

# *Intraday Volume and Volatility Relations With and Without Public News\**

## APPENDIX

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### **Abstract**

This paper reexamines the dynamic relation between intraday trading volume and return volatility of large and small NYSE stocks in two partitioned samples, with and without identifiable public news. We argue that the sequential information arrival hypothesis (SIAH) can be tested only in periods containing public news. After partitioning the sample into periods with and without public news, we find bi-directional Granger-causality between volume and volatility in the presence of public information as hypothesized by the SIAH. Our analysis further suggests that return volatility is higher in the periods with public news, while trading volume is significantly higher in the no-news period; perhaps owing to the importance of private information for trading stocks. Using the sample without public news, we find evidence that volume Granger-causes volatility without feedback. These results are broadly consistent with behavioral models like the overconfidence and biased self-attribution model of Daniel, Hirshleifer and Subrahmanyam (1998). It appears that overconfident investors overrate the precision of their private news signals and therefore trade too aggressively in the absence of public news; when public news arrives, investors' biased self-attribution triggers excessive return volatility.

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## Technical Appendix:

### Zellner's Posterior-Odds-Ratio Approach for Adjusting Critical Values

This appendix presents a technical summary of how we adjust critical values for large sample size in all of our statistical tests using the Bayesian theorem. Bayesian theorem is based on the definition of conditional probability. The probability that a hypothesis (H) is true *after* observing the data (usually called the posterior probability),  $P(H|D)$ , is defined as

$$P(H | D) = \frac{P(D | H)P(H)}{P(D)} \quad (\text{A.1})$$

where  $P(D|H)$  is the probability of observing the data given that H is true (called the likelihood);  $P(H)$  is the probability that H is true *before* observing the data (called the prior probability);  $P(D)$  is the unconditional probability of observing the data regardless of H.

Take the Granger-causality test in the context of volatility equation **Error! Reference source not found.** for example. We want to examine the null hypothesis ( $H_{A1}$ ) that volume does not Granger-cause volatility, i.e.,

$$H_{A1}: \text{all } b_k = 0, \quad (k=1,2, \dots,L)$$

Hence, the alternative hypothesis ( $H_{A2}$ ) is that volume Granger-causes volatility, i.e.,

$$H_{A2}: \text{not all } b_k = 0, \quad (k=1,2, \dots,L)$$

Therefore, the posterior probabilities of the two hypotheses are, respectively,

$$P(H_1 | D) = \frac{P(D | H_1)P(H_1)}{P(D)} \quad (\text{A.2})$$

$$P(H_2 | D) = \frac{P(D | H_2)P(H_2)}{P(D)} \quad (\text{A.3})$$

Thus, the ratio of the two posterior probabilities (called the posterior odds ratio) is

$$K_{12} = \frac{P(H_1 | D)}{P(H_2 | D)} = \left( \frac{P(D | H_1)}{P(D | H_2)} \right) \left( \frac{P(H_1)}{P(H_2)} \right) \quad (\text{A.4})$$

The first term on the right-hand side is called the likelihood ratio. The second term on the right-hand side is called the prior odds ratio, and assumed to be one if both hypotheses are equally probable.  $H_{A1}$  and  $H_{A2}$  involve some parameters, say  $\beta_1$  and  $\beta_2$ . The likelihood ratio is computed by a weighting procedure, where the weights are determined by the prior distributions of these parameter sets. Thus, the posterior odds ratio is:

$$K12 = \frac{\int L_1 P_1(\beta_1) d\beta_1}{\int L_2 P_2(\beta_2) d\beta_2} \frac{P(H_1)}{P(H_2)} \quad (\text{A.5})$$

where  $L_1$  and  $L_2$  are the respective likelihoods, and  $P_1$  and  $P_2$  are the respective prior distributions for the parameters implied by hypotheses A1 and A2. The first term on the right-hand side is sometimes called the Bayes factor.

Zellner and Siow (1980) show that, with prior odds ratio equal to one, the posterior odds ratio can be approximated by

$$K12 = \frac{A[(T-k-1)/2]^{k/2}}{\left[1 + \frac{kF_{k,T-k-1}}{(T-k-1)}\right]^{(T-k-2)/2}} \quad (\text{A.6})$$

where  $T$  is the sample size,  $k$  is the number of restrictions implied by the null hypothesis relative to the alternative hypothesis,  $A = \frac{\pi^{1/2}}{\Gamma[(k+1)/2]}$ ,  $\Gamma(\bullet)$  is the gamma function, and  $F_{k,n-k-1}$  is the standard F statistic for testing the null hypothesis versus the alternative. The hypothesis choice is undertaken with explicit consideration of losses (mistakes) associated with the incorrect choice. Assuming that the parameters to be tested are uniformly distributed over their respective range, the expectation of the total fraction of mistakes associated with both hypotheses will be minimized by using the critical value  $K12=1$  [see Zellner (1984), p.289]. That is, if  $K12>1$ , choose  $H_{A1}$ , and if  $K12<1$ , choose  $H_{A2}$ .

As can be seen in equation (A.6), the posterior odds ratio K12 is a monotonic function of the standard F statistic. This fact makes it easy to obtain the sample-size-adjusted critical values of F statistics. Any test procedure that rejects  $H_{A1}$  if  $K12 < 1$  is equivalent to the procedure that rejects  $H_{A1}$  if  $F_{k,n-k-1} > F_c$ , where  $F_c$  is a critical value corresponding to the unity posterior odds ratio. Hence, the Lindley's Paradox can be resolved by adopting the new critical value  $F_c$  in the F test. Specifically, the critical value of  $F_c$  for K12 to be 1.0 is

$$F_c = \left\{ \exp \left[ \frac{2}{T-k-2} \ln \left( \frac{A[(T-k-1)/2]^{k/2}}{K12} \right) \right] - 1 \right\} \left( \frac{T-k-1}{k} \right) \quad (A.7)$$

