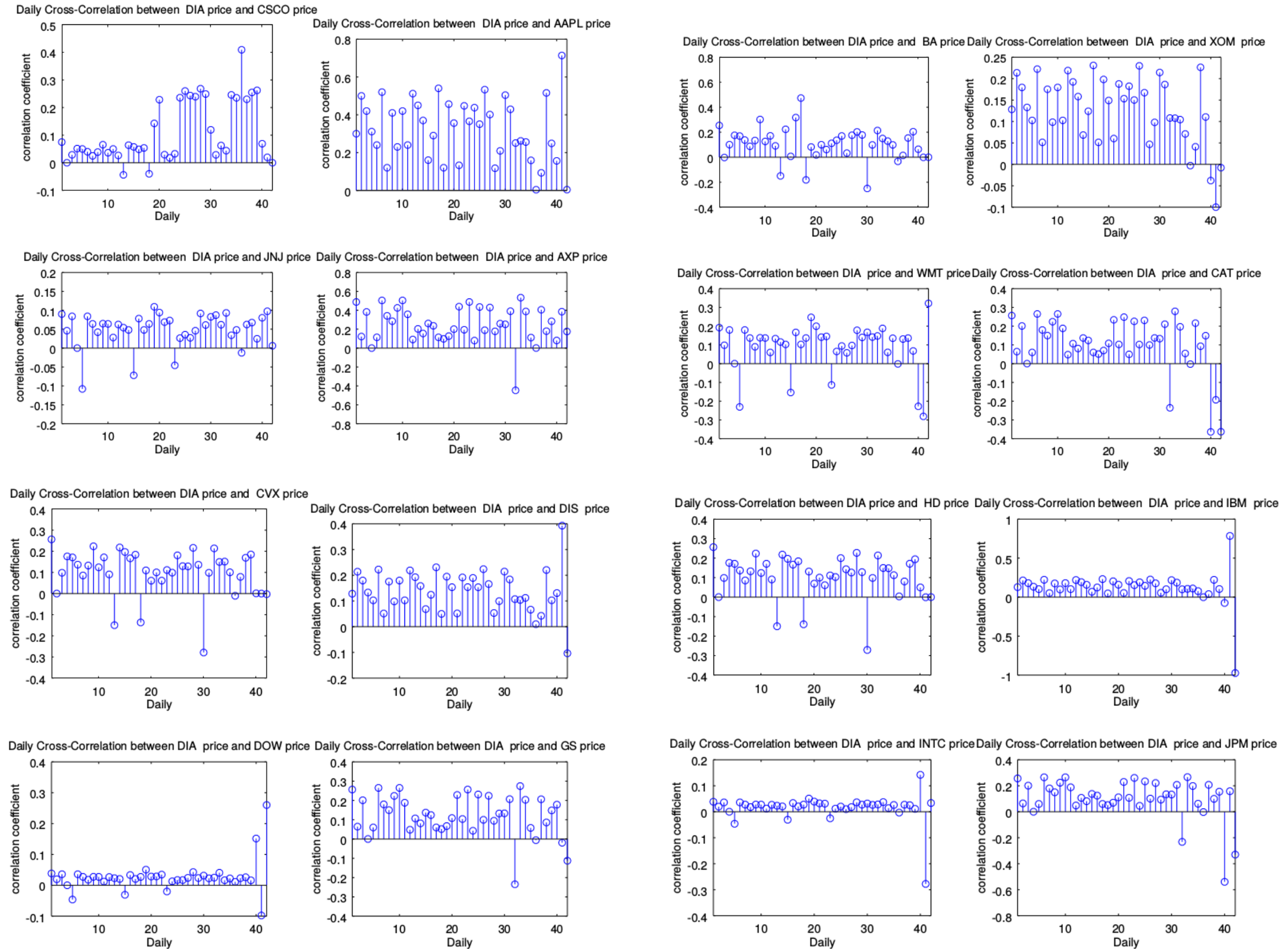


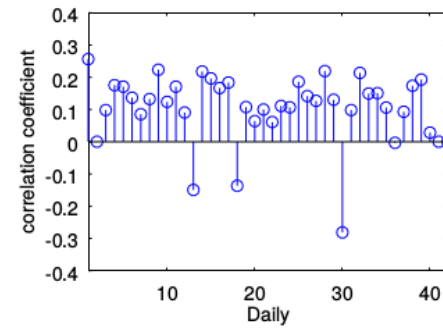
# Online Appendix

## Appendix A1

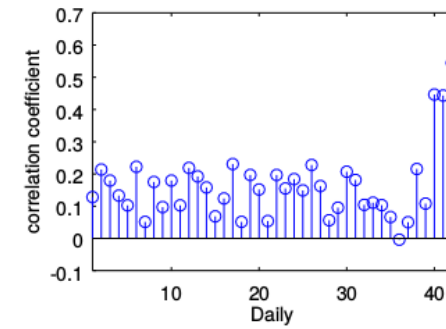
Figure 1: **Cross-Correlations between DIA ETF and its underlying Assets**



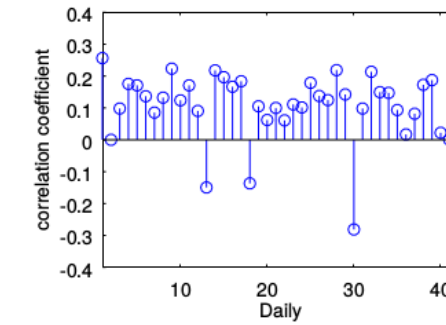
Daily Cross-Correlation between DIA price and KO price



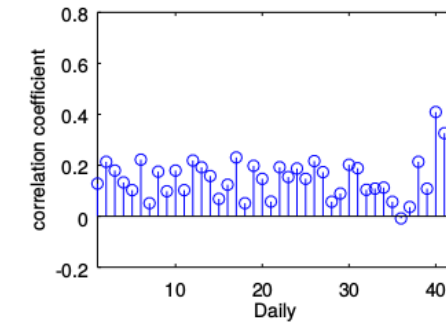
Daily Cross-Correlation between DIA price and MCD price



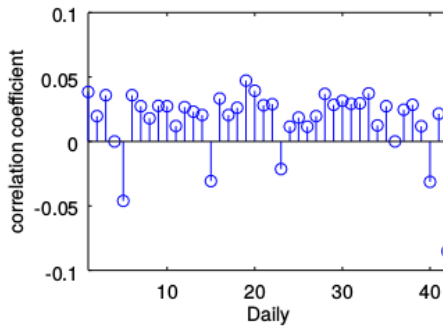
Daily Cross-Correlation between DIA price and MSFT price



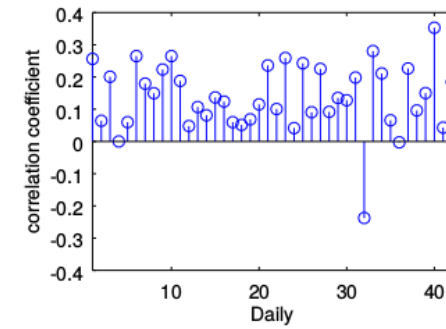
Daily Cross-Correlation between DIA price and NKE price



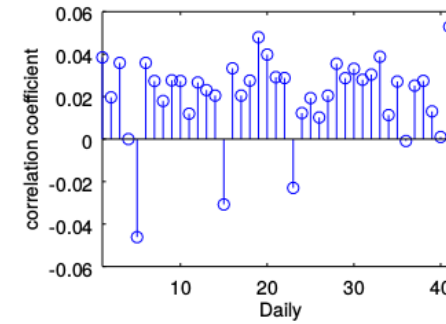
Daily Cross-Correlation between DIA price and MMM price



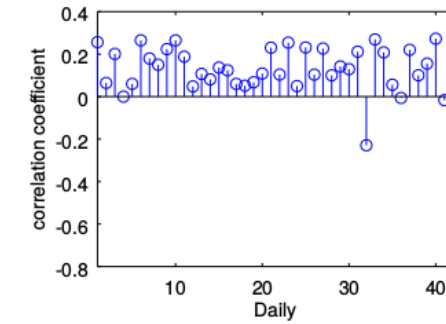
Daily Cross-Correlation between DIA price and MRK price



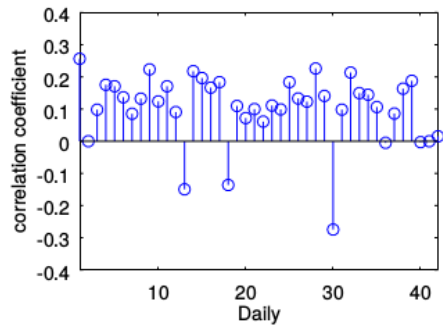
Daily Cross-Correlation between DIA price and PFE price



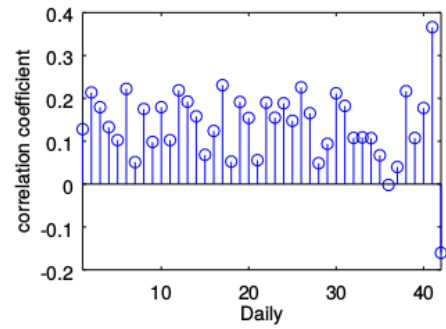
Daily Cross-Correlation between DIA price and PG price



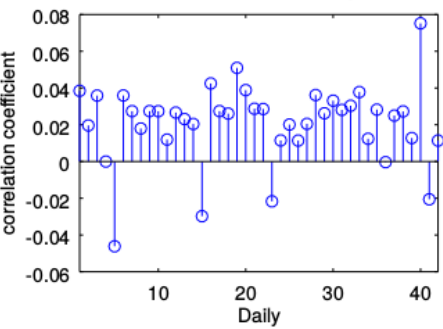
Daily Cross-Correlation between DIA price and TRV price



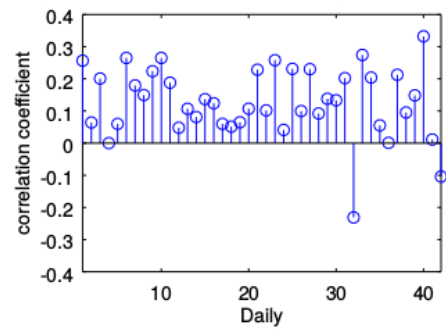
Daily Cross-Correlation between DIA price and UTX price



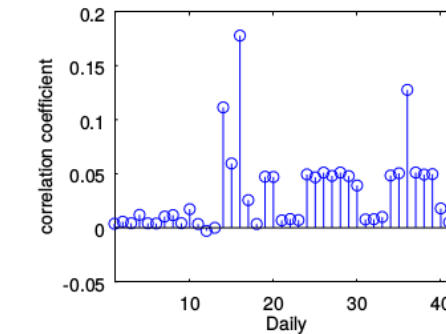
Daily Cross-Correlation between DIA price and V price



Daily Cross-Correlation between DIA price and WBA price



Daily Cross-Correlation between DIA price and UNH price



Daily Cross-Correlation between DIA price and VZ price

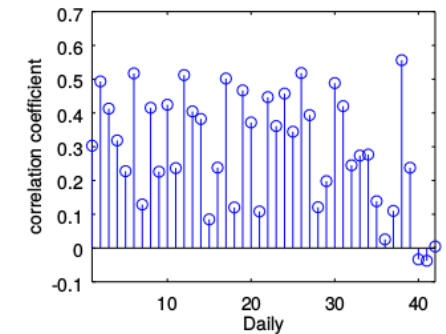
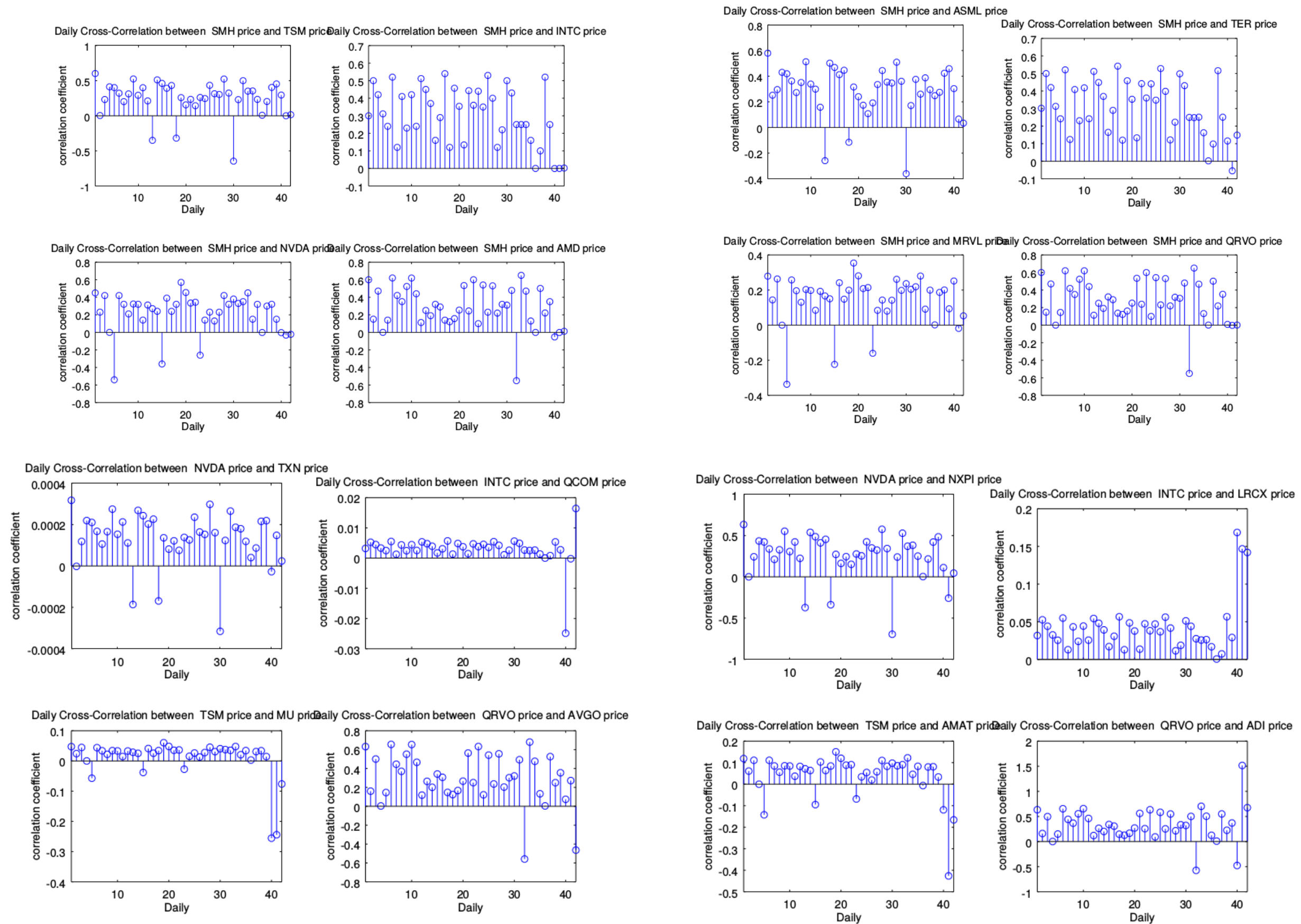
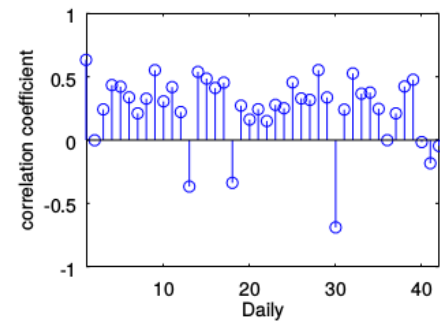


