Financial Markets(6314M0278Y)

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Group Assignment 2

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(a)

The correlation ρ measures the statistical relationship between two variables. In this case, we use the 'CORREL' function in MS Excel to determine the correlations between the variables listed in the instruction. The results are shown as follow:

Table1: Correlation Matrix

	p	vp	mktcap	bas100	ret	vola
p	1.0000					
vp	0.5022	1.0000				
mktcap	0.3948	0.9035	1.0000			
bas100	-0.2058	-0.0851	-0.0778	1.0000		
ret	-0.0763	-0.0208	-0.0367	-0.0635	1.0000	
vola	-0.2484	-0.0821	-0.1001	0.3406	0.3054	1.0000

As shown in the correlation matrix table, trading volume (vp) and market capitalization (mktcap) are most highly correlated (correlation coefficient = 0.9035). This suggests that the regression in which the dependent variable is the bid-ask spread should NOT include the trading volume (vp) and market capitalization (mktcap) as the independent variables at the same time. If the independent variables are highly correlated, the regression would face a multicollinearity issue that harms the robustness and even the correctness of the regression model.

(b)

As can be seen from Table 2, The explanatory power of these alternative specifications is summarized by R-squared values from the table. The R-squared values tend to increase by the use of logarithm of variables 'market capitalization' & 'trading volume' and adding extra independent variables. According to the table, the effect of most listed regressors on the relative spread is statistically significant for conventional thresholds (10%, 5% and 1%). The only exceptional case is the logarithm of closing price whose coefficient shows that the closing price does not have a statistically significant impact on the relative bid-ask spread. In the specification 1, the coefficient of market capitalization is 0.0000 (the coefficient is extremely small, but should not be zero), indicating that 1 unit increase in the market

capitalization does not really affect the relative bid-ask spread. However, when looking at specification 3, the coefficient for the logarithm of market capitalization is -1.1914, which states that 1 percent increase in market capitalization leads to a significant decrease in relative bid-ask spread by 0.0118 (-1.19*log(101/100)) percentage point. Similarly, in the specification 2, with 1 unit increase in trading volume, the relative bid-ask spread shows no change in its value. However, in specification 4, with the use of logarithm of trading volume, 1 percent increase in trading volume results in a significant reduction in relative bid-ask spread by 0.0086 (0.8656*log(101/100)) percentage point. Clearly, the use of logarithms contributes to the change in the coefficients, which displays more accurate estimates.

Table 2: Pooled OLS Regression Models for 6 Specifications (dependent variable: bas100)

	Model1	Model2	Model3	Model4	Model5	Model6
vola	41.9669***	41.9292***	21.5427***	25.6108***	29.0804***	29.2561***
	(5.4092)	(5.4218)	(2.8620)	(3.7957)	(3.9577)	(3.7434)
mktcap	-0.0000***					
	(-2.9206)					
vp		-0.0000***				
		(-2.7403)				
lg_mktcap			-1.1914***		0.8504***	0.8331***
			(-13.6793)		(3.3424)	(3.3137)
lg_vp				-0.8656***	-1.4228***	-1.4209***
				(-15.3092)	(-7.6467)	(-7.7051)
turnover					0.0196*	0.0196*
					(1.8582)	(1.8580)
lg_p						0.0284
						(0.1943)
Constant	-0.1753	-0.1614	7.2157***	6.5589***	5.4647***	5.4820***
	(-0.4574)	(-0.4231)	(10.7339)	(12.5688)	(8.1250)	(8.4345)
Observations	2256	2256	2256	2256	2256	2256
R^2	0.1179	0.1193	0.3310	0.4084	0.4263	0.4264
Adjusted R^2	0.1171	0.1185	0.3304	0.4078	0.4253	0.4251

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(c)

Table 3: Regression Models Controlled for Time Trends Dummy (Specifications 3, 4 and 5)

	Model3_time	Model4_time	Model5_time
vola	21.5117***	25.5812***	29.0572***
	(2.8521)	(3.7845)	(3.9471)
lg_mktcap	-1.1917***		0.8501***
	(-13.6709)		(3.3394)
month	0.0399**	0.0409**	0.0296
	(2.0820)	(2.3435)	(1.5949)
lg_vp		-0.8658***	-1.4227***
		(-15.3041)	(-7.6440)
turnover			0.0196*
			(1.8578)
Constant	7.1990***	6.5412***	5.4524***
	(10.8058)	(12.6639)	(8.1734)
Observations	2256	2256	2256
R^2	0.3310	0.4084	0.4263
Adjusted R^2	0.3301	0.4076	0.4251

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

After using the time fixed effects by the dummy variable "month", the values of R-squared do not obviously change (3rd: 0.3310 → 0.3310, 4th: 0.4084 → 0.4084, 5th: 0.4263 → 0.4263). The amounts of change in coefficients are also small, which reveals that the specification 3, 4, and 5 are not obviously affected by the time trend. Additionally, it can be clearly seen that all coefficients of dummy variable month in the specifications 3, 4 are statistically significant with a confidence level of 95% and in specification 5, there is no statistical significance for the coefficient of time trend dummy (month). Thus, it can be summarized that the results found in part (b) are robust to accounting for the time trends.