Table A1: Summary Statistics

Large Stocks	Return			Volatility mean	LogVolume mean	Corr.	Small Stocks	Return			Volatility mean	LogVolume mean	Corr.
	mean	variance	Normality test					mean	variance	Normality test			
ABT	-9.03E-06	3.50E-06	<b>7360.77</b>	3.45E-06	9.06978	0.01	ACF	-4.86E-05	1.40E-05	<b>9373.06</b>	1.36E-05	8.11124	0.01
ACL	-2.78E-07	4.54E-06	<b>7139.61</b>	4.24E-06	6.63789	-0.01	ACV	-1.36E-05	1.42E-06	<b>3419.39</b>	1.37E-06	6.40874	-0.02
ADP	1.71E-05	2.77E-06	<b>27802.71</b>	2.59E-06	8.53661	-0.06	AEM	-4.92E-05	8.60E-06	<b>6260.58</b>	8.24E-06	7.01704	0.00
AGN	-5.42E-06	2.71E-06	<b>73325.55</b>	2.65E-06	7.63023	0.00	AFC	-7.62E-05	5.80E-06	<b>16268.71</b>	5.63E-06	6.91669	-0.04
AIG	-1.13E-05	3.41E-06	<b>7858.56</b>	3.24E-06	9.52421	-0.04	AHG	8.53E-06	5.17E-06	<b>27931.59</b>	4.97E-06	6.58229	-0.04
AMX	2.77E-05	6.88E-06	<b>1465.97</b>	6.70E-06	7.07968	0.02	ATG	8.71E-06	4.85E-06	<b>482407.75</b>	5.86E-06	6.12116	0.00
AT	-3.26E-06	3.30E-06	<b>4966.51</b>	3.22E-06	7.47418	-0.01	ATK	-2.24E-06	4.68E-06	<b>4796.70</b>	4.75E-06	6.70779	0.04
AVE	8.22E-06	2.48E-06	<b>5793.08</b>	2.81E-06	6.40563	-0.02	BC	-4.52E-05	4.70E-06	<b>101905.87</b>	4.20E-06	6.96761	-0.02
AZN	3.22E-05	2.94E-06	<b>7327.76</b>	2.87E-06	7.53184	0.02	BCR	-3.18E-06	1.59E-06	<b>5095.74</b>	1.51E-06	6.65856	-0.01
BAC	-5.35E-06	2.13E-06	<b>5341.10</b>	2.10E-06	9.45871	0.01	BDK	-3.03E-05	2.88E-06	<b>36163.09</b>	2.74E-06	7.27848	-0.03
BBY	4.18E-06	5.26E-06	<b>4738.04</b>	5.22E-06	8.67736	-0.02	BER	-2.87E-05	3.40E-06	<b>7499.07</b>	3.33E-06	6.28403	-0.03
BCE	2.61E-05	4.17E-06	<b>351.34</b>	4.16E-06	6.41843	-0.04	BGP	-2.64E-05	4.41E-06	<b>7545.06</b>	4.20E-06	6.60784	-0.02
BEN	-3.14E-05	2.23E-06	<b>2749.51</b>	2.15E-06	7.41707	0.00	BKS	-3.45E-05	5.47E-06	<b>2646.39</b>	5.68E-06	6.99546	-0.03
BK	6.07E-06	3.08E-06	<b>4090.88</b>	3.02E-06	8.50423	-0.01	BLI	-3.78E-05	7.34E-06	<b>2700.84</b>	7.20E-06	7.02995	0.02
BLS	2.33E-05	7.05E-06	<b>25935.36</b>	6.59E-06	9.0098	-0.01	BMC	-4.42E-06	5.53E-06	<b>4730.60</b>	5.23E-06	7.86346	-0.03
BP	-7.82E-06	1.41E-06	<b>6706.08</b>	1.36E-06	8.29676	-0.01	BWA	-1.93E-05	2.41E-06	<b>9243.48</b>	2.39E-06	6.43869	-0.01
BSX	-1.68E-05	4.85E-06	<b>200400.88</b>	4.38E-06	8.00805	-0.01	CBH	2.35E-05	2.24E-06	<b>14013.62</b>	5.91E-06	6.98261	-0.03
CA	-1.09E-04	1.18E-05	<b>36587.51</b>	1.13E-05	8.56595	-0.01	CFB	2.97E-06	3.30E-06	<b>9489.30</b>	3.16E-06	5.89157	0.01
CCL	-1.30E-05	3.19E-06	<b>13444.65</b>	3.05E-06	7.86133	-0.01	CFR	8.63E-06	2.57E-06	<b>12394.28</b>	5.27E-06	6.09975	-0.01
CPB	-2.49E-05	3.79E-06	<b>29036.53</b>	3.72E-06	7.33989	-0.01	CHK	-4.85E-06	1.85E-05	<b>6613.66</b>	1.78E-05	7.17774	-0.02
CVX	-2.33E-05	1.77E-06	<b>3856.12</b>	1.76E-06	8.72287	-0.01	CHS	-4.85E-05	7.97E-06	<b>26773.85</b>	7.83E-06	7.27944	0.01
DEO	-1.39E-05	1.21E-06	<b>3845.62</b>	1.15E-06	6.42034	-0.03	CPN	-1.12E-04	3.84E-05	<b>18864.84</b>	3.79E-05	8.89823	0.02
DT	-9.21E-06	9.11E-06	<b>1253.12</b>	9.01E-06	7.28762	0.04	CTB	9.24E-07	4.61E-06	<b>5609.43</b>	4.44E-06	6.40152	-0.02
DTE	-7.36E-06	2.30E-06	<b>26552.54</b>	2.11E-06	7.11709	-0.01	CVH	-2.32E-05	7.00E-06	<b>8788.63</b>	6.91E-06	7.05131	0.02