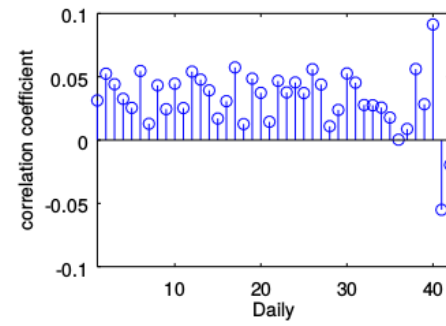
Figure 2: Cross-Correlations between SMH ETF and its underlying Assets



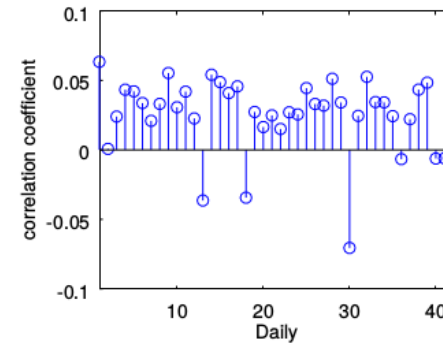
Daily Cross-Correlation between NVDA price and KLAC price



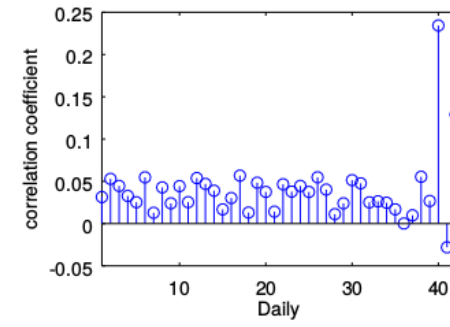
Daily Cross-Correlation between INTC price and XLNX price



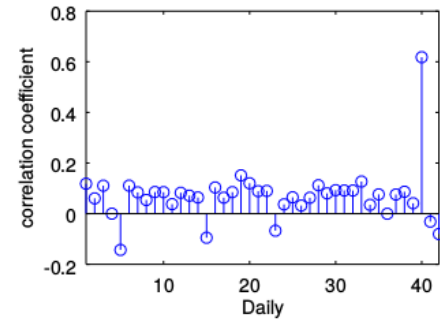
Daily Cross-Correlation between NVDA price and CDNS price



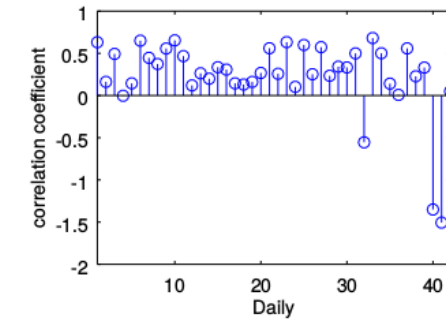
Daily Cross-Correlation between INTC price and SWKS price



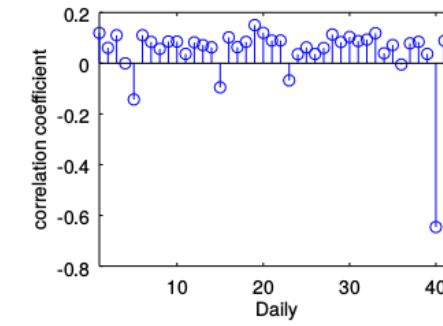
Daily Cross-Correlation between TSM price and STM price



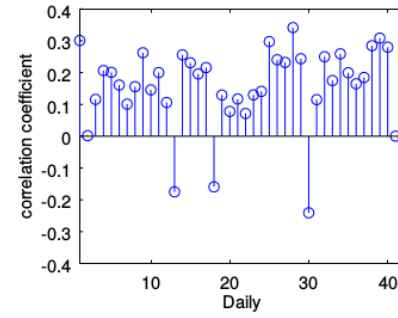
Daily Cross-Correlation between QRVO price and MCHP price



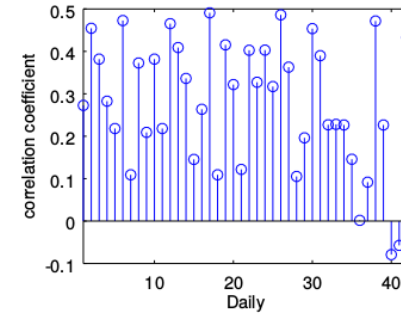
Daily Cross-Correlation between TSM price and MXIM price



Daily Cross-Correlation between SMH price and ON price



Daily Cross-Correlation between SMH price and OLED price



Appendix B1

Dynamic Model Estimates for the Underlying Assets of DIA ETF

Table 1: Estimated parameters for CSCO

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	
	0.077 (0.12)	0.083 (0.08)	0.080 (0.03)	0.078 (0.05)	0.078 (0.07)	0.077 (0.05)	0.076 (0.11)	0.085 (0.21)	0.712 (0.04)	0.138 (0.01)	0.077 (0.26)	0.079 (0.03)	0.077 (0.11)	0.077 (0.07)	0.077 (0.06)	0.078 (0.15)	0.073 (0.09)	0.077 (0.09)	0.078 (0.07)	0.082 (0.09)	0.127 (0.05)	0.078 (0.09)	0.081 (0.35)	0.078 (0.06)	0.077 (0.03)	0.078 (0.06)	0.078 (0.26)	0.078 (0.21)	0.076 (0.06)	0.077 (0.08)	
	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
0.083 (0.05)	0.082 (0.06)	0.078 (0.04)	0.081 (0.03)	0.082 (0.04)	0.082 (0.05)	0.074 (0.04)	0.082 (0.25)	0.079 (0.04)	0.082 (0.05)	0.082 (0.09)	0.072 (0.17)	0.081 (0.22)	0.085 (0.12)	0.082 (0.09)	0.072 (0.06)	0.084 (0.04)	0.074 (0.05)	0.080 (0.09)	0.083 (0.03)	0.082 (0.05)	0.083 (0.05)	0.083 (0.08)	0.080 (0.09)	0.080 (0.06)	0.073 (0.22)	0.086 (0.09)	0.083 (0.27)	0.077 (0.24)	0.077 (0.03)		
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	
	0.082 (0.09)	0.072 (0.04)	0.082 (0.05)	0.073 (0.03)	0.078 (0.08)	0.078 (0.04)	0.078 (0.06)	0.080 (0.04)	0.174 (0.06)	0.668 (0.22)	0.127 (0.05)	0.096 (0.09)	0.069 (0.04)	0.078 (0.21)	0.078 (0.05)	0.077 (0.07)	0.078 (0.03)	0.078 (0.08)	0.085 (0.02)	0.082 (0.09)	0.078 (0.07)	0.078 (0.21)	0.077 (0.07)	0.077 (0.02)	0.080 (0.16)	0.077 (0.06)	0.078 (0.07)	0.076 (0.08)	0.077 (0.36)	0.078 (0.06)	
	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
0.079 (0.06)	0.080 (0.08)	0.074 (0.09)	0.089 (0.07)	0.078 (0.06)	0.080 (0.08)	0.078 (0.09)	0.080 (0.09)	0.072 (0.05)	0.085 (0.16)	0.082 (0.08)	0.083 (0.06)	0.080 (0.03)	0.074 (0.18)	0.086 (0.09)	0.052 (0.04)	0.081 (0.02)	0.085 (0.04)	0.086 (0.05)	0.077 (0.05)	0.080 (0.09)	0.082 (0.23)	0.081 (0.03)	0.085 (0.04)	0.083 (0.13)	0.084 (0.09)	0.085 (0.08)	0.087 (0.03)	0.077 (0.14)	0.077 (0.04)		

For  $\phi_{..}^{ij}$ ,  $i = CSCO$  and  $j = AAPL, CVX, AXP, BA, CAT, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, UTX, PG, PFE, TRV, XOM, WMT, UNH, V, VZ$

Table 2: Estimated parameters for CAT

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	
	0.085 (0.03)	0.074 (0.04)	0.078 (0.07)	0.077 (0.08)	0.079 (0.23)	0.080 (0.06)	0.078 (0.08)	0.078 (0.26)	0.089 (0.04)	0.078 (0.06)	0.736 (0.31)	0.219 (0.10)	0.080 (0.06)	0.100 (0.09)	0.087 (0.02)	0.078 (0.05)	0.079 (0.04)	0.078 (0.06)	0.081 (0.05)	0.078 (0.21)	0.078 (0.06)	0.076 (0.05)	0.116 (0.15)	0.286 (0.04)	0.082 (0.05)	0.079 (0.30)	0.079 (0.20)	0.078 (0.09)	0.076 (0.09)	0.089 (0.03)	
	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
0.091 (0.03)	0.079 (0.06)	0.079 (0.09)	0.088 (0.21)	0.080 (0.22)	0.080 (0.08)	0.079 (0.07)	0.084 (0.13)	0.077 (0.04)	0.106 (0.08)	0.077 (0.20)	0.077 (0.20)	0.087 (0.08)	0.081 (0.09)	0.082 (0.05)	0.116 (0.06)	0.078 (0.07)	0.077 (0.02)	0.155 (0.14)	0.077 (0.33)	0.070 (0.05)	0.078 (0.09)	0.077 (0.07)	0.077 (0.04)	0.076 (0.08)	0.078 (0.10)	0.120 (0.06)	0.110 (0.06)	0.004 (0.09)	0.085 (0.04)		
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	
	0.083 (0.05)	0.078 (0.08)	0.078 (0.04)	0.076 (0.05)	0.081 (0.06)	0.078 (0.01)	0.078 (0.09)	0.076 (0.07)	0.078 (0.11)	0.082 (0.08)	0.135 (0.03)	0.577 (0.10)	0.078 (0.02)	0.075 (0.05)	0.083 (0.27)	0.078 (0.07)	0.076 (0.07)	0.078 (0.04)	0.083 (0.05)	0.078 (0.07)	0.072 (0.33)	0.077 (0.09)	0.078 (0.03)	0.078 (0.21)	0.089 (0.08)	0.078 (0.05)	0.075 (0.09)	0.078 (0.04)	0.097 (0.04)	0.102 (0.08)	
	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
0.089 (0.09)	0.080 (0.09)	0.167 (0.09)	0.078 (0.08)	0.077 (0.09)	0.079 (0.05)	0.082 (0.04)	0.095 (0.21)	0.079 (0.17)	0.084 (0.09)	0.077 (0.06)	0.081 (0.08)	0.138 (0.06)	0.080 (0.02)	0.077 (0.08)	0.096 (0.04)	0.169 (0.08)	0.079 (0.08)	0.095 (0.08)	0.077 (0.09)	0.086 (0.07)	0.077 (0.06)	0.078 (0.15)	0.077 (0.08)	0.078 (0.03)	0.077 (0.07)	0.077 (0.02)	0.082 (0.03)	0.085 (0.02)	0.078 (0.21)		

For  $\phi_{..}^{ij}$ ,  $i = CAT$  and  $j = AAPL, CVX, AXP, BA, CSCO, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, UTX, PG, PFE, TRV, XOM, WMT, UNH, V, VZ$

Table 3: Estimated parameters for DIS

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	
	0.069 (0.05)	0.074 (0.08)	0.079 (0.34)	0.078 (0.21)	0.079 (0.04)	0.081 (0.06)	0.076 (0.20)	0.079 (0.06)	0.089 (0.04)	0.079 (0.06)	0.078 (0.09)	0.082 (0.02)	0.658 (0.10)	-0.044 (0.03)	0.088 (0.30)	0.079 (0.09)	0.076 (0.07)	0.079 (0.12)	0.082 (0.22)	0.079 (0.09)	0.079 (0.03)	0.076 (0.20)	0.117 (0.06)	0.287 (0.04)	0.083 (0.07)	0.079 (0.09)	0.080 (0.02)	0.078 (0.10)	0.076 (0.30)	0.090 (0.20)	
	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.092 (0.06)	0.075 (0.07)	0.080 (0.08)	0.089 (0.19)	0.080 (0.08)	0.081 (0.05)	0.080 (0.22)	0.084 (0.08)	0.078 (0.04)	0.107 (0.06)	0.077 (0.09)	0.078 (0.11)	0.079 (0.10)	0.082 (0.03)	0.073 (0.10)	0.117 (0.08)	0.078 (0.07)	0.078 (0.05)	0.156 (0.08)	0.078 (0.06)	0.071 (0.05)	0.078 (0.05)	0.078 (0.06)	0.078 (0.04)	0.078 (0.06)	0.121 (0.10)	0.044 (0.01)	0.078 (0.20)	0.078 (0.09)		
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	
	0.077 (0.06)	0.082 (0.09)	0.054 (0.04)	0.089 (0.02)	0.078 (0.21)	0.078 (0.17)	0.079 (0.15)	0.080 (0.08)	0.080 (0.05)	0.079 (0.10)	0.061 (0.07)	0.079 (0.09)	0.222 (0.04)	0.817 (0.10)	0.015 (0.06)	0.086 (0.03)	0.110 (0.09)	0.091 (0.04)	0.087 (0.08)	0.068 (0.21)	0.089 (0.10)	0.078 (0.06)	0.080 (0.09)	0.079 (0.09)	0.088 (0.10)	0.078 (0.07)	0.079 (0.03)	0.076 (0.04)	0.100 (0.20)	0.088 (0.07)	
	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.089 (0.05)	0.080 (0.09)	0.078 (0.05)	0.066 (0.07)	0.078 (0.27)	0.076 (0.10)	0.087 (0.05)	0.079 (0.04)	0.093 (0.02)	0.088 (0.20)	0.079 (0.06)	0.076 (0.03)	0.084 (0.05)	0.078 (0.06)	0.079 (0.08)	0.079 (0.05)	0.085 (0.0)9	0.082 (0.06)	0.079 (0.06)	0.083 (0.19)	0.068 (0.06)	0.083 (0.08)	0.081 (0.07)	0.073 (0.01)	0.078 (0.07)	0.082 (0.06)	0.098 (0.06)	0.077 (0.05)	0.077 (0.06)	0.079 (0.09)	