(d)

Table 4: Regression Models Controlled for Financial Sector Dummy (Specifications 3, 4 and 5)

	Model3_fin	Model4_fin	Model5_fin
vola	20.7023***	25.2591***	28.3999***
	(2.8508)	(3.8213)	(3.9281)
lg_mktcap	-1.1633***		0.7750***
	(-13.4984)		(2.9747)
fin	1.3181***	0.7466**	0.5188*
	(4.0451)	(2.4571)	(1.6889)
lg_vp		-0.8449***	-1.3635***
		(-15.0864)	(-7.1551)
turnover			0.0192*
			(1.8355)
Constant	6.8522***	6.2901***	5.4001***
	(10.1734)	(11.6386)	(8.0184)
Observations	2256	2256	2256
R^2	0.3472	0.4135	0.4287
Adjusted R^2	0.3463	0.4127	0.4274

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Firstly, compared the results in part b, R-squared values do not change significantly after adding the financial-sector dummy (3rd: 0.3310 → 0.3472, 4th: 0.4084 → 0.4135, 5th: 0.4263 → 0.4287). Then in the light of the dummy variable 'fin', all coefficients of this dummy are positive, implying that the relative bid-ask spreads of financial stocks are higher than the spreads of non-financial stocks on average. To be more detailed, taking Model3 as an example, the relative bid-ask spreads of financial stocks are expected to be 1.318 percentage points higher than the spreads of non-financial securities on average. Hence, the financial stocks are expected to be more illiquid than the non-financial stocks.

(e)

Table 5: Regression Models adding interaction of lg_vp and fin (Specifications 4, 5 and 6)

	Model4_fin_lvp	Model5_fin_lvp	Model6_fin_lvp
vola	24.3529***	26.6898***	25.0869***
	(3.9254)	(3.9042)	(3.4121)
lg_vp	-0.7169***	-1.1298***	-1.1194***
	(-11.9817)	(-5.8153)	(-5.7020)
fin	5.0526***	4.5064***	4.8164***
	(3.8340)	(3.3602)	(3.5313)
lg_vp # fin	-0.7198***	-0.6573***	-0.6887***
	(-3.8575)	(-3.5263)	(-3.6560)
turnover		0.0162*	0.0160*
		(1.7151)	(1.7008)
lg_mktcap		0.5931**	0.7014***
		(2.3137)	(2.8171)
lg_p			-0.2204
			(-1.6218)
Constant	5.4402***	4.8606***	4.6860***
	(9.2468)	(7.1700)	(7.2378)
Observations	2256	2256	2256
R^2	0.4441	0.4536	0.4551
Adjusted R^2	0.4432	0.4521	0.4534

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

To investigate the extra effect caused by daily trading volume interacting with financial stocks. We added an interaction variable between the financial sector dummy and the logarithm of daily trading volume by multiplying them. If the coefficient of the interaction variable is non-zero and statistically significant, we can conclude that the relationship of relative spread with trading volume in financial stocks might be different from other stocks.

According to the table above, all the coefficients of interaction variables are statistically significant. From Model4_fin_lvp, we can see that a 1% increase of daily trading volume would decrease relative spread by 0.0072 (0.7198*log(101/100)) percentage point on average

when the observation is a financial stock. From Model5_fin_lvp, the interaction would cause an extra decrease of 0.0066 percentage point. Similarly, the extra effect of this interaction variable on the relative spread is expected to be -0.0067 percentage point, as shown in Model6_fin_lvp. Therefore we can conclude that bid-ask spread decreases when industry is a financial industry. Given that the relative bid-ask spreads are usually large in a market with low liquidity, the result shows that higher trading volume provides more liquidity (and lower spreads) in the financial sector.

(f)

The outcomes of the regressions can be seen in the following table:

Table 6: Regression Models adding interaction of lg(mkt) and vola (Specifications 3, 5 and 6)

	Model3_vola_lmkt	Model5_vola_lmkt	Model6_vola_lmkt
vola	117.8879***	118.8827***	119.4086***
	(5.3888)	(5.9209)	(5.8321)
lg_mktcap	-0.1128	1.7493***	1.7097***
	(-0.6005)	(5.3817)	(5.4801)
vola # lg_mktcap	-22.5278***	-21.2030***	-21.2295***
	(-5.7343)	(-5.9618)	(-5.9471)
turnover		0.0243*	0.0242*
		(1.6725)	(1.6727)
lg_vp		-1.3554***	-1.3510***
		(-7.3434)	(-7.3670)
lg_p			0.0668
			(0.4859)
Constant	2.3455**	1.0441	1.0792
	(2.0401)	(0.9453)	(1.0013)
Observations	2256	2256	2256
R^2	0.4127	0.4975	0.4977
Adjusted R^2	0.4119	0.4964	0.4964

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In order to fully understand the relationship between the bid-ask spread (bas100) and the volatility (vola), an assessment of the effects of firm size measured by market capitalization must be made. In order to reach educated conclusions on the topic, an interaction term between the log of market capitalization (lg_mktcap) and volatility is introduced.

As can be seen from table 6, the interaction term has a statistical significance level of less than 0.01 across all specifications 3, 5 and 6. On the other hand, the effect of log of market capitalization on relative bid-ask spreads becomes statistically significant only in the specifications 5 and 6. To be more detailed, the interaction term has a negative coefficient across all specifications, meaning that holding other variables constant and differentiating w.r.t. volatility, the coefficient of volatility decreases as firms grow larger. This also means that the volatility is expected to have an additional negative impact on the relative spreads of stocks when the firm is larger. This is illustrated in the following example, based on the third specification:

$$\Delta bas\ 100 = 119.409 - 21.23 * lmktcap$$

Based on this example, holding everything else constant, firms that have a log of market capitalization larger than 5.625 would have a negative relationship between bid-ask spread and volatility. On the other hand, smaller firms have a positive relationship. For the first specification this size would have to be 5.233 and for the second it is 5.606. The average log of market capitalization across the entire sample is 5.279.