Large Stocks	Return			Volatility mean	LogVolume		Corr.	Small Stocks	Return			Volatility mean	LogVolume mean	Corr.
	mean	variance	Normality test		mean	variance			Normality test	mean	variance			
EDS	2.55E-05	6.08E-06	<b>34082.85</b>	5.71E-06	8.93431	0.07		DNY	-1.10E-05	3.52E-06	<b>8288.48</b>	3.36E-06	6.35447	0.02
EOP	-3.99E-05	2.40E-06	<b>5175.23</b>	2.33E-06	7.85828	-0.02		DQE	-1.93E-05	5.69E-06	<b>45214.48</b>	5.11E-06	6.62521	0.02
EXC	8.27E-06	3.32E-06	<b>3931.28</b>	3.33E-06	7.73406	-0.03		DRI	-2.21E-05	5.03E-06	<b>45989.14</b>	4.67E-06	7.64175	-0.01
FDX	1.96E-07	2.05E-06	<b>22159.29</b>	1.95E-06	7.91367	-0.01		DVA	-2.75E-06	3.32E-06	<b>34297.28</b>	3.09E-06	6.83039	-0.02
FE	-9.46E-06	4.68E-06	<b>17619.66</b>	4.51E-06	7.52326	-0.03		DYN	-3.10E-04	1.42E-04	<b>32605.04</b>	1.43E-04	8.67372	0.01
FRX	8.73E-06	1.66E-06	<b>6324.58</b>	1.62E-06	7.88314	-0.04		EC	-4.79E-06	3.22E-06	<b>1801.45</b>	3.15E-06	6.92572	-0.04
G	-2.63E-06	3.14E-06	<b>7046.11</b>	3.05E-06	8.50017	-0.02		ELY	-1.16E-05	6.55E-06	<b>5049.92</b>	6.32E-06	7.02877	-0.02
GCI	-1.21E-05	1.06E-06	<b>3336.57</b>	1.03E-06	7.66301	0.02		ENR	-1.58E-05	3.68E-06	<b>115764.12</b>	3.33E-06	6.39765	-0.01
GD	-3.61E-05	2.66E-06	<b>4547.72</b>	2.63E-06	8.19499	-0.01		EQT	-1.43E-06	1.37E-06	<b>3788.79</b>	1.28E-06	6.5099	-0.03
GE	6.96E-06	3.73E-06	<b>147.15</b>	3.71E-06	10.84821	0.01		ESV	-1.13E-05	5.46E-06	<b>3049.13</b>	5.37E-06	7.74566	0.02
GMH	-3.95E-05	8.87E-06	<b>4634.65</b>	8.76E-06	7.88871	0.04		EV	-1.81E-05	4.15E-06	<b>24863.24</b>	7.62E-06	6.16018	0.00
GPS	-1.99E-05	1.10E-05	<b>30484299.51</b>	8.27E-06	8.5788	-0.02		FBN	-6.01E-05	5.86E-06	<b>14678.63</b>	5.44E-06	7.12785	0.00
GS	-9.02E-06	1.69E-06	<b>8293.07</b>	1.63E-06	9.24134	-0.02		FIC	-9.74E-06	3.09E-06	<b>28535.31</b>	3.66E-06	6.67763	0.02
GSK	4.16E-05	2.89E-06	<b>10690.07</b>	2.86E-06	7.38914	0.01		FLR	-4.32E-05	4.37E-06	<b>1787.74</b>	4.33E-06	6.64617	-0.02
HAL	-2.17E-05	8.30E-06	<b>16878.09</b>	7.92E-06	8.63344	-0.01		FSH	-5.43E-05	7.99E-06	<b>135256.94</b>	9.92E-06	5.94073	0.05
HBC	-4.07E-06	1.46E-06	<b>7372.78</b>	1.46E-06	6.17212	0.02		GG	4.19E-06	1.39E-05	<b>68405.14</b>	1.30E-05	7.50126	0.03
HD	-2.61E-05	4.79E-06	<b>6318.45</b>	4.59E-06	9.96244	-0.01		GMT	-2.73E-05	5.06E-06	<b>1800483.81</b>	3.94E-06	6.30408	-0.02
HDI	-1.87E-05	3.72E-06	<b>14113.99</b>	3.66E-06	7.94687	-0.04		GR	-4.17E-05	3.80E-06	<b>20418.53</b>	3.52E-06	7.06427	-0.03
HIG	-2.22E-05	2.70E-06	<b>7699.42</b>	2.68E-06	7.60219	0.00		HAS	-6.14E-06	8.59E-06	<b>3733.77</b>	8.36E-06	6.91424	0.02
HNZ	-1.83E-05	2.04E-06	<b>13850.16</b>	1.98E-06	7.60872	0.01		HB	-5.63E-06	1.31E-06	<b>4838.73</b>	1.25E-06	5.9981	-0.04
HPQ	1.66E-05	9.76E-06	<b>19226.98</b>	9.48E-06	9.72595	-0.02		HHS	-5.15E-05	4.13E-06	<b>1971.20</b>	3.96E-06	6.24037	-0.04
IBM	-3.49E-06	2.31E-06	<b>613.90</b>	2.31E-06	9.74072	0.02		HIB	2.35E-05	2.88E-06	<b>117995.37</b>	2.66E-06	6.99721	0.02
IFX	-1.21E-05	7.88E-06	<b>1346.07</b>	7.66E-06	6.48533	-0.01		HNT	-3.35E-05	5.53E-06	<b>5598.15</b>	9.41E-06	7.14277	-0.01
IGT	5.64E-06	2.20E-06	<b>6140.03</b>	2.16E-06	7.3325	-0.02		HPT	4.43E-06	2.82E-06	<b>61153.73</b>	2.56E-06	6.4981	-0.01
IR	-1.80E-05	2.62E-06	<b>6903.49</b>	2.52E-06	7.64412	0.01		HRL	1.06E-06	4.28E-06	<b>12012.04</b>	4.02E-06	6.17444	-0.01
ITW	-3.34E-06	2.53E-06	<b>9113.90</b>	2.64E-06	7.53107	0.01		HSP	4.82E-07	5.02E-06	<b>3342.54</b>	4.82E-06	6.85631	0.02