Table 4: Estimated parameters for IBM

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	
	0.072 (0.22)	0.073 (0.07)	0.078 (0.07)	0.077 (0.10)	0.083 (0.09)	0.079 (0.06)	0.074 (0.30)	0.077 (0.10)	0.128 (0.08)	0.083 (0.07)	0.077 (0.04)	0.072 (0.07)	0.077 (0.30)	0.059 (0.09)	0.857 (0.04)	0.084 (0.04)	0.073 (0.06)	0.081 (0.07)	0.078 (0.11)	0.085 (0.03)	0.083 (0.06)	0.083 (0.02)	0.079 (0.10)	0.086 (0.08)	0.080 (0.07)	0.084 (0.03)	0.086 (0.09)	0.082 (0.20)	0.076 (0.09)	0.089 (0.06)	
	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.091 (0.04)	0.075 (0.07)	0.079 (0.04)	0.080 (0.07)	0.082 (0.06)	0.079 (0.03)	0.082 (0.20)	0.084 (0.10)	0.077 (0.07)	0.080 (0.05)	0.071 (0.05)	0.082 (0.05)	0.084 (0.07)	0.081 (0.08)	0.080 (0.07)	0.077 (0.04)	0.083 (0.06)	0.165 (0.10)	0.077 (0.09)	0.072 (0.04)	0.096 (0.20)	0.077 (0.20)	0.082 (0.10)	0.076 (0.08)	0.085 (0.07)	0.120 (0.07)	0.074 (0.05)	0.078 (0.08)	0.077 (0.08)	0.078 (0.08)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	
	0.083 (0.06)	0.074 (0.09)	0.054 (0.20)	0.089 (0.10)	0.086 (0.23)	0.081 (0.10)	0.083 (0.09)	0.077 (0.20)	0.148 (0.06)	0.085 (0.05)	0.068 (0.04)	0.082 (0.05)	0.077 (0.08)	0.096 (0.20)	0.080 (0.20)	0.711 (0.06)	0.083 (0.08)	0.081 (0.22)	0.085 (0.10)	0.058 (0.25)	0.085 (0.20)	0.076 (0.09)	0.082 (0.05)	0.081 (0.06)	0.082 (0.05)	0.081 (0.05)	0.082 (0.07)	0.071 (0.06)	0.077 (0.30)	0.088 (0.10)	
	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.089 (0.04)	0.080 (0.08)	0.078 (0.02)	0.076 (0.10)	0.079 (0.26)	0.072 (0.20)	0.082 (0.09)	0.079 (0.05)	0.079 (0.08)	0.081 (0.04)	0.081 (0.07)	0.076 (0.05)	0.084 (0.06)	0.085 (0.20)	0.082 (0.07)	0.079 (0.06)	0.085 (0.04)	0.086 (0.0)2	0.077 (0.10)	0.079 (0.21)	0.081 (0.09)	0.124 (0.09)	0.074 (0.07)	0.078 (0.05)	0.082 (0.04)	0.084 (0.08)	0.079 (0.07)	0.077 (0.20)	0.077 (0.10)	0.081 (0.09)	

For  $\phi_{..}^{ij}$ ,  $i = \text{IBM}$  and  $j = \text{AAPL, CVX, AXP, BA, CSCO, CAT, DIS, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, UTX, PG, PFE, TRV, XOM, WMT, UNH, V, VZ}$

Table 5: Estimated parameters for DOW

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	
	0.079 (0.02)	0.074 (0.05)	0.078 (0.20)	0.079 (0.10)	0.080 (0.09)	0.078 (0.03)	0.066 (0.32)	0.078 (0.06)	0.077 (0.06)	0.081 (0.04)	0.077 (0.08)	0.080 (0.06)	0.100 (0.03)	0.087 (0.10)	0.078 (0.20)	0.112 (0.01)	0.756 (0.07)	0.081 (0.02)	0.076 (0.10)	0.080 (0.09)	0.080 (0.05)	0.078 (0.25)	0.077 (0.06)	0.078 (0.07)	0.078 (0.04)	0.116 (0.08)	0.286 (0.05)	0.082 (0.06)	0.075 (0.10)	0.079 (0.10)	
	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.078 (0.01)	0.078 (0.07)	0.089 (0.20)	0.091 (0.01)	0.079 (0.09)	0.079 (0.05)	0.088 (0.27)	0.074 (0.08)	0.080 (0.06)	0.079 (0.06)	0.084 (0.09)	0.077 (0.08)	0.106 (0.05)	0.077 (0.10)	0.077 (0.09)	0.081 (0.04)	0.082 (0.07)	0.037 (0.02)	0.077 (0.10)	0.155 (0.09)	0.077 (0.04)	0.084 (0.06)	0.078 (0.08)	0.077 (0.07)	0.077 (0.05)	0.078 (0.04)	0.077 (0.03)	0.108 (0.08)	0.103 (0.10)	0.067 (0.07)	
	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	
$p_t - b_t$	0.080 (0.22)	0.078 (0.04)	0.078 (0.08)	0.076 (0.05)	0.081 (0.05)	0.076 (0.07)	0.078 (0.08)	0.078 (0.05)	0.078 (0.09)	0.078 (0.05)	0.079 (0.08)	0.079 (0.21)	0.078 (0.22)	0.075 (0.11)	0.079 (0.07)	0.083 (0.23)	0.077 (0.04)	0.064 (0.08)	0.611 (0.06)	0.083 (0.05)	0.078 (0.07)	0.082 (0.08)	0.077 (0.07)	0.076 (0.05)	0.078 (0.05)	0.089 (0.04)	0.078 (0.06)	0.079 (0.06)	0.078 (0.08)	0.052 (0.07)	
	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.089 (0.20)	0.080 (0.06)	0.167 (0.06)	0.078 (0.05)	0.077 (0.05)	0.079 (0.04)	0.082 (0.04)	0.059 (0.08)	0.079 (0.08)	0.070 (0.06)	0.077 (0.06)	0.081 (0.07)	0.138 (0.09)	0.080 (0.08)	0.077 (0.07)	0.058 (0.04)	0.169 (0.06)	0.079 (0.07)	0.095 (0.04)	0.077 (0.07)	0.086 (0.04)	0.077 (0.03)	0.078 (0.09)	0.077 (0.09)	0.078 (0.06)	0.077 (0.03)	0.076 (0.03)	0.077 (0.03)	0.077 (0.09)	0.079 (0.03)	

For  $\phi_{..}^{ij}$ ,  $i = \text{DOW}$  and  $j = \text{AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, UTX, PG, PFE, TRV, XOM, WMT, UNH, V, VZ}$

Table 6: Estimated parameters for GS

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	
	0.082 (0.09)	0.072 (0.09)	0.082 (0.08)	0.073 (0.06)	0.078 (0.05)	0.078 (0.03)	0.078 (0.10)	0.080 (0.20)	0.078 (0.09)	0.120 (0.16)	0.082 (0.04)	0.078 (0.05)	0.077 (0.20)	0.069 (0.10)	0.078 (0.41)	0.078 (0.09)	0.077 (0.08)	0.078 (0.04)	0.733 (0.05)	0.123 (0.07)	0.078 (0.20)	0.078 (0.20)	0.077 (0.20)	0.077 (0.19)	0.080 (0.10)	0.077 (0.04)	0.078 (0.07)	0.076 (0.02)	0.077 (0.04)	0.078 (0.09)	
	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.079 (0.09)	0.080 (0.08)	0.074 (0.04)	0.089 (0.06)	0.078 (0.06)	0.080 (0.20)	0.078 (0.04)	0.080 (0.07)	0.072 (0.19)	0.085 (0.09)	0.082 (0.04)	0.083 (0.09)	0.080 (0.20)	0.074 (0.06)	0.086 (0.08)	0.052 (0.09)	0.081 (0.08)	0.069 (0.04)	0.086 (0.05)	0.077 (0.08)	0.080 (0.10)	0.082 (0.06)	0.081 (0.07)	0.085 (0.08)	0.083 (0.10)	0.084 (0.04)	0.085 (0.09)	0.073 (0.02)	0.067 (0.07)	0.077 (0.06)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	
	0.077 (0.04)	0.068 (0.09)	0.083 (0.07)	0.077 (0.05)	0.082 (0.23)	0.068 (0.05)	0.100 (0.08)	0.082 (0.07)	0.083 (0.10)	0.108 (0.09)	0.083 (0.21)	0.110 (0.25)	0.075 (0.07)	0.081 (0.08)	0.079 (0.08)	0.082 (0.03)	0.139 (0.04)	0.086 (0.08)	0.111 (0.04)	0.593 (0.16)	0.078 (0.04)	0.102 (0.09)	0.058 (0.07)	0.083 (0.09)	0.078 (0.09)	0.078 (0.11)	0.077 (0.21)	0.069 (0.08)	0.086 (0.07)	0.083 (0.09)	
	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.082 (0.06)	0.086 (0.06)	0.080 (0.08)	0.058 (0.04)	0.078 (0.26)	0.078 (0.06)	0.085 (0.08)	0.079 (0.07)	0.079 (0.06)	0.061 (0.09)	0.086 (0.23)	0.080 (0.06)	0.081 (0.03)	0.080 (0.05)	0.078 (0.03)	0.109 (0.09)	0.138 (0.08)	0.075 (0.09)	0.072 (0.06)	0.077 (0.28)	0.071 (0.07)	0.068 (0.09)	0.071 (0.07)	0.083 (0.06)	0.074 (0.09)	0.095 (0.11)	0.073 (0.06)	0.082 (0.02)	0.077 (0.08)	0.076 (0.06)	



Table 8: Estimated parameters for KO

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	
	0.086 (0.07)	0.081 (0.07)	0.073 (0.08)	0.085 (0.07)	0.085 (0.09)	0.080 (0.04)	0.078 (0.04)	0.085 (0.03)	0.080 (0.04)	0.080 (0.08)	0.085 (0.10)	0.114 (0.09)	0.077 (0.07)	0.077 (0.07)	0.085 (0.04)	0.083 (0.08)	0.081 (0.05)	0.084 (0.07)	0.078 (0.08)	0.078 (0.09)	0.085 (0.04)	0.077 (0.05)	0.947 (0.07)	0.082 (0.05)	0.081 (0.08)	0.082 (0.01)	0.076 (0.09)	0.089 (0.08)	0.091 (0.04)	0.075 (0.08)	
	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.079 (0.07)	0.080 (0.05)	0.082 (0.07)	0.079 (0.09)	0.082 (0.09)	0.084 (0.09)	0.077 (0.04)	0.080 (0.08)	0.071 (0.06)	0.082 (0.09)	0.084 (0.10)	0.081 (0.05)	0.073 (0.03)	0.080 (0.04)	0.077 (0.05)	0.083 (0.04)	0.165 (0.08)	0.077 (0.09)	0.072 (0.07)	0.096 (0.09)	0.077 (0.10)	0.082 (0.09)	0.081 (0.08)	0.077 (0.08)	0.076 (0.10)	0.085 (0.01)	0.120 (0.07)	0.074 (0.06)	0.078 (0.09)	0.077 (0.08)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	
	0.071 (0.21)	0.085 (0.08)	0.074 (0.20)	0.077 (0.08)	0.083 (0.08)	0.081 (0.02)	0.080 (0.06)	0.071 (0.04)	0.081 (0.10)	0.077 (0.06)	0.080 (0.04)	0.071 (0.06)	0.082 (0.03)	0.076 (0.07)	0.086 (0.09)	0.107 (0.20)	0.111 (0.06)	0.109 (0.08)	0.079 (0.09)	0.105 (0.05)	0.082 (0.03)	0.077 (0.08)	0.061 (0.05)	0.776 (0.04)	0.040 (0.07)	0.121 (0.04)	0.080 (0.06)	0.072 (0.08)	0.100 (0.06)	0.089 (0.03)	
	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.078 (0.30)	0.077 (0.04)	0.040 (0.09)	0.078 (0.05)	0.079 (0.04)	0.080 (0.06)	0.074 (0.04)	0.079 (0.07)	0.080 (0.03)	0.073 (0.30)	0.085 (0.03)	0.071 (0.08)	0.084 (0.06)	0.085 (0.08)	0.082 (0.06)	0.082 (0.10)	0.079 (0.03)	0.085 (0.05)	0.086 (0.07)	0.077 (0.03)	0.079 (0.05)	0.081 (0.02)	0.124 (0.08)	0.074 (0.20)	0.078 (0.10)	0.082 (0.02)	0.084 (0.04)	0.079 (0.03)	0.077 (0.06)	0.077 (0.03)	

For  $\phi_{.,j}^{i,j}$ ,  $i = KO$  and  $j = AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, UTX, PG, PFE, TRV, XOM, WMT, UNH, V, VZ$

