industry-level clustered standard errors are reported in parentheses.

	Coefficient	Marginal Effect (dP/dX)
Stock Turnover	1.550	0.060
	(10.09)***	(10.09)***
Equity Return Volatility	0.420	0.016
	(4.06)***	
Stock Return	-0.348	-0.013
	(4.79)***	
Log of Market Capitalization	0.173	0.007
	(8.81)***	
Previous Litigation Dummy	-0.019	-0.001
	(0.29)	
Litigation Intensity	0.060	0.002
	(8.92)***	
Litigation Intensity Squared	-0.001	-0.000
	(7.29)***	
Regulated Industry Dummy	0.060	0.002
	(0.70)	
Financial Dummy	0.466	0.028
	(4.73)***	
Technology Dummy	-0.117	-0.004
	(1.58)	
Retail Dummy	-0.009	-0.000
	(0.10)	
Return on Assets	-0.477	-0.018
	(2.25)**	
Discretionary Accruals$_t$	-0.025	-0.001
	(1.62)	
Discretionary Accruals$_{t-1}$	0.004	0.000
	(0.22)	
Discretionary Accruals$_{t-2}$	-0.000	-0.000
	(0.31)	
Standardized Unexpected Earnings	-0.143	-0.006
	(7.61)***	
Bonus/TotalCompensation	-0.073	-0.003
	(0.56)	
Bonus $\times$ Neg. ROA Dummy	0.311	0.012
	(0.62)	
CEO Share Ownership	-0.000	-0.000
	(0.84)	
Observations	13,589	
Pseudo R^2	0.191	
Percent Concordant	83.2	
Percent Discordant	15.7	

Table AII
Cash Regressions: Ex Ante Litigation Risk Proxies

The dependent variable is the ratio of cash and short-term investments to net-of-cash total assets. The firm characteristics are defined as previously and described in detail in the data appendix. The variables Prob(Litigation) 1 through 3 are ex ante measures of litigation risk, proxied by the propensity to be sued. Prob(Litigation) 1 are the predicted probabilities from the probit regression reported in Table AI. Prob(Litigation) 2 and 3 are out-of-sample predicted probabilities, where the probit regression parameters are obtained on a rolling-window basis (all previous years for Prob(Litigation) 2 and the previous two-year rolling window for Prob(Litigation) 3) and the estimates are used to generate predicted probabilities for the following year. The standard errors reported in brackets are clustered at the industry level. The sample period is 1996 to 2006.

	(1)	(2)	(3)	(4)	(5)	(6)
Prob(Litigation) 1	0.207			0.109		
	(5.03)***			(3.53)***		
Prob(Litigation) 2		0.123			0.084	
		(4.83)***			(3.02)***	
Prob(Litigation) 3			0.120			0.077
			(4.97)***			(2.65)***
ln(Total Assets)	-0.018	-0.016	-0.016	-0.022	-0.022	-0.022
	(9.00)***	(8.56)***	(8.58)***	(7.51)***	(7.41)***	(7.29)***
Leverage	-0.194	-0.196	-0.196	-0.154	-0.155	-0.155
	(10.61)***	(10.75)***	(10.67)***	(5.56)***	(5.61)***	(5.58)***
Cash Flow	-0.014	-0.014	-0.014	-0.010	-0.010	-0.010
	(5.03)***	(5.05)***	(5.04)***	(4.13)***	(4.10)***	(4.09)***
Net Working Capital	-0.021	-0.022	-0.022	-0.029	-0.029	-0.029
	(4.16)***	(4.23)***	(4.22)***	(1.37)	(1.37)	(1.38)
Dividend Payer	-0.044	-0.044	-0.044	-0.025	-0.024	-0.024
	(8.02)***	(7.92)***	(7.93)***	(3.35)***	(3.34)***	(3.34)***
Market-to-Book	0.023	0.023	0.023	0.019	0.019	0.019
	(13.27)***	(13.30)***	(13.22)***	(9.02)***	(9.08)***	(9.07)***
Capital Expenditures	-0.578	-0.577	-0.577	-0.617	-0.614	-0.613
	(14.61)***	(14.63)***	(14.63)***	(6.67)***	(6.73)***	(6.71)***
Acquisitions	-0.395	-0.395	-0.396	-0.403	-0.403	-0.404
	(17.18)***	(17.18)***	(17.18)***	(10.03)***	(10.03)***	(10.01)***
R&D to Sales	0.125	0.126	0.126	0.099	0.099	0.099
	(6.85)***	(6.84)***	(6.88)***	(4.02)***	(3.98)***	(3.99)***
Net Debt Issuance	0.156	0.157	0.157	0.137	0.137	0.137
	(11.70)***	(11.75)***	(11.73)***	(7.16)***	(7.17)***	(7.17)***
Net Equity Issuance	-0.005	-0.010	-0.010	0.010	0.007	0.007
	(0.16)	(0.31)	(0.32)	(0.44)	(0.33)	(0.32)
Industry CF Volatility	0.067	0.079	0.081	-0.151	-0.148	-0.147
	(1.51)	(1.78)*	(1.81)*	(2.98)***	(2.89)***	(2.89)***
Idiosyncratic Volatility	0.657	0.781	0.776	0.110	0.138	0.147
	(2.62)***	(3.22)***	(3.20)***	(0.45)	(0.53)	(0.57)
Systematic Volatility	4.443	4.761	4.799	2.702	2.833	2.871
	(9.93)***	(10.87)***	(10.95)***	(4.00)***	(4.18)***	(4.22)***
Fixed Effects	Year	Year	Year	Industry, Year	Industry, Year	Industry, Year
Observations	12,587	12,587	12,587	12,587	12,587	12,587
R-squared	0.50	0.50	0.50	0.60	0.60	0.60

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