Large Stocks	Return			Volatility mean	LogVolume mean	Corr.	Small Stocks	Small					
	mean	variance	Normality test					mean	variance	Normality test	mean	mean	Corr.
JHF	1.36E-06	2.31E-06	<b>65159.36</b>	2.14E-06	7.40483	-0.01	HUG	-5.21E-05	4.08E-06	<b>32275.73</b>	3.77E-06	6.04153	0.04
JNJ	2.45E-05	2.88E-06	<b>1978.85</b>	2.84E-06	9.94373	0.04	HUM	-5.74E-05	1.13E-05	<b>29251.52</b>	1.06E-05	7.35376	-0.01
JPM	-1.97E-05	9.66E-06	<b>42414.08</b>	9.09E-06	9.93714	0.01	IRF	-4.39E-05	8.17E-06	<b>15988.48</b>	7.95E-06	7.37649	0.02
KFT	-6.04E-06	1.33E-06	<b>7637.25</b>	1.27E-06	7.95095	0.02	KG	1.08E-05	7.41E-06	<b>14946.07</b>	7.09E-06	7.87803	0.01
KO	-7.96E-06	2.19E-06	<b>3356.96</b>	2.16E-06	9.31038	-0.01	LEG	-2.25E-05	3.99E-06	<b>7990.71</b>	3.90E-06	6.92356	-0.02
KR	-7.44E-06	3.12E-06	<b>330751.84</b>	2.95E-06	8.51423	0.01	LNT	-1.98E-05	7.86E-06	<b>264563.25</b>	1.02E-05	6.64137	-0.03
KRB	-2.55E-05	8.12E-06	<b>15786.83</b>	7.96E-06	9.209	-0.05	LSI	-6.35E-05	1.90E-05	<b>1722283.42</b>	1.78E-05	8.35388	-0.02
KSS	-1.22E-05	2.70E-06	<b>46457.10</b>	2.59E-06	8.27914	-0.01	LZ	-6.19E-05	2.62E-06	<b>1919.46</b>	2.52E-06	6.16385	-0.04
KTC	1.18E-05	1.68E-06	<b>1449.42</b>	1.64E-06	7.06121	0.01	MAN	-3.70E-05	2.67E-06	<b>11781.85</b>	2.62E-06	7.05433	-0.02
L	-2.73E-05	1.13E-05	<b>2924.04</b>	1.12E-05	9.18642	0.06	MBG	-2.14E-05	2.78E-06	<b>4900.55</b>	2.59E-06	7.00178	-0.02
LLY	4.42E-05	3.63E-06	<b>67448.22</b>	3.40E-06	9.0656	0.02	MKC	-2.60E-05	3.02E-06	<b>10121.81</b>	5.13E-06	6.60368	-0.01
MAR	-3.38E-05	2.82E-06	<b>44861.30</b>	4.87E-06	7.64998	-0.05	NAV	-3.77E-05	5.45E-06	<b>1670.20</b>	5.41E-06	6.8363	-0.02
MFC	-1.81E-05	2.51E-06	<b>11380.44</b>	2.42E-06	6.51212	-0.06	NEU	-6.23E-05	4.20E-06	<b>12980.82</b>	4.05E-06	6.32829	0.03
MO	-4.49E-06	1.86E-06	<b>2206.47</b>	1.86E-06	9.54337	0.06	NFS	-8.93E-05	3.71E-06	<b>5567.85</b>	3.65E-06	5.88336	0.08
MRK	1.37E-05	3.57E-06	<b>68471.13</b>	3.43E-06	9.66707	-0.02	OHP	-7.92E-06	4.24E-06	<b>14095.65</b>	4.12E-06	7.5549	-0.03
NOC	-1.29E-05	2.02E-06	<b>6932.12</b>	1.96E-06	8.30535	0.07	PCP	-5.10E-05	3.05E-06	<b>6527.60</b>	2.89E-06	6.46883	0.00
NOK	-6.71E-06	6.22E-06	<b>2215.88</b>	6.21E-06	9.64443	0.02	PCS	-5.15E-05	4.98E-05	<b>50750.64</b>	4.91E-05	9.15419	0.00
NWS	-4.77E-05	4.54E-06	<b>2425.74</b>	4.45E-06	7.26533	-0.02	PDX	5.24E-05	7.94E-06	<b>179180.64</b>	7.01E-06	6.43575	-0.01
PBR	-1.11E-04	5.71E-06	<b>8060.89</b>	5.48E-06	7.31544	-0.04	PKG	-1.51E-05	3.57E-06	<b>3131.67</b>	3.33E-06	6.53751	-0.04
PCG	-4.63E-05	6.98E-06	<b>291567.70</b>	6.46E-06	7.73824	-0.03	PL	3.22E-06	4.19E-06	<b>297008.36</b>	1.22E-05	6.16725	-0.03
PEP	2.26E-06	3.16E-06	<b>5989.64</b>	3.14E-06	9.33611	-0.01	PMI	-3.00E-05	3.41E-06	<b>4667.03</b>	3.38E-06	7.11493	0.01
PFE	2.54E-06	3.11E-06	<b>2748.37</b>	3.07E-06	10.65411	0.00	PNW	-9.03E-06	3.65E-06	<b>4138.34</b>	3.59E-06	6.87416	-0.02
PFG	-3.36E-05	3.91E-06	<b>42436.46</b>	4.97E-06	8.14891	0.00	POM	-1.57E-05	3.78E-06	<b>8375.93</b>	3.62E-06	6.92543	-0.03
PG	6.20E-06	1.42E-06	<b>6252.06</b>	1.39E-06	8.97532	0.01	PPE	-9.83E-06	1.21E-05	<b>2843.97</b>	1.19E-05	7.32405	0.01
PGR	-5.71E-06	1.84E-06	<b>6377.80</b>	1.79E-06	7.35895	-0.03	PRE	-1.96E-05	3.07E-06	<b>11888.01</b>	2.88E-06	6.93489	-0.02
PHG	-8.74E-06	5.39E-06	<b>3458.64</b>	5.27E-06	7.21347	-0.02	RDA	-2.06E-05	6.73E-06	<b>13369.71</b>	1.28E-05	6.45049	0.00