Table 9: Estimated parameters for JPM

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	
	0.079 (0.03)	0.076 (0.06)	0.077 (0.10)	0.071 (0.30)	0.080 (0.08)	0.073 (0.03)	0.074 (0.21)	0.081 (0.09)	0.077 (0.09)	0.084 (0.15)	0.077 (0.08)	0.084 (0.09)	0.081 (0.03)	0.082 (0.02)	0.073 (0.06)	0.070 (0.07)	0.080 (0.10)	0.099 (0.20)	0.089 (0.09)	0.082 (0.05)	0.077 (0.23)	0.080 (0.09)	-0.002 (0.09)	0.767 (0.18)	0.080 (0.09)	0.076 (0.05)	0.080 (0.20)	0.086 (0.02)			
	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.057 (0.05)	0.082 (0.03)	0.065 (0.10)	0.081 (0.05)	0.073 (0.06)	0.083 (0.04)	0.079 (0.27)	0.080 (0.06)	0.078 (0.09)	0.073 (0.27)	0.083 (0.08)	0.058 (0.03)	0.081 (0.20)	0.100 (0.04)	0.081 (0.05)	0.082 (0.07)	0.072 (0.10)	0.080 (0.05)	0.076 (0.07)	0.083 (0.03)	0.083 (0.31)	0.076 (0.05)	0.082 (0.09)	0.072 (0.32)	0.083 (0.06)	0.085 (0.03)	0.085 (0.05)	0.073 (0.03)			
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	
	0.080 (0.06)	0.072 (0.03)	0.073 (0.08)	0.078 (0.05)	0.077 (0.08)	0.083 (0.01)	0.079 (0.07)	0.074 (0.08)	0.077 (0.05)	0.128 (0.10)	0.078 (0.08)	0.077 (0.05)	0.075 (0.05)	0.080 (0.09)	0.078 (0.06)	0.089 (0.06)	0.078 (0.06)	0.077 (0.08)	0.077 (0.05)	0.077 (0.09)	0.074 (0.20)	0.077 (0.06)	0.091 (0.07)	0.078 (0.03)	0.079 (0.30)	0.827 (0.09)	0.073 (0.04)	0.083 (0.06)	0.073 (0.09)	0.082 (0.06)	
	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.107 (0.08)	0.079 (0.07)	0.090 (0.08)	0.059 (0.07)	0.077 (0.07)	0.083 (0.30)	0.084 (0.06)	0.073 (0.07)	0.081 (0.06)	0.073 (0.07)	0.078 (0.05)	0.078 (0.03)	0.078 (0.07)	0.085 (0.09)	0.083 (0.03)	0.083 (0.05)	0.079 (0.08)	0.086 (0.08)	0.072 (0.07)	0.080 (0.09)	0.078 (0.16)	0.071 (0.09)	0.071 (0.09)	0.078 (0.08)	0.082 (0.08)	0.082 (0.08)	0.071 (0.06)	0.085 (0.07)	0.085 (0.09)	0.081 (0.02)	

For  $\phi_{.,j}^{i,j}$ ,  $i = JPM$  and  $j = AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, KO, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, UTX, PG, PFE, TRV, XOM, WMT, UNH, V, VZ$

Table 10: Estimated parameters for INTC

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	
	0.083 (0.05)	0.077 (0.08)	0.072 (0.04)	0.077 (0.20)	0.059 (0.10)	0.080 (0.07)	0.070 (0.05)	0.073 (0.08)	0.078 (0.05)	0.077 (0.08)	0.083 (0.03)	0.079 (0.08)	0.074 (0.09)	0.077 (0.08)	0.128 (0.09)	0.084 (0.05)	0.073 (0.08)	0.081 (0.04)	0.078 (0.03)	0.085 (0.10)	0.071 (0.06)	0.083 (0.07)	0.079 (0.08)	0.086 (0.07)	0.080 (0.04)	0.078 (0.05)	0.779 (0.07)	0.082 (0.08)	0.076 (0.05)	0.089 (0.09)	
	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.091 (0.05)	0.075 (0.08)	0.079 (0.04)	0.080 (0.03)	0.082 (0.10)	0.079 (0.08)	0.082 (0.08)	0.084 (0.08)	0.077 (0.07)	0.080 (0.09)	0.071 (0.05)	0.082 (0.08)	0.084 (0.03)	0.081 (0.09)	0.073 (0.02)	0.080 (0.05)	0.077 (0.08)	0.083 (0.04)	0.165 (0.08)	0.077 (0.10)	0.072 (0.05)	0.096 (0.04)	0.077 (0.08)	0.082 (0.05)	0.076 (0.03)	0.085 (0.04)	0.120 (0.09)	0.074 (0.02)	0.078 (0.09)	0.077 (0.10)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	
	0.080 (0.08)	0.083 (0.04)	0.054 (0.09)	0.077 (0.06)	0.086 (0.04)	0.073 (0.10)	0.083 (0.21)	0.084 (0.09)	0.079 (0.07)	0.071 (0.09)	0.081 (0.10)	0.085 (0.04)	0.075 (0.09)	0.085 (0.14)	0.076 (0.22)	0.082 (0.08)	0.081 (0.06)	0.085 (0.09)	0.068 (0.06)	0.082 (0.07)	0.077 (0.10)	0.075 (0.17)	0.078 (0.09)	0.080 (0.09)	0.082 (0.03)	0.082 (0.06)	0.081 (0.05)	0.667 (0.09)	0.077 (0.24)	0.078 (0.15)	
	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.078 (0.08)	0.080 (0.08)	0.078 (0.06)	0.082 (0.07)	0.082 (0.09)	0.079 (0.05)	0.068 (0.18)	0.086 (0.06)	0.077 (0.09)	0.079 (0.20)	0.081 (0.06)	0.082 (0.07)	0.074 (0.08)	0.078 (0.26)	0.082 (0.17)	0.069 (0.08)	0.079 (0.09)	0.076 (0.20)	0.079 (0.08)	0.072 (0.08)	0.082 (0.23)	0.079 (0.06)	0.079 (0.05)	0.081 (0.09)	0.081 (0.10)	0.076 (0.33)	0.084 (0.07)	0.085 (0.03)	0.077 (0.21)	0.078 (0.09)	

Table 12: Estimated parameters for MMM

var																																
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$		
	0.082 (0.11)	0.074 (0.09)	0.069 (0.10)	0.078 (0.03)	0.078 (0.05)	0.089 (0.03)	0.077 (0.08)	0.081 (0.08)	0.066 (0.03)	0.092 (0.08)	0.077 (0.04)	0.077 (0.07)	0.078 (0.08)	0.076 (0.09)	0.070 (0.07)	0.078 (0.10)	0.117 (0.05)	0.078 (0.10)	0.077 (0.06)	0.081 (0.05)	0.078 (0.06)	0.065 (0.08)	0.079 (0.07)	0.080 (0.05)	0.074 (0.06)	0.056 (0.07)	0.077 (0.09)	0.082 (0.07)	0.082 (0.08)	0.162 (0.06)		
	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$		
	0.993 (0.06)	0.076 (0.05)	0.081 (0.07)	0.078 (0.07)	0.080 (0.05)	0.076 (0.08)	0.083 (0.08)	0.086 (0.09)	0.080 (0.07)	0.075 (0.08)	0.079 (0.05)	0.083 (0.08)	0.072 (0.07)	0.022 (0.03)	0.081 (0.07)	0.127 (0.08)	0.078 (0.20)	0.083 (0.21)	0.073 (0.08)	0.080 (0.05)	0.074 (0.09)	0.080 (0.08)	-0.005 (0.05)	0.077 (0.07)	0.099 (0.04)	0.106 (0.06)	0.078 (0.04)	0.086 (0.07)	0.077 (0.04)	0.077 (0.06)		
	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$		
$p_t - b_t$	0.076 (0.09)	0.074 (0.07)	0.086 (0.07)	0.077 (0.04)	0.085 (0.04)	0.097 (0.05)	0.079 (0.08)	0.077 (0.01)	0.089 (0.06)	0.077 (0.20)	0.097 (0.06)	0.076 (0.07)	0.077 (0.01)	0.075 (0.06)	0.084 (0.08)	0.078 (0.09)	0.045 (0.05)	0.080 (0.03)	0.085 (0.04)	0.079 (0.06)	0.071 (0.05)	0.081 (0.08)	0.081 (0.06)	0.077 (0.04)	0.078 (0.10)	0.077 (0.05)	0.074 (0.08)	0.077 (0.03)	0.079 (0.07)	0.108 (0.07)		
	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$		
	0.147 (0.04)	0.844 (0.09)	0.086 (0.08)	0.071 (0.04)	0.107 (0.03)	0.079 (0.05)	0.075 (0.08)	0.098 (0.20)	0.099 (0.04)	0.056 (0.10)	0.078 (0.07)	0.080 (0.08)	0.075 (0.06)	0.138 (0.08)	0.047 (0.16)	0.102 (0.06)	0.096 (0.04)	0.085 (0.04)	0.082 (0.04)	0.080 (0.08)	0.078 (0.05)	0.076 (0.08)	0.081 (0.05)	0.074 (0.04)	0.082 (0.04)	0.077 (0.07)	0.077 (0.09)	0.077 (0.04)	0.076 (0.09)	0.080 (0.28)		

For  $\phi_{..}^{ij}$ ,  $i = \text{MMM}$  and  $j = \text{AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MCD, NKE, MRK, MSFT, WBA, UTX, PG, PFE, TRV, XOM, WMT, UNH, V, VZ}$

Table 13: Estimated parameters for MCD

var																																
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$		
	0.084 (0.04)	0.081 (0.05)	0.075 (0.07)	0.074 (0.09)	0.082 (0.28)	0.085 (0.07)	0.071 (0.05)	0.080 (0.08)	0.068 (0.05)	0.079 (0.06)	0.076 (0.08)	0.079 (0.20)	0.083 (0.06)	0.069 (0.09)	0.071 (0.05)	0.082 (0.04)	0.085 (0.05)	0.067 (0.09)	0.073 (0.07)	0.077 (0.08)	0.074 (0.07)	0.077 (0.05)	0.077 (0.08)	0.076 (0.05)	0.077 (0.07)	0.074 (0.09)	0.079 (0.23)	0.082 (0.06)	0.083 (0.08)	0.084 (0.05)		
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$				
	0.082 (0.04)	0.077 (0.05)	0.158 (0.08)	0.072 (0.03)	0.805 (0.10)	0.055 (0.04)	0.078 (0.05)	0.080 (0.08)	0.082 (0.05)	0.085 (0.07)	0.082 (0.09)	0.086 (0.27)	0.084 (0.07)	0.083 (0.09)	0.068 (0.04)	0.077 (0.04)	0.082 (0.05)	0.073 (0.06)	0.070 (0.20)	0.078 (0.07)	0.080 (0.07)	0.075 (0.05)	0.079 (0.08)	0.082 (0.05)	0.080 (0.08)	0.073 (0.09)	0.110 (0.29)	0.065 (0.08)	0.085 (0.05)	0.079 (0.04)		
	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$		
$p_t - b_t$	0.064 (0.06)	0.107 (0.08)	0.042 (0.01)	0.109 (0.09)	0.076 (0.04)	0.078 (0.07)	0.087 (0.20)	0.076 (0.08)	0.137 (0.04)	0.076 (0.40)	0.087 (0.07)	0.076 (0.03)	0.095 (0.07)	0.078 (0.09)	0.068 (0.04)	0.079 (0.07)	0.078 (0.09)	0.088 (0.10)	0.074 (0.09)	0.078 (0.04)	0.773 (0.06)	0.079 (0.05)	0.071 (0.08)	0.074 (0.04)	0.083 (0.06)	0.078 (0.07)	0.075 (0.05)	0.095 (0.06)	0.078 (0.01)	0.075 (0.03)		
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$				
	0.080 (0.07)	0.095 (0.08)	0.150 (0.01)	0.082 (0.09)	0.081 (0.06)	0.078 (0.08)	0.074 (0.05)	0.075 (0.08)	0.104 (0.04)	0.081 (0.06)	0.078 (0.07)	0.094 (0.05)	0.096 (0.09)	0.067 (0.01)	0.079 (0.06)	0.077 (0.08)	-0.034 (0.03)	0.702 (0.10)	0.105 (0.09)	0.113 (0.06)	0.032 (0.08)	0.103 (0.10)	0.076 (0.08)	0.079 (0.04)	0.075 (0.07)	0.077 (0.03)	0.094 (0.06)	0.055 (0.08)	0.098 (0.10)	0.071 (0.05)		

For  $\phi_{..}^{ij}$ ,  $i = \text{MCD}$  and  $j = \text{AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, NKE, MRK, MSFT, WBA, UTX, PG, PFE, TRV, XOM, WMT, UNH, V, VZ}$

Table 14: Estimated parameters for NKE

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	
	0.085 (0.09)	0.065 (0.06)	0.067 (0.05)	0.073 (0.08)	0.077 (0.07)	0.074 (0.06)	0.077 (0.08)	0.077 (0.01)	0.076 (0.33)	0.084 (0.20)	0.081 (0.07)	0.075 (0.06)	0.074 (0.08)	0.082 (0.03)	0.085 (0.08)	0.080 (0.08)	0.068 (0.06)	0.079 (0.03)	0.076 (0.08)	0.076 (0.08)	0.080 (0.05)	0.075 (0.08)	0.798 (0.01)	0.072 (0.25)	0.080 (0.06)	0.079 (0.07)	0.083 (0.07)	0.069 (0.09)	0.086 (0.05)	0.084 (0.07)	
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	$\phi_{aa}^{i31}$	$\phi_{ab}^{i31}$	
	0.083 (0.09)	0.068 (0.08)	0.077 (0.05)	0.082 (0.08)	0.081 (0.09)	0.150 (0.07)	0.042 (0.09)	0.110 (0.01)	0.065 (0.21)	0.085 (0.06)	0.079 (0.03)	0.077 (0.06)	0.071 (0.08)	0.082 (0.06)	0.077 (0.03)	0.074 (0.08)	0.079 (0.04)	0.082 (0.07)	0.083 (0.08)	0.084 (0.03)	0.082 (0.06)	0.077 (0.08)	0.081 (0.10)	0.072 (0.22)	0.085 (0.07)	0.055 (0.06)	0.078 (0.08)	0.080 (0.03)	0.082 (0.07)	0.085 (0.08)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	
	0.065 (0.04)	0.087 (0.06)	0.077 (0.03)	0.077 (0.06)	0.076 (0.08)	0.078 (0.03)	0.085 (0.09)	0.120 (0.08)	0.044 (0.06)	0.076 (0.30)	0.077 (0.10)	0.078 (0.07)	0.075 (0.06)	0.078 (0.09)	0.073 (0.08)	0.076 (0.06)	0.078 (0.07)	0.076 (0.06)	0.116 (0.08)	0.068 (0.08)	0.082 (0.03)	0.079 (0.09)	0.075 (0.08)	0.857 (0.08)	0.074 (0.05)	0.078 (0.10)	0.077 (0.08)	0.079 (0.07)	0.080 (0.09)	0.075 (0.09)	
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	$\phi_{ba}^{i31}$	$\phi_{bb}^{i31}$	
	0.078 (0.08)	0.089 (0.02)	0.078 (0.08)	-0.012 (0.06)	0.082 (0.09)	0.119 (0.05)	0.146 (0.03)	0.079 (0.08)	0.156 (0.09)	0.077 (0.06)	0.070 (0.10)	0.078 (0.08)	0.070 (0.08)	0.078 (0.05)	0.076 (0.08)	0.089 (0.05)	0.091 (0.06)	0.075 (0.06)	0.079 (0.06)	0.066 (0.09)	0.080 (0.06)	0.080 (0.05)	0.075 (0.08)	0.084 (0.03)	0.077 (0.70)	0.106 (0.10)	0.077 (0.09)	0.077 (0.05)	0.078 (0.05)	0.081 (0.09)	