Large							Small						
Stocks	Return mean	variance	Normality test	Volatility mean	LogVolume mean	Corr.	Stocks	mean	variance	Normality test	mean	mean	Corr.
PNC	7.31E-06	3.89E-06	<b>1211200.61</b>	3.00E-06	7.87117	-0.02	RHI	-4.23E-05	4.35E-06	<b>5441.18</b>	4.17E-06	7.08868	-0.01
PX	-1.07E-05	2.06E-06	<b>23064.61</b>	1.97E-06	7.53183	-0.01	RI	-6.06E-06	4.14E-06	<b>6851.46</b>	3.88E-06	6.65076	0.04
RTN	-1.66E-05	4.28E-06	<b>11712.84</b>	4.14E-06	8.17282	0.07	RNR	-6.72E-06	5.21E-06	<b>25381.66</b>	4.87E-06	6.73542	-0.02
SAP	-7.92E-07	1.30E-05	<b>75173893.52</b>	9.84E-06	7.22806	0.01	RYL	-2.12E-05	7.59E-06	<b>5972.94</b>	7.56E-06	7.44255	0.02
SC	-4.79E-05	1.86E-06	<b>3230.63</b>	1.81E-06	6.9887	0.01	RYN	-9.25E-06	2.11E-06	<b>8097.32</b>	2.07E-06	5.92696	-0.01
SCH	-1.76E-05	8.73E-06	<b>9712.83</b>	8.51E-06	8.80136	0.00	SBL	-1.35E-05	1.42E-05	<b>2514.53</b>	1.38E-05	7.39487	-0.05
SI	-9.80E-06	3.76E-06	<b>9227.87</b>	3.46E-06	6.24639	0.01	SCG	-1.07E-05	2.56E-06	<b>3044.90</b>	2.43E-06	6.34532	0.00
SKM	9.41E-06	1.67E-06	<b>5231.17</b>	1.63E-06	7.20192	-0.03	SII	-1.54E-05	4.95E-06	<b>6547.10</b>	4.95E-06	7.83953	0.00
SLB	-1.17E-05	3.63E-06	<b>5076.06</b>	3.62E-06	8.55745	0.05	STR	-2.56E-05	4.14E-06	<b>59974.66</b>	3.87E-06	6.05313	0.00
SLE	-9.35E-06	4.44E-06	<b>83753.50</b>	4.17E-06	8.05894	0.00	STZ	-7.63E-06	4.92E-06	<b>14531.23</b>	9.66E-06	6.70705	0.01
SLM	-1.35E-05	1.49E-06	<b>40371.62</b>	1.37E-06	7.37804	0.02	SUN	-4.52E-06	2.11E-06	<b>9798.17</b>	2.06E-06	6.93055	-0.03
STM	-2.27E-05	3.57E-06	<b>1475.61</b>	3.50E-06	7.65567	0.01	SVM	-3.83E-06	1.24E-05	<b>15000.71</b>	1.27E-05	6.66891	-0.05
SU	1.46E-05	5.27E-06	<b>4252.89</b>	5.11E-06	6.53497	-0.02	SVU	-2.64E-05	3.51E-06	<b>6068.87</b>	3.40E-06	7.04022	0.03
TGT	-2.61E-05	4.94E-06	<b>2050.65</b>	4.88E-06	8.66863	0.02	TBL	6.98E-06	2.74E-06	<b>2162.07</b>	2.64E-06	6.40812	-0.01
TMX	-2.16E-05	1.90E-06	<b>3144.48</b>	1.85E-06	7.59586	-0.02	TCB	-9.24E-06	1.40E-06	<b>467.11</b>	1.37E-06	6.4195	0.00
TOT	-2.12E-05	1.56E-06	<b>24611.31</b>	1.46E-06	7.02743	0.01	TEK	1.79E-06	4.44E-06	<b>1485.18</b>	4.34E-06	6.55291	-0.01
TRB	-6.62E-06	2.21E-06	<b>28246.35</b>	2.06E-06	7.43691	-0.03	TFX	-3.06E-05	2.76E-06	<b>4184.69</b>	2.66E-06	6.18879	-0.01
TXN	-1.41E-05	8.39E-06	<b>7974.50</b>	8.25E-06	9.81017	0.02	TMO	4.19E-06	4.88E-06	<b>14811.89</b>	4.62E-06	7.07537	0.03
UNH	-1.96E-05	1.82E-06	<b>7242.24</b>	1.79E-06	8.52202	0.00	TNE	-8.49E-05	1.33E-05	<b>2884.61</b>	1.29E-05	7.56923	0.01
USB	-8.56E-06	5.17E-06	<b>43856.81</b>	4.80E-06	8.9351	-0.03	TOL	-3.16E-05	7.37E-06	<b>7203.22</b>	7.25E-06	7.43351	0.01
VOD	2.36E-05	4.94E-06	<b>1751.65</b>	4.96E-06	8.22206	-0.02	VRC	-4.29E-05	1.16E-05	<b>18262.38</b>	1.85E-05	6.72587	0.00
WB	9.77E-06	2.73E-06	<b>13079.92</b>	3.62E-06	8.6212	-0.02	WAT	-1.12E-05	7.79E-06	<b>10179.61</b>	1.06E-05	7.55907	-0.02
WFC	1.03E-05	2.97E-06	<b>68783317.21</b>	2.35E-06	9.29264	0.00	WEC	3.61E-06	3.37E-06	<b>2672.49</b>	3.25E-06	6.59083	0.03
WMT	-1.55E-05	3.03E-06	<b>10072.96</b>	2.95E-06	9.72198	0.04	WR	-8.63E-05	6.93E-06	<b>21211.89</b>	6.44E-06	6.40043	0.04
WWY	-1.92E-05	1.95E-06	<b>11368.34</b>	1.87E-06	7.00802	0.02	YCC	-6.50E-05	6.80E-06	<b>1403469.76</b>	6.95E-06	6.4004	0.00
XOM	-1.51E-05	2.93E-06	<b>7761.84</b>	2.93E-06	10.19358	-0.01	ZLC	9.68E-06	3.09E-06	<b>17044.03</b>	2.84E-06	6.73063	0.01

Large Stocks	Return		Normality test	Volatility mean	LogVolume		Corr.	Small									
	mean	variance			mean	mean		Corr.	Stocks	mean	variance	Normality test	mean	mean	Corr.		
YUM	-1.49E-05	4.97E-06	<b>9427.79</b>	4.86E-06	7.819	0.022											
Average	-9.19E-06	4.00E-06	<b>1726763.62</b>	3.86E-06	8.15	0.00		-2.52E-05	7.55E-06	<b>76852.36</b>	7.86E-06	6.86	0.00				
Maximum	4.42E-05	1.30E-05	<b>75173893.52</b>	1.13E-05	10.85	0.07		5.24E-05	1.42E-04	<b>1800483.81</b>	1.43E-04	9.15	0.08				
Minimum	-1.11E-04	1.06E-06	<b>147.15</b>	1.03E-06	6.17	-0.06		-3.10E-04	1.31E-06	<b>467.11</b>	1.25E-06	5.88	-0.05				

Notes: This table displays the mean and variance of return, Jarque-Bera test for normality of return, mean of return volatility, mean of log trading volume, and the contemporaneous correlation between volatility and volume of 103 large stocks (left panel) and 102 small stocks (right panel). The Jarque-Bera test statistics that are significant at 5% level are highlighted in bold. They all proved highly significant. The bottom panel displays the cross-stock average, maximum and minimum of each column.

Figure A1

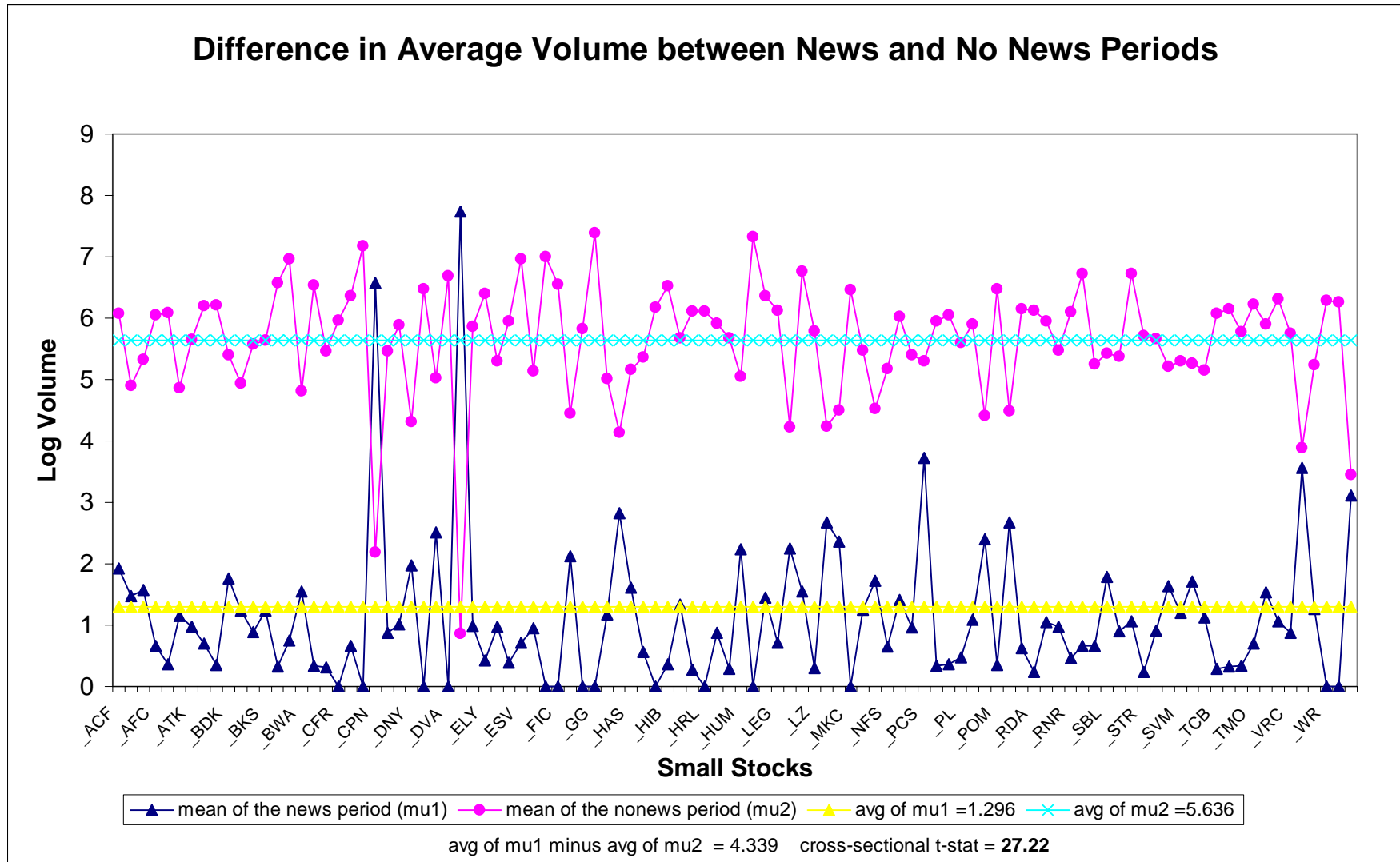


Figure A2

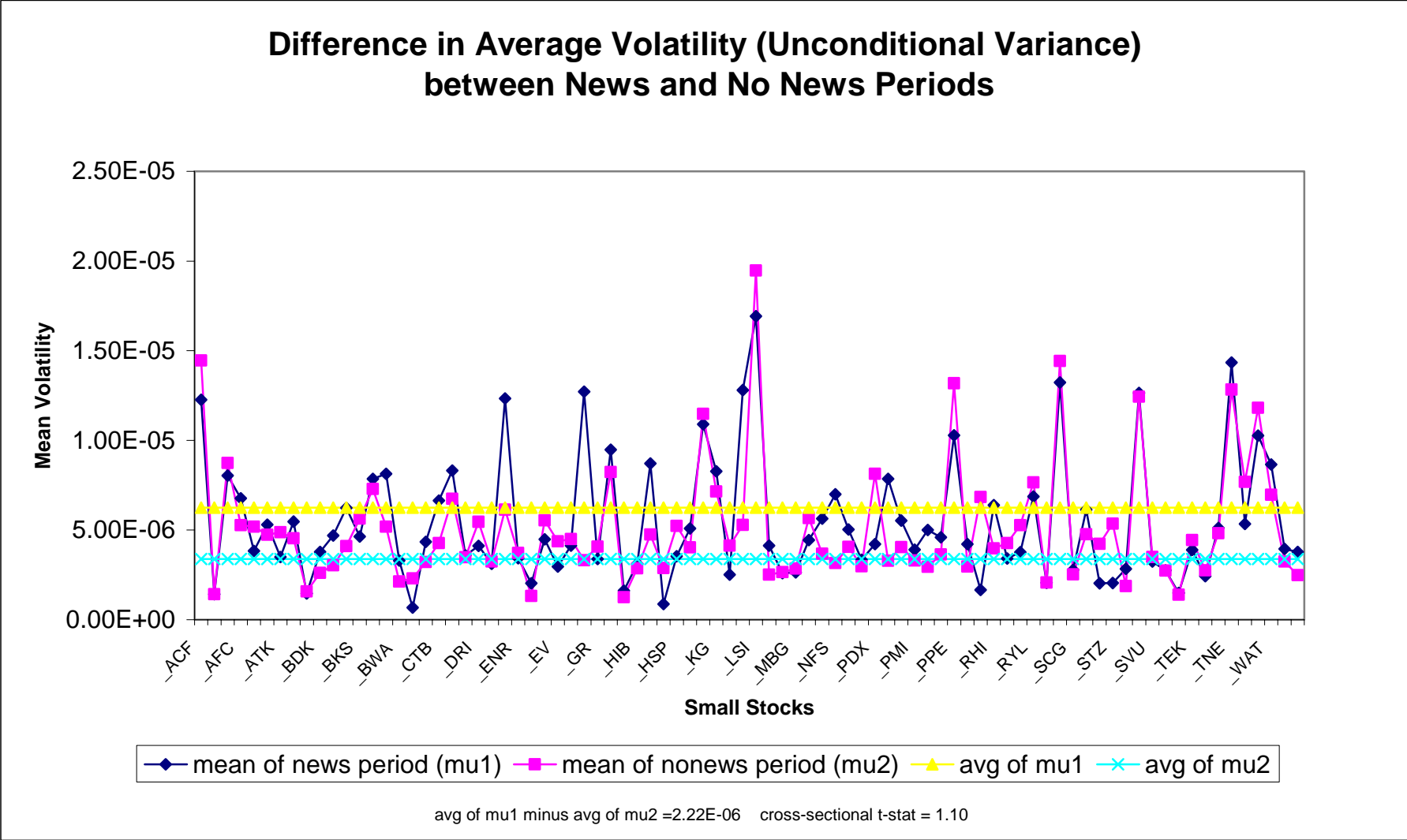