Table 16: Estimated parameters for MSFT

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	
	0.084 (0.09)	0.081 (0.08)	0.075 (0.04)	0.074 (0.20)	0.082 (0.08)	0.085 (0.08)	0.071 (0.05)	0.080 (0.06)	0.068 (0.10)	0.079 (0.20)	0.076 (0.07)	0.079 (0.09)	0.083 (0.06)	0.069 (0.08)	0.071 (0.06)	0.082 (0.06)	0.085 (0.08)	0.067 (0.07)	0.073 (0.05)	0.077 (0.08)	0.074 (0.09)	0.077 (0.07)	0.077 (0.09)	0.076 (0.03)	0.077 (0.04)	0.074 (0.07)	0.079 (0.09)	0.072 (0.07)	0.083 (0.09)	0.084 (0.04)	
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$			
	0.840 (0.04)	0.162 (0.08)	0.082 (0.08)	0.077 (0.06)	0.081 (0.08)	0.072 (0.11)	0.085 (0.08)	0.055 (0.06)	0.078 (0.03)	0.080 (0.04)	0.082 (0.08)	0.086 (0.08)	0.840 (0.03)	0.162 (0.05)	0.084 (0.05)	0.083 (0.07)	0.068 (0.08)	0.077 (0.08)	0.082 (0.07)	0.073 (0.08)	0.070 (0.23)	0.078 (0.08)	0.080 (0.06)	0.075 (0.20)	0.079 (0.04)	0.082 (0.09)	0.080 (0.05)	0.073 (0.07)	0.110 (0.04)	0.065 (0.05)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	
	0.086 (0.09)	0.079 (0.06)	0.076 (0.10)	0.079 (0.07)	0.084 (0.09)	-0.012 (0.06)	0.078 (0.05)	0.096 (0.09)	0.079 (0.03)	0.066 (0.10)	0.099 (0.06)	0.098 (0.20)	0.058 (0.03)	0.087 (0.04)	0.117 (0.07)	0.138 (0.09)	0.047 (0.06)	0.102 (0.01)	0.058 (0.04)	0.082 (0.09)	0.070 (0.06)	0.077 (0.05)	0.078 (0.09)	0.066 (0.03)	0.077 (0.10)	0.078 (0.06)	0.073 (0.04)	0.085 (0.03)	0.082 (0.03)	0.080 (0.05)	
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$			
	0.106 (0.09)	0.078 (0.06)	0.085 (0.10)	0.089 (0.08)	0.075 (0.09)	0.092 (0.04)	0.086 (0.05)	0.079 (0.09)	0.078 (0.03)	0.097 (0.10)	0.087 (0.06)	0.096 (0.05)	-0.043 (0.02)	0.758 (0.30)	0.157 (0.08)	0.077 (0.09)	0.077 (0.06)	0.083 (0.10)	0.068 (0.08)	0.084 (0.09)	0.081 (0.04)	0.083 (0.05)	0.107 (0.10)	0.079 (0.03)	0.079 (0.10)	0.078 (0.06)	0.094 (0.10)	0.078 (0.20)	0.095 (0.06)	0.097 (0.02)	

For  $\phi_{.j}^{ij}$ ,  $i = MSFT$  and  $j = AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, WBA, UTX, PG, PFE, TRV, XOM, WMT, UNH, V, VZ$

Table 17: Estimated parameters for WBA

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	
	0.077 (0.26)	0.078 (0.20)	0.089 (0.09)	0.075 (0.05)	0.081 (0.06)	0.094 (0.20)	0.100 (0.20)	0.072 (0.07)	0.089 (0.10)	0.047 (0.10)	0.111 (0.08)	0.045 (0.03)	0.075 (0.30)	0.082 (0.06)	0.095 (0.06)	0.061 (0.27)	0.106 (0.20)	0.114 (0.09)	0.033 (0.05)	0.103 (0.06)	0.077 (0.20)	0.079 (0.05)	0.075 (0.07)	0.078 (0.01)	0.060 (0.20)	0.078 (0.08)	0.095 (0.03)	0.097 (0.10)	0.086 (0.08)	0.079 (0.04)	
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$			
	0.078 (0.21)	0.075 (0.20)	0.084 (0.09)	0.167 (0.05)	0.078 (0.06)	0.096 (0.20)	0.079 (0.06)	0.066 (0.07)	0.099 (0.10)	0.098 (0.02)	0.058 (0.08)	0.087 (0.03)	0.077 (0.20)	0.138 (0.07)	0.770 (0.20)	0.077 (0.20)	0.096 (0.20)	0.079 (0.09)	0.085 (0.05)	0.075 (0.06)	0.077 (0.20)	0.079 (0.08)	0.078 (0.07)	0.077 (0.10)	0.082 (0.20)	0.073 (0.08)	0.075 (0.03)	0.077 (0.05)	0.076 (0.09)	0.083 (0.04)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	
	0.074 (0.20)	0.078 (0.04)	0.069 (0.09)	0.078 (0.06)	0.075 (0.08)	0.089 (0.09)	0.074 (0.06)	0.112 (0.10)	0.075 (0.07)	0.078 (0.09)	0.070 (0.06)	0.078 (0.06)	0.081 (0.05)	0.080 (0.09)	0.138 (0.03)	0.053 (0.20)	0.093 (0.03)	0.071 (0.09)	0.092 (0.06)	0.063 (0.09)	0.127 (0.09)	0.075 (0.06)	0.086 (0.10)	0.073 (0.09)	0.090 (0.04)	0.081 (0.07)	0.080 (0.07)	0.099 (0.05)	0.048 (0.08)	0.078 (0.04)	
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$			
	0.078 (0.20)	0.117 (0.05)	0.078 (0.09)	0.057 (0.07)	0.081 (0.08)	0.078 (0.09)	0.065 (0.06)	0.079 (0.10)	0.080 (0.08)	0.074 (0.08)	0.098 (0.08)	0.055 (0.07)	0.110 (0.05)	0.077 (0.08)	0.120 (0.05)	0.577 (0.20)	0.116 (0.03)	0.082 (0.09)	0.075 (0.08)	0.073 (0.09)	0.080 (0.09)	0.081 (0.06)	0.079 (0.10)	0.083 (0.07)	0.073 (0.03)	0.084 (0.09)	0.075 (0.08)	0.080 (0.05)	0.075 (0.09)	0.086 (0.06)	

For  $\phi_{.j}^{ij}$ ,  $i = WBA$  and  $j = AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, UTX, PG, PFE, TRV, XOM, WMT, UNH, V, VZ$

Table 18: Estimated parameters for UTX

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	
	0.100 (0.02)	0.072 (0.10)	0.089 (0.05)	0.047 (0.05)	0.111 (0.09)	0.045 (0.03)	0.075 (0.09)	0.105 (0.04)	0.082 (0.07)	0.095 (0.06)	0.061 (0.03)	0.106 (0.30)	0.114 (0.05)	0.033 (0.0)	0.077 (0.08)	0.079 (0.02)	0.077 (0.01)	0.078 (0.08)	0.089 (0.07)	0.075 (0.09)	0.081 (0.03)	0.094 (0.09)	0.075 (0.05)	0.078 (0.06)	0.060 (0.09)	0.078 (0.03)	0.095 (0.30)	0.097 (0.06)	0.086 (0.0)	0.079 (0.09)	
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$			
	0.078 (0.02)	0.075 (0.10)	0.084 (0.06)	0.167 (0.05)	0.078 (0.09)	0.096 (0.03)	0.079 (0.09)	0.066 (0.03)	0.099 (0.07)	0.098 (0.08)	0.058 (0.03)	0.078 (0.30)	0.153 (0.07)	-0.046 (0.0)	0.087 (0.04)	0.077 (0.02)	0.602 (0.10)	0.079 (0.08)	0.085 (0.08)	0.075 (0.09)	0.077 (0.03)	0.079 (0.09)	0.078 (0.06)	0.077 (0.07)	0.082 (0.03)	0.073 (0.03)	0.075 (0.03)	0.077 (0.05)	0.076 (0.0)	0.083 (0.05)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	
	0.053 (0.04)	0.093 (0.09)	0.071 (0.30)	0.092 (0.18)	0.063 (0.11)	0.127 (0.09)	0.075 (0.06)	0.086 (0.09)	0.073 (0.30)	0.090 (0.20)	0.081 (0.22)	0.080 (0.26)	0.099 (0.04)	0.048 (0.04)	0.078 (0.03)	0.117 (0.06)	0.078 (0.09)	0.057 (0.04)	0.081 (0.26)	0.078 (0.16)	0.065 (0.09)	0.079 (0.06)	0.074 (0.09)	0.078 (0.04)	0.069 (0.01)	0.078 (0.28)	0.075 (0.27)	0.089 (0.06)	0.074 (0.05)	0.042 (0.03)	
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$			
	0.075 (0.06)	0.078 (0.09)	0.070 (0.03)	0.078 (0.22)	0.081 (0.14)	0.042 (0.09)	0.080 (0.07)	0.138 (0.09)	0.080 (0.04)	0.074 (0.10)	0.098 (0.22)	0.055 (0.32)	0.080 (0.07)	0.120 (0.06)	0.775 (0.03)	0.077 (0.05)	0.116 (0.09)	0.812 (0.03)	0.075 (0.27)	0.073 (0.18)	0.080 (0.09)	0.081 (0.10)	0.079 (0.09)	0.083 (0.06)	0.073 (0.20)	0.084 (0.20)	0.075 (0.21)	0.080 (0.08)	0.075 (0.07)	0.086 (0.03)	

For  $\phi_{.j}^{ij}$ ,  $i = UTX$  and  $j = AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, PG, PFE, TRV, XOM, WMT, UNH, V, VZ$

Table 19: Estimated parameters for PG

var			
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Table 20: Estimated parameters for PFE

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	
	0.084 (0.10)	0.081 (0.05)	0.075 (0.08)	0.077 (0.07)	0.076 (0.04)	0.074 (0.07)	0.079 (0.10)	0.082 (0.08)	0.083 (0.01)	0.084 (0.03)	0.082 (0.07)	0.077 (0.04)	0.081 (0.06)	0.085 (0.03)	0.055 (0.09)	0.078 (0.10)	0.080 (0.05)	0.082 (0.08)	0.085 (0.07)	0.082 (0.04)	0.086 (0.07)	0.084 (0.10)	0.083 (0.08)	0.068 (0.01)	0.077 (0.03)	0.082 (0.07)	0.073 (0.04)	0.070 (0.06)	0.078 (0.03)	0.074 (0.09)	
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.082 (0.10)	0.085 (0.05)	0.071 (0.08)	0.080 (0.07)	0.068 (0.04)	0.079 (0.07)	0.076 (0.10)	0.079 (0.08)	0.083 (0.01)	0.069 (0.03)	0.097 (0.07)	0.071 (0.04)	0.082 (0.06)	0.085 (0.30)	0.067 (0.05)	0.073 (0.10)	0.114 (0.05)	0.083 (0.08)	0.080 (0.07)	0.166 (0.04)	0.309 (0.07)	0.075 (0.10)	0.079 (0.08)	0.082 (0.01)	0.080 (0.03)	0.073 (0.07)	0.110 (0.04)	0.065 (0.06)	0.162 (0.30)	0.061 (0.05)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	
	-0.041 (0.0)	0.079 (0.08)	0.078 (0.10)	0.075 (0.05)	0.079 (0.07)	0.072 (0.03)	0.075 (0.04)	0.084 (0.09)	0.079 (0.07)	0.076 (0.04)	0.096 (0.30)	0.079 (0.05)	0.076 (0.15)	0.096 (0.03)	0.077 (0.03)	0.082 (0.0)	0.089 (0.08)	0.079 (0.10)	0.079 (0.05)	0.075 (0.07)	0.105 (0.30)	0.082 (0.04)	0.078 (0.09)	0.095 (0.07)	0.097 (0.04)	0.068 (0.30)	0.079 (0.05)	0.078 (0.16)	0.076 (0.07)	0.080 (0.03)	
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.106 (0.0)	0.069 (0.08)	0.107 (0.10)	0.046 (0.05)	0.109 (0.07)	0.077 (0.30)	0.078 (0.04)	0.087 (0.09)	0.077 (0.07)	0.138 (0.04)	0.072 (0.03)	0.087 (0.05)	0.052 (0.17)	0.096 (0.09)	0.079 (0.03)	0.068 (0.0)	0.079 (0.08)	0.086 (0.10)	0.093 (0.05)	0.145 (0.07)	0.033 (0.03)	0.603 (0.04)	0.077 (0.09)	0.079 (0.07)	0.075 (0.04)	0.078 (0.03)	0.094 (0.05)	0.055 (0.26)	0.098 (0.04)	0.071 (0.03)	

For  $\phi_{..}^{ij}$ ,  $i = PFE$  and  $j = AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, UTX, PG, TRV, XOM, WMT, UNH, V, VZ$

Table 21: Estimated parameters for TRV

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	
	0.080 (0.08)	0.068 (0.07)	0.079 (0.05)	0.076 (0.04)	0.079 (0.08)	0.083 (0.10)	0.069 (0.09)	0.077 (0.07)	0.071 (0.06)	0.082 (0.02)	0.085 (0.03)	0.067 (0.04)	0.073 (0.07)	0.074 (0.30)	0.084 (0.06)	0.081 (0.08)	0.075 (0.07)	0.074 (0.05)	0.082 (0.04)	0.085 (0.08)	0.071 (0.10)	0.081 (0.09)	0.075 (0.07)	0.083 (0.06)	0.068 (0.02)	0.077 (0.03)	0.082 (0.04)	0.073 (0.07)	0.070 (0.03)	0.078 (0.06)	
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.080 (0.08)	0.075 (0.07)	0.079 (0.05)	0.082 (0.04)	0.080 (0.08)	0.073 (0.10)	0.110 (0.09)	0.065 (0.07)	0.085 (0.06)	0.079 (0.02)	0.072 (0.03)	0.077 (0.04)	0.074 (0.07)	0.079 (0.30)	0.082 (0.06)	0.083 (0.08)	0.078 (0.07)	0.082 (0.05)	0.165 (0.04)	0.105 (0.08)	0.072 (0.10)	0.086 (0.09)	0.554 (0.07)	0.078 (0.06)	0.080 (0.02)	0.082 (0.03)	0.085 (0.04)	0.082 (0.07)	0.086 (0.03)	0.084 (0.06)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	
	0.109 (0.05)	0.077 (0.07)	0.078 (0.0)	0.087 (0.10)	0.077 (0.05)	0.138 (0.07)	0.077 (0.08)	0.087 (0.10)	0.078 (0.20)	0.078 (0.07)	0.075 (0.04)	0.084 (0.05)	0.065 (0.06)	0.043 (0.07)	0.114 (0.10)	0.079 (0.05)	0.072 (0.07)	0.075 (0.0)	0.084 (0.21)	0.079 (0.05)	0.076 (0.07)	0.079 (0.08)	0.079 (0.10)	0.076 (0.20)	0.080 (0.07)	0.096 (0.04)	0.077 (0.05)	0.072 (0.06)	0.081 (0.07)	0.077 (0.10)	
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.096 (0.05)	0.079 (0.07)	0.068 (0.0)	0.079 (0.18)	0.077 (0.05)	0.079 (0.07)	0.077 (0.08)	0.079 (0.10)	0.075 (0.20)	0.078 (0.07)	0.094 (0.04)	0.055 (0.05)	0.098 (0.06)	0.075 (0.07)	0.074 (0.10)	0.075 (0.05)	0.080 (0.07)	0.077 (0.0)	0.062 (0.26)	0.158 (0.05)	0.097 (0.07)	0.068 (0.08)	0.079 (0.10)	0.728 (0.20)	0.088 (0.07)	0.083 (0.04)	0.048 (0.05)	0.114 (0.06)	0.033 (0.07)	0.103 (0.10)	