Figure A3

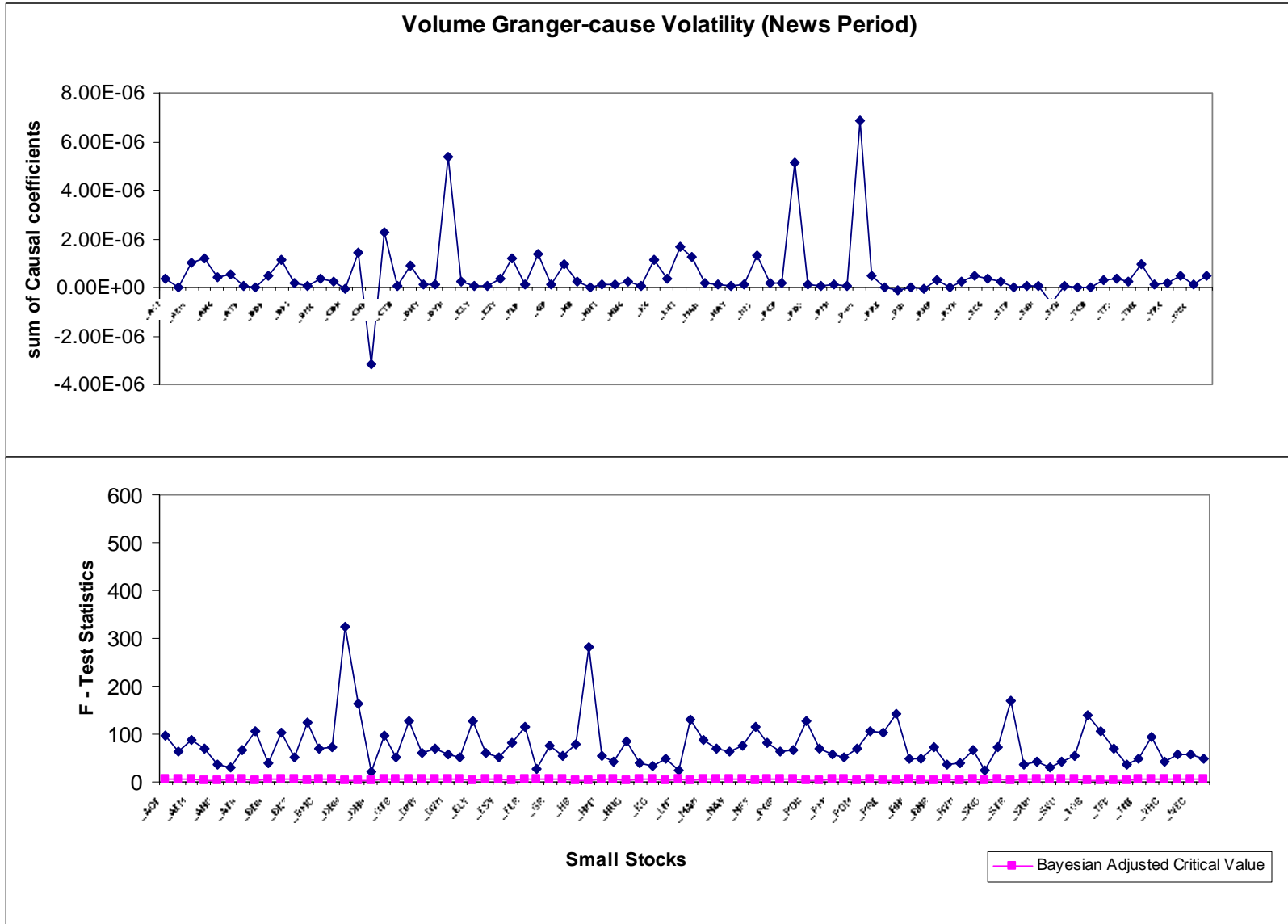


Figure A4

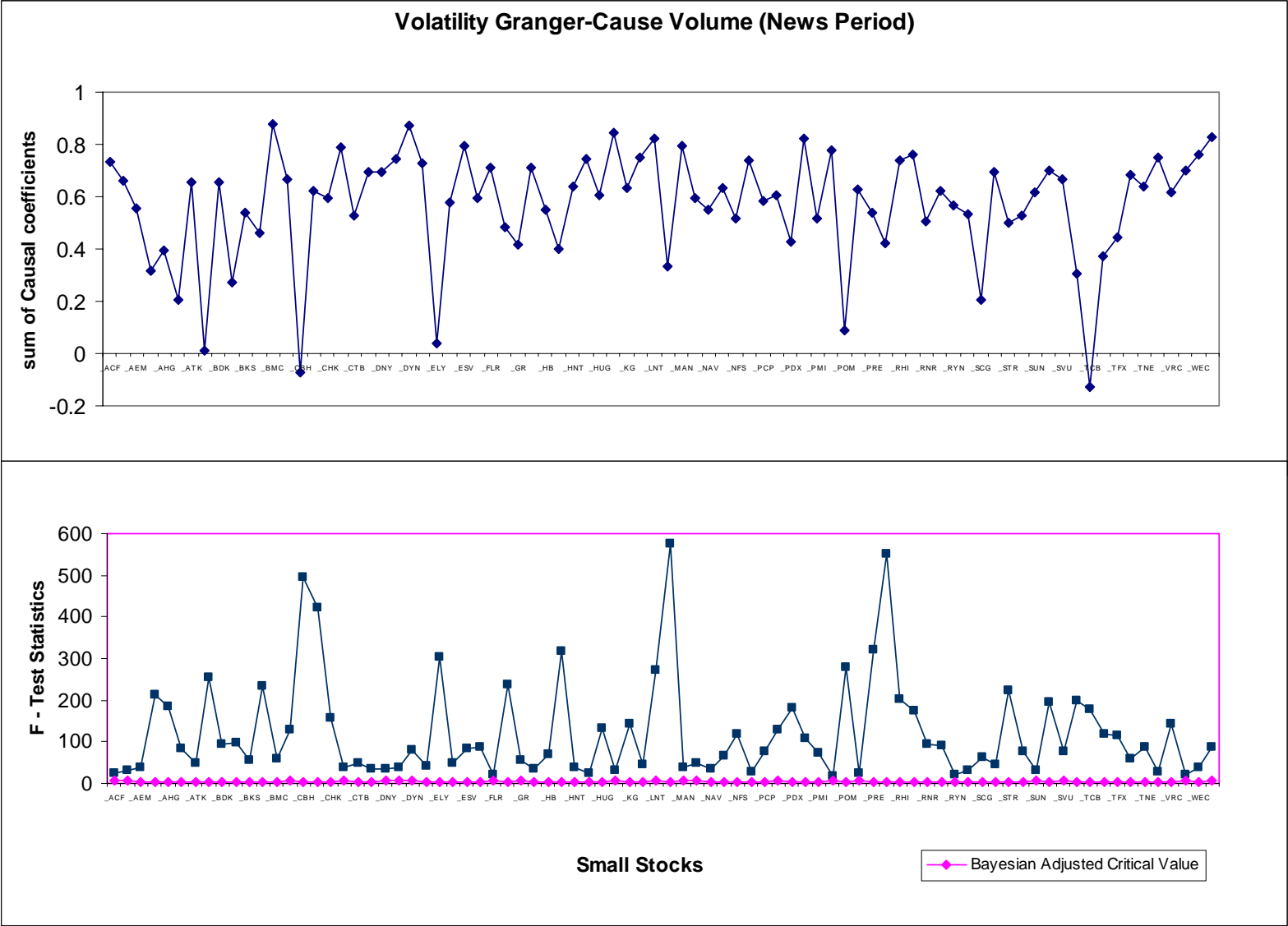


Figure A5

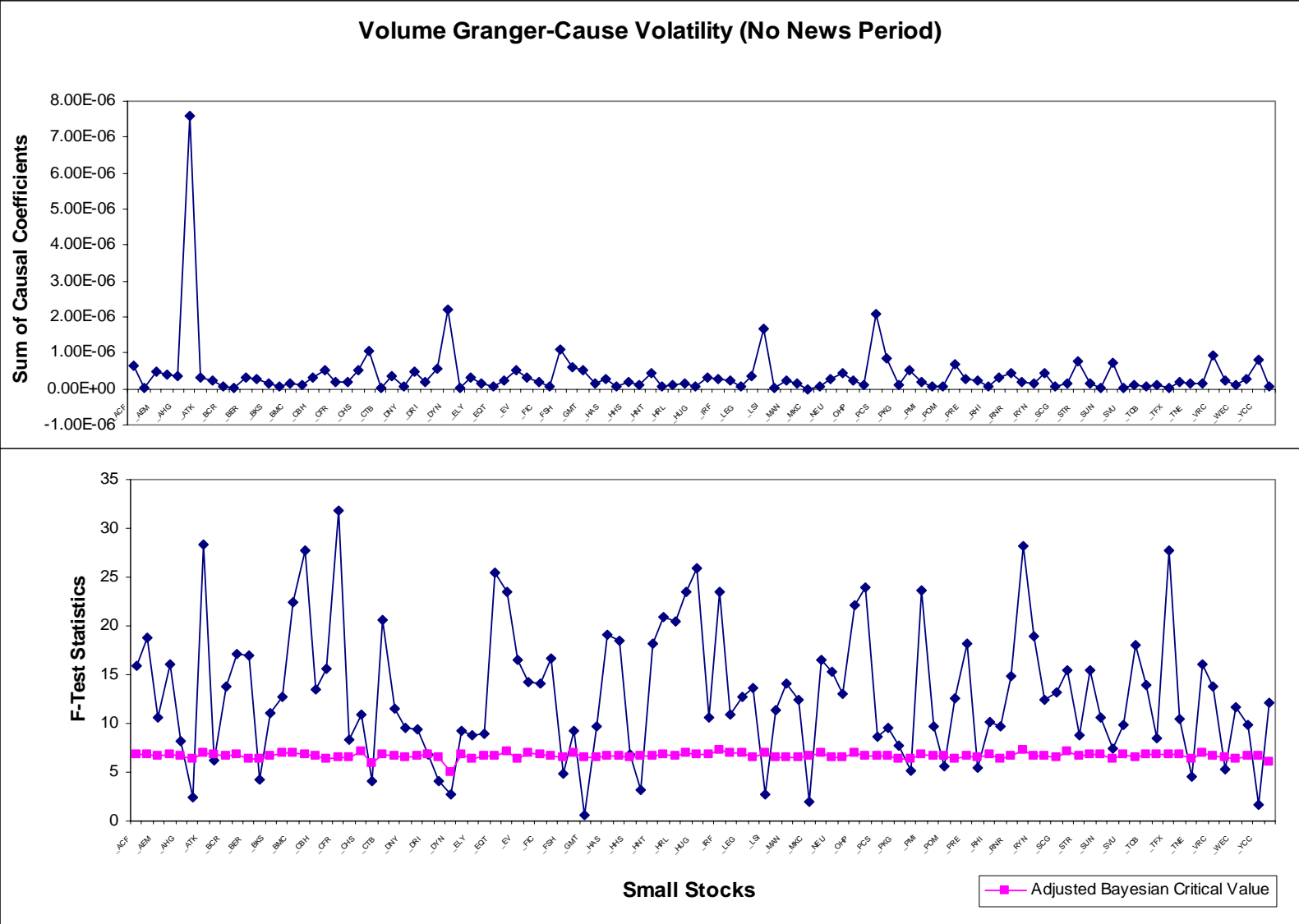


Figure A6