For  $\phi_{..}^{ij}$ ,  $i = TRV$  and  $j = AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, UTX, PG, PFE, XOM, WMT, UNH, V, VZ$

Table 22: Estimated parameters for XOM

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	
	0.119 (0.04)	0.118 (0.12)	0.060 (0.08)	0.084 (0.10)	0.067 (0.09)	0.078 (0.04)	0.097 (0.03)	0.168 (0.10)	0.078 (0.06)	0.066 (0.40)	0.086 (0.07)	0.042 (0.02)	0.107 (0.03)	0.092 (0.07)	0.143 (0.05)	0.086 (0.04)	0.128 (0.23)	0.045 (0.08)	0.098 (0.10)	0.090 (0.09)	0.082 (0.04)	0.120 (0.05)	0.089 (0.01)	0.076 (0.06)	0.096 (0.04)	0.101 (0.07)	0.131 (0.02)	0.100 (0.03)	0.138 (0.07)	0.108 (0.05)	
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.085 (0.04)	0.074 (0.35)	0.106 (0.08)	0.077 (0.10)	0.089 (0.09)	0.110 (0.04)	0.073 (0.07)	0.065 (0.01)	0.100 (0.06)	0.079 (0.04)	0.101 (0.07)	0.085 (0.02)	0.076 (0.03)	0.060 (0.07)	0.129 (0.05)	0.078 (0.04)	0.138 (0.28)	0.054 (0.08)	0.082 (0.10)	0.078 (0.09)	0.143 (0.04)	0.100 (0.08)	0.077 (0.10)	0.075 (0.06)	0.811 (0.41)	0.080 (0.07)	0.075 (0.02)	0.070 (0.03)	0.068 (0.07)	0.074 (0.05)	
	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	
$p_t - b_t$	0.080 (0.05)	0.074 (0.08)	0.068 (0.07)	0.078 (0.10)	0.075 (0.04)	0.082 (0.08)	0.080 (0.05)	0.069 (0.09)	0.080 (0.03)	0.080 (0.10)	0.077 (0.04)	0.005 (0.20)	0.076 (0.11)	0.083 (0.06)	0.073 (0.07)	0.080 (0.05)	0.071 (0.08)	0.079 (0.07)	0.081 (0.10)	0.080 (0.04)	0.109 (0.08)	0.072 (0.05)	0.077 (0.09)	0.078 (0.03)	0.085 (0.10)	0.045 (0.04)	0.077 (0.20)	0.072 (0.22)	0.100 (0.06)	0.167 (0.08)	
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.079 (0.05)	0.070 (0.08)	0.081 (0.07)	0.080 (0.05)	0.075 (0.04)	0.083 (0.08)	0.076 (0.05)	0.073 (0.09)	0.084 (0.03)	0.073 (0.10)	0.080 (0.04)	0.076 (0.20)	0.138 (0.33)	0.083 (0.06)	0.076 (0.09)	0.082 (0.05)	0.085 (0.08)	0.079 (0.07)	0.074 (0.05)	0.081 (0.04)	0.036 (0.08)	0.154 (0.05)	0.070 (0.09)	0.077 (0.03)	0.648 (0.10)	0.079 (0.04)	0.073 (0.20)	0.082 (0.10)	0.076 (0.06)	0.106 (0.09)	

Table 24: Estimated parameters for UNH

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	
	0.074 (0.04)	0.079 (0.05)	0.076 (0.06)	0.079 (0.08)	0.083 (0.30)	0.069 (0.08)	0.077 (0.04)	0.071 (0.20)	0.082 (0.06)	0.085 (0.11)	0.076 (0.07)	0.073 (0.05)	0.083 (0.06)	0.077 (0.04)	0.077 (0.10)	0.024 (0.04)	0.077 (0.05)	0.084 (0.06)	0.081 (0.08)	0.075 (0.30)	0.074 (0.08)	0.082 (0.04)	0.085 (0.20)	0.071 (0.06)	0.080 (0.22)	0.074 (0.08)	0.079 (0.05)	0.082 (0.06)	0.083 (0.04)	0.084 (0.10)	
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.082 (0.04)	0.077 (0.05)	0.081 (0.06)	0.072 (0.08)	0.085 (0.03)	0.055 (0.08)	0.078 (0.04)	0.080 (0.20)	0.082 (0.06)	0.085 (0.22)	0.082 (0.08)	0.086 (0.05)	0.084 (0.06)	0.083 (0.04)	0.068 (0.10)	0.077 (0.04)	0.082 (0.05)	0.073 (0.06)	0.070 (0.08)	0.078 (0.03)	0.080 (0.08)	0.075 (0.04)	0.079 (0.20)	0.827 (0.06)	0.156 (0.33)	0.042 (0.09)	0.110 (0.05)	0.065 (0.06)	0.085 (0.04)	0.079 (0.10)	
	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	
$p_t - b_t$	0.065 (0.10)	0.076 (0.07)	0.080 (0.08)	0.096 (0.03)	0.077 (0.05)	0.082 (0.06)	0.081 (0.20)	0.079 (0.08)	0.074 (0.10)	0.075 (0.30)	0.105 (0.06)	0.082 (0.04)	0.078 (0.07)	0.068 (0.02)	0.079 (0.08)	0.078 (0.10)	0.073 (0.07)	0.083 (0.08)	0.107 (0.30)	0.043 (0.05)	0.109 (0.06)	0.077 (0.20)	0.078 (0.08)	0.087 (0.10)	0.077 (0.03)	0.138 (0.06)	0.076 (0.04)	0.087 (0.07)	0.077 (0.03)	0.096 (0.03)	
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.079 (0.10)	0.068 (0.07)	0.079 (0.08)	0.077 (0.03)	0.079 (0.05)	0.078 (0.06)	0.089 (0.20)	0.075 (0.08)	0.078 (0.10)	0.077 (0.30)	0.079 (0.06)	0.072 (0.04)	0.075 (0.07)	0.084 (0.02)	0.079 (0.06)	0.076 (0.10)	0.096 (0.07)	0.079 (0.08)	0.106 (0.30)	0.114 (0.05)	0.033 (0.06)	0.103 (0.20)	0.077 (0.08)	0.079 (0.10)	0.578 (0.30)	0.150 (0.06)	0.094 (0.04)	0.055 (0.07)	0.098 (0.05)	0.071 (0.04)	

For  $\phi_{.j}^{ij}$ ,  $i = UNH$  and  $j = AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, UTX, PG, PFE, TRV, XOM, WMT, V, VZ$

Table 25: Estimated parameters for V

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	
	0.079 (0.08)	0.072 (0.20)	0.083 (0.05)	0.077 (0.10)	0.082 (0.07)	0.073 (0.08)	0.079 (0.07)	0.076 (0.06)	0.082 (0.06)	0.127 (0.06)	0.083 (0.10)	0.081 (0.09)	0.146 (0.03)	0.078 (0.07)	0.083 (0.01)	0.075 (0.08)	0.083 (0.20)	0.080 (0.05)	0.078 (0.10)	0.076 (0.07)	0.079 (0.08)	0.076 (0.07)	0.085 (0.06)	0.080 (0.06)	0.083 (0.20)	0.134 (0.10)	0.077 (0.09)	0.085 (0.05)	0.070 (0.07)	0.080 (0.01)	
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	
	0.083 (0.08)	0.082 (0.20)	0.078 (0.05)	0.081 (0.10)	0.072 (0.07)	0.082 (0.08)	0.074 (0.07)	0.082 (0.06)	0.079 (0.06)	0.082 (0.20)	0.082 (0.10)	0.072 (0.09)	0.081 (0.02)	0.069 (0.07)	0.082 (0.01)	0.072 (0.08)	0.084 (0.20)	0.074 (0.05)	0.080 (0.10)	0.083 (0.07)	0.082 (0.08)	0.083 (0.07)	0.071 (0.06)	0.080 (0.06)	0.074 (0.05)	0.081 (0.10)	0.553 (0.09)	0.015 (0.06)	0.112 (0.07)	0.101 (0.10)	
$p_t - b_t$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	
	0.082 (0.20)	0.078 (0.08)	0.072 (0.04)	0.085 (0.08)	0.130 (0.07)	0.069 (0.06)	0.082 (0.10)	0.083 (0.05)	0.084 (0.10)	0.079 (0.20)	0.077 (0.06)	0.080 (0.08)	0.074 (0.06)	0.076 (0.04)	0.072 (0.07)	0.082 (0.20)	0.073 (0.08)	0.078 (0.04)	0.069 (0.08)	0.149 (0.07)	0.080 (0.06)	0.071 (0.10)	0.120 (0.05)	0.102 (0.10)	0.078 (0.04)	0.082 (0.06)	0.069 (0.08)	0.142 (0.07)	0.083 (0.06)	0.078 (0.08)	
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	
	0.074 (0.20)	0.080 (0.08)	0.074 (0.04)	0.089 (0.08)	0.085 (0.07)	0.080 (0.06)	0.078 (0.10)	0.080 (0.05)	0.072 (0.10)	0.085 (0.30)	0.082 (0.06)	0.083 (0.08)	0.080 (0.05)	0.074 (0.07)	0.086 (0.09)	0.052 (0.20)	0.081 (0.08)	0.069 (0.04)	0.086 (0.08)	0.077 (0.07)	0.080 (0.06)	0.082 (0.10)	0.073 (0.05)	0.085 (0.10)	0.083 (0.10)	0.084 (0.06)	0.152 (0.08)	0.466 (0.04)	0.067 (0.09)	0.081 (0.08)	

For  $\phi_{.j}^{ij}$ ,  $i = V$  and  $j = AAPL, CVX, AXP, BA, CSCO, CAT, DIS, IBM, DOW, GS, HD, KO, JPM, INTC, JNJ, MMM, MCD, NKE, MRK, MSFT, WBA, UTX, PG, PFE, TRV, XOM, WMT, UNH, VZ$

Table 26: Estimated parameters for VZ

var																															
$a_t - p_t$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	
	0.078 (0.10)	0.069 (0.04)	0.089 (0.08)	0.079 (0.20)	0.079 (0.06)	0.078 (0.08)	0.060 (0.05)	0.075 (0.05)	0.095 (0.20)	0.097 (0.06)	0.086 (0.20)	0.079 (0.30)	0.078 (0.08)	0.084 (0.05)	-0.012 (0.06)	0.078 (0.10)	0.096 (0.04)	0.079 (0.08)	0.087 (0.20)	0.099 (0.06)	0.056 (0.08)	0.096 (0.05)	0.087 (0.07)	0.117 (0.20)	0.138 (0.05)	0.047 (0.20)	0.102 (0.03)	0.096 (0.08)	0.062 (0.05)	0.086 (0.06)	
	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	$\phi_{aa}^{i26}$	$\phi_{ab}^{i26}$	$\phi_{aa}^{i27}$	$\phi_{ab}^{i27}$	$\phi_{aa}^{i28}$	$\phi_{ab}^{i28}$	$\phi_{aa}^{i29}$	$\phi_{ab}^{i29}$	$\phi_{aa}^{i30}$	$\phi_{ab}^{i30}$	$\phi_{aa}^i$	$\phi_{ab}^i$	
	0.079 (0.10)	0.078 (0.04)	0.089 (0.08)	0.108 (0.20)	0.097 (0.06)	0.067 (0.08)	0.058 (0.05)	0.157 (0.09)	0.077 (0.20)	0.077 (0.04)	0.071 (0.02)	0.068 (0.30)	0.070 (0.08)	0.081 (0.07)	0.083 (0.06)	0.107 (0.10)	0.074 (0.04)	0.085 (0.08)	0.082 (0.20)	0.070 (0.06)	0.077 (0.08)	0.078 (0.05)	0.088 (0.09)	0.074 (0.20)	0.078 (0.03)	0.081 (0.20)	0.069 (0.03)	0.082 (0.08)	0.408 (0.07)	0.155 (0.06)	
	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	
$p_t - b_t$	0.077 (0.08)	0.093 (0.05)	0.085 (0.07)	0.077 (0.06)	0.108 (0.10)	0.089 (0.08)	0.076 (0.20)	0.080 (0.08)	0.088 (0.20)	0.051 (0.06)	0.093 (0.10)	0.117 (0.03)	0.078 (0.08)	0.078 (0.04)	0.082 (0.09)	0.084 (0.08)	0.083 (0.05)	0.089 (0.07)	0.080 (0.06)	0.075 (0.10)	0.081 (0.08)	0.098 (0.20)	0.100 (0.08)	0.088 (0.20)	0.099 (0.06)	0.035 (0.01)	0.028 (0.03)	0.039 (0.09)	0.079 (0.04)	0.082 (0.04)	
	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	$\phi_{ba}^{i26}$	$\phi_{bb}^{i26}$	$\phi_{ba}^{i27}$	$\phi_{bb}^{i27}$	$\phi_{ba}^{i28}$	$\phi_{bb}^{i28}$	$\phi_{ba}^{i29}$	$\phi_{bb}^{i29}$	$\phi_{ba}^{i30}$	$\phi_{bb}^{i30}$	$\phi_{aa}^i$	$\phi_{ab}^i$	
	0.079 (0.08)	0.081 (0.05)	0.078 (0.07)	0.056 (0.06)	0.068 (0.10)	0.074 (0.09)	0.133 (0.20)	0.082 (0.08)	0.028 (0.02)	0.080 (0.06)	0.069 (0.10)	0.082 (0.03)	0.091 (0.07)	0.073 (0.05)	0.081 (0.06)	0.100 (0.08)	0.049 (0.05)	0.079 (0.07)	0.079 (0.06)	0.118 (0.10)	0.077 (0.09)	0.058 (0.20)	0.082 (0.08)	0.079 (0.20)	0.075 (0.06)	0.083 (0.01)	0.074 (0.03)	-0.004 (0.07)	0.160 (0.05)	0.209 (0.06)	

## Appendix B2

### Estimated GARCH Parameters for DIA and its Underlying Assets

ETF	$\kappa_{pf}^0$	$\kappa_{pf}$	$\kappa_{apf}^0$	$\kappa_{apf}$	$\kappa_{pbf}^0$	$\kappa_{pbf}$	$\tau_0^f$	$\tau_1^f$	$\tau_2^f$	$\tau_3^f$
DIA	-0.611 (0.184)	0.601 (0.001)	-0.553 (0.010)	0.781 (0.09)	-0.772 (0.001)	0.784 (0.005)	-0.220 (0.003)	0.939 (0.012)	-0.229 (0.038)	0.601 (0.007)
STOCK $\kappa_p^0$	$\kappa_p$	$\kappa_{ap}^0$	$\kappa_{ap}$	$\kappa_{pb}^0$	$\kappa_{pb}$	$\tau_0$	$\tau_1$	$\tau_2$	$\tau_3$	
AAPL	-0.761 (0.001)	0.600 (0.004)	-0.663 (0.134)	0.783 (0.005)	-0.453 (0.014)	0.785 (0.003)	-0.671 (0.002)	0.879 (0.004)	-0.071 (0.189)	0.601 (0.039)
CVX	-0.651 (0.001)	0.601 (0.010)	-0.343 (0.034)	0.844 (0.066)	-0.427 (0.062)	0.870 (0.027)	-0.421 (0.023)	0.929 (0.009)	-0.521 (0.067)	0.601 (0.035)
AXP	-0.260 (0.077)	0.611 (0.033)	-0.473 (0.035)	0.785 (0.056)	-0.333 (0.076)	0.785 (0.025)	-0.240 (0.090)	0.779 (0.044)	-0.370 (0.064)	0.606 (0.043)
BA	-0.761 (0.048)	0.601 (0.067)	-0.413 (0.005)	0.786 (0.011)	-0.273 (0.091)	0.788 (0.024)	-0.671 (0.045)	0.879 (0.089)	-0.071 (0.029)	0.601 (0.046)
CSCO	-0.321 (0.074)	0.601 (0.053)	-0.393 (0.045)	0.789 (0.009)	-0.623 (0.010)	0.785 (0.022)	-0.291 (0.034)	0.649 (0.038)	-0.371 (0.059)	0.606 (0.037)
CAT	-0.321 (0.027)	0.674 (0.045)	-0.553 (0.089)	0.792 (0.048)	-0.773 (0.042)	0.805 (0.049)	-0.203 (0.032)	0.881 (0.043)	-0.721 (0.077)	0.696 (0.029)
DIS	-0.221 (0.057)	0.027 (0.034)	-0.707 (0.045)	0.790 (0.009)	-0.447 (0.033)	0.786 (0.030)	0.123 (0.011)	0.639 (0.019)	-0.371 (0.039)	0.604 (0.065)
IBM	-0.484 (0.048)	0.652 (0.021)	-0.351 (0.006)	0.794 (0.002)	-0.593 (0.094)	0.789 (0.085)	0.119 (0.032)	0.870 (0.037)	-0.276 (0.076)	0.604 (0.008)
DOW	-0.405 (0.008)	0.652 (0.045)	-0.553 (0.055)	0.785 (0.067)	-0.773 (0.027)	0.785 (0.039)	-0.851 (0.028)	0.560 (0.088)	-0.221 (0.008)	0.642 (0.035)
GS	-0.484 (0.054)	0.604 (0.065)	-0.623 (0.039)	0.785 (0.066)	-0.573 (0.056)	0.785 (0.043)	-0.451 (0.037)	0.637 (0.074)	-0.486 (0.038)	0.601 (0.007)
HD	-0.342 (0.058)	0.639 (0.055)	-0.553 (0.121)	0.803 (0.012)	-0.573 (0.043)	0.802 (0.032)	0.039 (0.045)	0.789 (0.066)	-0.371 (0.021)	0.613 (0.073)
KO	-0.284 (0.058)	0.631 (0.035)	-0.553 (0.037)	0.876 (0.021)	-0.593 (0.028)	0.871 (0.113)	0.031 (0.044)	0.570 (0.009)	-0.576 (0.032)	0.611 (0.048)
JPM	-0.201 (0.062)	0.666 (0.027)	-0.543 (0.037)	0.862 (0.056)	-0.693 (0.047)	0.872 (0.078)	-0.051 (0.055)	0.684 (0.003)	-0.771 (0.001)	0.657 (0.037)
INTC	-0.604 (0.118)	0.688 (0.041)	-0.453 (0.053)	0.833 (0.065)	-0.588 (0.096)	0.809 (0.086)	-0.261 (0.033)	0.739 (0.211)	-0.471 (0.053)	0.631 (0.099)
JNJ	-0.426 (0.032)	0.665 (0.098)	-0.413 (0.067)	0.787 (0.045)	-0.473 (0.012)	0.835 (0.021)	-0.292 (0.022)	0.686 (0.067)	-0.336 (0.045)	0.656 (0.053)
MMM	-0.521 (0.065)	0.622 (0.063)	-0.573 (0.007)	0.788 (0.067)	-0.720 (0.087)	0.789 (0.054)	-0.401 (0.015)	0.699 (0.141)	-0.301 (0.111)	0.615 (0.056)
MCD	-0.426 (0.032)	0.621 (0.035)	-0.613 (0.093)	0.877 (0.078)	-0.773 (0.068)	0.884 (0.067)	-0.071 (0.056)	0.599 (0.078)	-0.551 (0.053)	0.626 (0.052)
NKE	-0.303 (0.011)	0.636 (0.021)	-0.513 (0.035)	0.877 (0.076)	-0.512 (0.037)	0.802 (0.043)	-0.159 (0.038)	0.699 (0.029)	-0.401 (0.053)	0.645 (0.054)
MRK	-0.321 (0.013)	0.685 (0.054)	-0.6931 (0.021)	0.822 (0.043)	-0.453 (0.051)	0.802 (0.015)	-0.251 (0.006)	0.659 (0.032)	-0.321 (0.067)	0.696 (0.009)
MSFT	-0.426 (0.023)	0.617 (0.121)	-0.813 (0.023)	0.877 (0.034)	-0.823 (0.053)	0.885 (0.034)	-0.071 (0.032)	0.599 (0.031)	-0.551 (0.011)	0.626 (0.043)
WBA	-0.393 (0.022)	0.682 (0.118)	-0.683 (0.038)	0.836 (0.051)	-0.573 (0.037)	0.854 (0.037)	-0.096 (0.035)	0.848 (0.026)	-0.531 (0.009)	0.655 (0.101)
UTX	-0.514 (0.042)	0.652 (0.023)	-0.837 (0.023)	0.836 (0.008)	-0.727 (0.100)	0.854 (0.052)	-0.396 (0.053)	0.748 (0.045)	-0.231 (0.039)	0.665 (0.088)
PG	-0.192 (0.054)	0.666 (0.031)	-0.413 (0.032)	0.811 (0.052)	-0.543 (0.053)	0.797 (0.053)	-0.331 (0.031)	0.569 (0.030)	0.130 (0.008)	0.666 (0.008)
PFE	-0.621 (0.025)	0.697 (0.024)	0.177 (0.073)	0.813 (0.053)	-0.708 (0.009)	0.804 (0.053)	-0.241 (0.034)	0.499 (0.064)	-0.482 (0.045)	0.660 (0.007)
TRV	0.006 (0.046)	0.635 (0.038)	-0.313 (0.074)	0.877 (0.063)	-0.373 (0.063)	0.885 (0.037)	-0.411 (0.087)	0.793 (0.054)	-0.193 (0.032)	0.646 (0.021)
XOM	-0.431 (0.034)	0.613 (0.032)	-0.648 (0.021)	0.881 (0.007)	-0.608 (0.053)	0.852 (0.042)	-0.671 (0.032)	0.761 (0.012)	-0.031 (0.031)	0.645 (0.032)
WMT	-0.471 (0.023)	0.675 (0.045)	-0.720 (0.034)	0.822 (0.044)	-0.636 (0.011)	0.842 (0.045)	-0.351 (0.023)	0.959 (0.012)	-0.392 (0.022)	0.6867 (0.031)
UNH	-0.426 (0.043)	0.617 (0.032)	-0.813 (0.032)	0.847 (0.034)	-0.673 (0.009)	0.836 (0.074)	-0.071 (0.053)	0.599 (0.042)	-0.551 (0.019)	0.626 (0.042)
V	-0.321 (0.035)	0.601 (0.015)	-0.499 (0.076)	0.849 (0.023)	-0.402 (0.056)	0.874 (0.073)	-0.291 (0.046)	0.649 (0.042)	-0.371 (0.042)	0.606 (0.055)
VZ	-0.121 (0.025)	0.692 (0.024)	-0.722 (0.057)	0.846 (0.053)	-0.737 (0.052)	0.854 (0.043)	-0.381 (0.032)	0.969 (0.053)	-0.181 (0.042)	0.751 (0.053)

Appendix C1

Dynamic Model Estimates for the Underlying Assets of SMH ETF

Table 27: Estimated parameters for TXN

var																											
$a_t - p_t$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$		
	0.091 (0.11)	0.080 (0.09)	0.082 (0.07)	0.083 (0.12)	0.085 (0.25)	0.086 (0.13)	0.084 (0.11)	0.084 (0.09)	0.071 (0.03)	0.084 (0.08)	0.152 (0.12)	0.087 (0.07)	0.080 (0.04)	0.106 (0.08)	0.072 (0.13)	0.084 (0.25)	0.085 (0.07)	0.081 (0.02)	0.087 (0.12)	0.084 (0.09)	0.084 (0.11)	0.082 (0.08)	0.122 (0.13)	-0.125 (0.11)	0.088 (0.07)		
	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$		
$p_t - b_t$	0.085 (0.04)	0.081 (0.11)	0.082 (0.07)	0.082 (0.13)	0.095 (0.05)	0.069 (0.07)	0.085 (0.09)	0.085 (0.25)	0.094 (0.08)	0.080 (0.12)	0.086 (0.13)	0.085 (0.07)	0.090 (0.08)	0.083 (0.25)	0.112 (0.11)	0.083 (0.90)	0.083 (0.05)	0.093 (0.12)	0.087 (0.04)	0.078 (0.03)	0.829 (0.07)	0.084 (0.11)	0.082 (0.12)	0.161 (0.11)	0.083 (0.09)		
	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$		
	0.077 (0.25)	0.084 (0.11)	0.079 (0.07)	0.082 (0.13)	0.087 (0.08)	0.084 (0.12)	0.082 (0.09)	0.082 (0.05)	0.082 (0.04)	0.088 (0.09)	0.090 (0.11)	0.161 (0.07)	0.084 (0.25)	0.081 (0.12)	0.089 (0.11)	0.084 (0.09)	0.082 (0.05)	0.081 (0.13)	0.089 (0.08)	0.084 (0.07)	0.078 (0.09)	0.083 (0.11)	0.084 (0.12)	0.084 (0.11)	0.071 (0.13)		
	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$		
	0.084 (0.09)	0.081 (0.07)	0.084 (0.25)	0.103 (0.11)	0.108 (0.12)	0.071 (0.05)	0.086 (0.08)	0.173 (0.09)	0.084 (0.13)	0.083 (0.11)	0.081 (0.07)	0.088 (0.13)	0.101 (0.11)	0.084 (0.08)	0.090 (0.25)	0.083 (0.11)	0.087 (0.07)	0.144 (0.08)	0.086 (0.12)	0.083 (0.09)	0.102 (0.13)	0.175 (0.09)	0.081 (0.11)	0.101 (0.07)	0.083 (0.12)		

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, QCOM, MU, AVGO, NXPI, LRCX, AMAT, ADI, KLAC, XLNX, STM, MCHP, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 28: Estimated parameters for QCOM

var																											
$a_t - p_t$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$		
	0.091 (0.09)	0.080 (0.11)	0.084 (0.24)	0.083 (0.06)	0.085 (0.22)	0.086 (0.24)	0.081 (0.09)	0.084 (0.11)	0.071 (0.06)	0.084 (0.22)	0.082 (0.06)	0.088 (0.03)	0.171 (0.03)	-0.039 (0.24)	0.093 (0.03)	0.084 (0.11)	0.081 (0.14)	0.084 (0.06)	0.087 (0.12)	0.084 (0.22)	0.084 (0.24)	0.082 (0.09)	0.122 (0.24)	0.292 (0.11)	0.088 (0.09)		
	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$		
$p_t - b_t$	0.085 (0.06)	0.081 (0.90)	0.084 (0.24)	0.082 (0.22)	0.095 (0.11)	0.097 (0.06)	0.081 (0.11)	0.085 (0.22)	0.094 (0.06)	0.086 (0.22)	0.086 (0.09)	0.085 (0.24)	0.090 (0.19)	0.083 (0.14)	0.112 (0.11)	0.083 (0.16)	0.083 (0.09)	0.084 (0.17)	0.087 (0.11)	0.078 (0.24)	0.829 (0.09)	0.084 (0.13)	0.083 (0.22)	0.161 (0.24)	0.083 (0.09)		
	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$		
	0.060 (0.11)	0.088 (0.06)	0.060 (0.09)	0.095 (0.22)	0.084 (0.13)	0.082 (0.06)	0.085 (0.24)	0.080 (0.17)	0.086 (0.11)	0.085 (0.24)	0.067 (0.09)	0.085 (0.22)	0.097 (0.13)	0.167 (0.06)	0.021 (0.24)	0.092 (0.11)	0.116 (0.09)	0.097 (0.26)	0.093 (0.22)	0.074 (0.09)	0.095 (0.18)	0.084 (0.06)	0.080 (0.24)	0.085 (0.11)	0.094 (0.09)		
	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$		
	0.084 (0.11)	0.085 (0.14)	0.082 (0.16)	0.106 (0.06)	0.094 (0.11)	0.095 (0.24)	0.086 (0.22)	0.084 (0.11)	0.072 (0.24)	0.084 (0.09)	0.081 (0.11)	0.093 (0.16)	0.085 (0.13)	0.099 (0.14)	0.094 (0.06)	0.085 (0.09)	0.082 (0.24)	0.090 (0.11)	0.084 (0.22)	0.085 (0.09)	0.788 (0.06)	0.091 (0.14)	0.078 (0.06)	0.085 (0.24)	0.089 (0.09)		

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, AVGO, NXPI, LRCX, AMAT, ADI, KLAC, XLNX, STM, MCHP, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 29: Estimated parameters for MU

var																										
$a_t - p_t$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	
	0.079 (0.08)	0.080 (0.05)	0.085 (0.11)	0.085 (0.22)	0.090 (0.23)	0.087 (0.33)	0.081 (0.08)	0.085 (0.05)	0.135 (0.21)	0.090 (0.21)	0.080 (0.23)	0.067 (0.07)	0.085 (0.11)	0.162 (0.22)	0.091 (0.05)	0.088 (0.08)	0.086 (0.21)	0.093 (0.22)	0.090 (0.11)	0.090 (0.33)	0.087 (0.23)	0.093 (0.33)	0.088 (0.05)	0.091 (0.21)	0.093 (0.08)	
	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	
$p_t - b_t$	0.089 (0.05)	0.083 (0.11)	0.096 (0.08)	0.098 (0.23)	0.082 (0.07)	0.086 (0.23)	0.087 (0.05)	0.089 (0.33)	0.087 (0.07)	0.089 (0.08)	0.091 (0.21)	0.085 (0.05)	0.087 (0.23)	0.078 (0.11)	0.089 (0.33)	0.091 (0.04)	0.088 (0.08)	0.081 (0.21)	0.088 (0.08)	0.084 (0.05)	0.798 (0.11)	0.172 (0.04)	0.081 (0.33)	0.085 (0.23)	0.074 (0.05)	
	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	
	0.076 (0.04)	0.080 (0.04)	0.060 (0.33)	0.095 (0.11)	0.092 (0.08)	0.087 (0.50)	0.089 (0.33)	0.084 (0.23)	0.154 (0.21)	0.091 (0.23)	0.074 (0.11)	0.088 (0.05)	0.083 (0.11)	0.102 (0.11)	0.083 (0.07)	0.146 (0.08)	0.089 (0.04)	0.087 (0.21)	0.091 (0.33)	0.064 (0.23)	0.091 (0.04)	0.082 (0.07)	0.088 (0.05)	0.087 (0.08)	0.088 (0.11)	
	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	
	0.088 (0.23)	0.087 (0.05)	0.077 (0.21)	0.083 (0.11)	0.094 (0.04)	0.095 (0.23)	0.086 (0.33)	0.084 (0.04)	0.075 (0.21)	0.085 (0.08)	0.078 (0.31)	0.088 (0.44)	0.085 (0.05)	0.084 (0.08)	0.087 (0.11)	0.087 (0.31)	0.082 (0.11)	0.090 (0.06)	0.091 (0.05)	0.088 (0.08)	0.785 (0.05)	0.085 (0.33)	0.074 (0.08)	0.092 (0.11)	0.079 (0.07)	

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, AVGO, NXPI, LRCX, AMAT, ADI, KLAC, XLNX, STM, MCHP, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 30: Estimated parameters for AVGO

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.079 (0.01)	0.091 (0.03)	0.084 (0.11)	0.078 (0.07)	0.087 (0.12)	0.064 (0.03)	0.097 (0.07)	0.068 (0.04)	0.086 (0.12)	0.086 (0.03)	0.036 (0.01)	0.114 (0.03)	0.085 (0.11)	0.085 (0.03)	0.060 (0.03)	0.144 (0.07)	0.128 (0.01)	0.212 (0.04)	0.138 (0.09)	0.040 (0.11)	0.108 (0.03)	0.105 (0.01)	0.074 (0.03)	0.173 (0.07)	0.051 (0.11)
		$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$
$p_t - b_t$		0.098 (0.22)	0.163 (0.07)	0.054 (0.01)	0.112 (0.03)	0.096 (0.04)	0.124 (0.03)	0.084 (0.11)	0.085 (0.22)	0.095 (0.04)	0.093 (0.11)	0.102 (0.01)	0.048 (0.03)	0.103 (0.22)	0.090 (0.07)	0.080 (0.03)	0.086 (0.04)	0.089 (0.03)	0.084 (0.11)	0.114 (0.07)	0.087 (0.04)	0.078 (0.22)	0.087 (0.01)	0.081 (0.07)	0.087 (0.04)	0.094 (0.11)
		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.081 (0.06)	0.071 (0.08)	0.114 (0.09)	0.081 (0.07)	0.084 (0.08)	0.086 (0.03)	0.060 (0.11)	0.078 (0.04)	0.071 (0.04)	0.113 (0.11)	0.117 (0.01)	0.115 (0.03)	0.082 (0.11)	0.055 (0.06)	0.098 (0.07)	0.101 (0.01)	0.099 (0.03)	0.087 (0.06)	0.087 (0.11)	0.057 (0.01)	0.086 (0.07)	0.085 (0.01)	0.064 (0.03)	0.082 (0.11)	0.066 (0.01)
		$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$
		0.084 (0.01)	0.101 (0.03)	0.145 (0.06)	0.074 (0.11)	0.085 (0.11)	0.082 (0.07)	0.085 (0.01)	0.076 (0.06)	0.112 (0.09)	0.086 (0.11)	0.064 (0.03)	0.085 (0.03)	0.072 (0.01)	0.105 (0.03)	0.062 (0.11)	0.102 (0.07)	0.073 (0.01)	0.082 (0.09)	0.144 (0.09)	0.073 (0.06)	0.083 (0.11)	0.102 (0.07)	0.081 (0.03)	0.091 (0.01)	0.085 (0.09)

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, NXPI, LRCX, AMAT, ADI, KLAC, XLNX, STM, MCHP, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 31: Estimated parameters for NXPI

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.093 (0.22)	0.077 (0.13)	0.087 (0.11)	0.083 (0.09)	0.087 (0.09)	0.089 (0.05)	0.077 (0.13)	0.083 (0.09)	0.093 (0.11)	0.084 (0.09)	0.090 (0.22)	0.146 (0.13)	0.090 (0.11)	0.083 (0.05)	0.111 (0.08)	0.083 (0.22)	0.091 (0.09)	0.092 (0.13)	0.899 (0.02)	0.082 (0.08)	0.084 (0.05)	0.074 (0.09)	0.086 (0.22)	0.076 (0.08)	0.070 (0.09)
		$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$
$p_t - b_t$		0.085 (0.13)	0.083 (0.11)	0.087 (0.22)	0.087 (0.09)	0.085 (0.08)	0.080 (0.05)	0.083 (0.05)	0.089 (0.11)	0.086 (0.05)	0.087 (0.90)	0.083 (0.22)	0.091 (0.13)	0.084 (0.08)	0.085 (0.11)	0.082 (0.90)	0.085 (0.13)	0.091 (0.05)	0.083 (0.11)	0.089 (0.22)	0.082 (0.08)	0.088 (0.90)	0.085 (0.05)	0.076 (0.05)	0.087 (0.22)	0.085 (0.13)
		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.056 (0.09)	0.087 (0.11)	0.086 (0.05)	0.074 (0.08)	0.084 (0.11)	0.085 (0.13)	0.078 (0.05)	0.080 (0.09)	0.091 (0.13)	0.091 (0.08)	0.086 (0.09)	0.042 (0.22)	0.084 (0.05)	0.083 (0.09)	0.082 (0.11)	0.082 (0.13)	0.086 (0.11)	0.086 (0.05)	0.085 (0.08)	0.764 (0.22)	0.083 (0.05)	0.086 (0.09)	0.076 (0.22)	0.083 (0.13)	0.084 (0.22)
		$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$
		0.091 (0.09)	0.083 (0.22)	0.083 (0.13)	0.088 (0.11)	0.082 (0.05)	0.092 (0.09)	0.091 (0.22)	0.076 (0.13)	0.087 (0.11)	0.086 (0.05)	0.085 (0.09)	0.089 (0.22)	0.083 (0.13)	0.087 (0.08)	0.090 (0.09)	0.079 (0.08)	0.086 (0.13)	0.081 (0.03)	0.144 (0.24)	0.083 (0.05)	0.078 (0.05)	0.091 (0.22)	0.085 (0.13)	0.085 (0.11)	0.079 (0.09)

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, LRCX, AMAT, ADI, KLAC, XLNX, STM, MCHP, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 32: Estimated parameters for LRCX

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.083 (0.22)	0.099 (0.14)	0.076 (0.07)	0.085 (0.24)	0.114 (0.11)	0.095 (0.07)	0.097 (0.22)	0.099 (0.14)	0.086 (0.20)	0.074 (0.10)	0.111 (0.11)	0.099 (0.20)	0.123 (0.10)	0.134 (0.20)	0.083 (0.07)	0.084 (0.14)	0.088 (0.22)	0.090 (0.11)	0.089 (0.07)	0.139 (0.20)	0.084 (0.11)	0.149 (0.07)	0.930 (0.24)	0.088 (0.14)	0.097 (0.22)
		$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$
$p_t - b_t$		0.088 (0.24)	0.087 (0.07)	0.106 (0.10)	0.055 (0.22)	0.085 (0.24)	0.082 (0.22)	0.124 (0.11)	0.085 (0.07)	0.064 (0.05)	0.088 (0.14)	0.085 (0.10)	0.095 (0.24)	0.086 (0.11)	0.081 (0.14)	0.087 (0.24)	0.063 (0.07)	0.106 (0.22)	0.094 (0.24)	0.063 (0.11)	0.127 (0.07)	0.134 (0.14)	0.123 (0.24)	0.085 (0.07)	0.082 (0.22)	0.084 (0.14)
		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.091 (0.14)	0.080 (0.22)	0.084 (0.05)	0.083 (0.11)	0.081 (0.07)	0.086 (0.22)	0.081 (0.07)	0.084 (0.20)	0.071 (0.11)	0.084 (0.24)	0.082 (0.14)	0.088 (0.10)	0.083 (0.07)	0.092 (0.24)	-0.039 (0.20)	0.093 (0.22)	0.084 (0.14)	0.081 (0.10)	0.084 (0.24)	0.083 (0.14)	0.082 (0.24)	0.165 (0.11)	0.122 (0.20)	0.741 (0.07)	0.088 (0.22)
		$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$
		0.085 (0.11)	0.081 (0.22)	0.084 (0.07)	0.082 (0.24)	0.095 (0.11)	0.069 (0.07)	0.081 (0.14)	0.085 (0.24)	0.094 (0.20)	0.080 (0.21)	0.086 (0.11)	0.085 (0.22)	0.076 (0.07)	0.083 (0.11)	0.112 (0.14)	0.083 (0.12)	0.083 (0.24)	0.084 (0.22)	0.087 (0.10)	0.078 (0.07)	0.829 (0.14)	0.084 (0.21)	0.083 (0.30)	0.161 (0.22)	0.083 (0.14)

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, AMAT, ADI, KLAC, XLNX, STM, MCHP, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 33: Estimated parameters for AMAT

var																											
$a_t - p_t$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$		
	0.083 (0.10)	0.088 (0.11)	0.060 (0.22)	0.095 (0.09)	0.082 (0.23)	0.082 (0.09)	0.085 (0.10)	0.080 (0.08)	0.086 (0.12)	0.085 (0.22)	0.067 (0.22)	0.085 (0.11)	0.083 (0.08)	0.097 (0.21)	0.097 (0.09)	0.021 (0.23)	0.092 (0.11)	0.116 (0.10)	0.097 (0.08)	0.093 (0.08)	0.074 (0.23)	0.095 (0.22)	0.803 (0.09)	-0.286 (0.07)	0.094 (0.10)		
	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$		
	0.084 (0.22)	0.085 (0.23)	0.082 (0.08)	0.106 (0.23)	0.094 (0.22)	0.095 (0.09)	0.086 (0.10)	0.084 (0.09)	0.072 (0.12)	0.084 (0.08)	0.081 (0.09)	0.093 (0.11)	0.085 (0.10)	0.099 (0.08)	0.094 (0.11)	0.085 (0.10)	0.082 (0.22)	0.090 (0.22)	0.084 (0.11)	0.085 (0.23)	0.788 (0.10)	0.091 (0.23)	0.078 (0.11)	0.085 (0.09)	0.099 (0.22)		
$p_t - b_t$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$		
	0.085 (0.23)	0.048 (0.09)	0.095 (0.22)	0.083 (0.08)	0.122 (0.11)	0.064 (0.09)	0.123 (0.10)	0.068 (0.22)	0.085 (0.08)	0.093 (0.23)	0.076 (0.09)	0.098 (0.10)	0.086 (0.11)	0.084 (0.22)	0.053 (0.08)	0.144 (0.22)	0.123 (0.10)	0.113 (0.11)	0.173 (0.23)	0.138 (0.08)	0.040 (0.11)	0.083 (0.10)	0.973 (0.09)	0.173 (0.23)	0.051 (0.22)		
	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$		
	0.098 (0.22)	0.163 (0.11)	0.054 (0.09)	0.112 (0.22)	0.096 (0.10)	0.095 (0.09)	0.084 (0.30)	0.085 (0.08)	0.095 (0.10)	0.093 (0.10)	0.102 (0.23)	0.118 (0.22)	0.103 (0.22)	0.090 (0.23)	0.086 (0.10)	0.086 (0.09)	0.085 (0.08)	0.084 (0.11)	0.114 (0.20)	0.087 (0.10)	0.088 (0.22)	0.087 (0.09)	0.085 (0.22)	0.087 (0.11)	0.094 (0.10)		



Table 34: Estimated parameters for ADI

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.091 (0.07)	0.080 (0.04)	0.082 (0.23)	0.083 (0.06)	0.085 (0.11)	0.086 (0.07)	0.084 (0.04)	0.084 (0.14)	0.071 (0.06)	0.084 (0.11)	0.082 (0.07)	0.102 (0.04)	0.087 (0.14)	0.080 (0.06)	0.106 (0.23)	0.072 (0.07)	0.084 (0.04)	0.085 (0.11)	0.081 (0.06)	0.087 (0.23)	0.084 (0.07)	0.084 (0.04)	0.082 (0.11)	0.122 (0.06)	0.143 (0.23)
		$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$
		0.105 (0.09)	0.081 (0.11)	0.082 (0.07)	0.082 (0.09)	0.095 (0.23)	0.069 (0.04)	0.085 (0.09)	0.085 (0.07)	0.094 (0.11)	0.080 (0.14)	0.086 (0.06)	0.085 (0.04)	0.090 (0.07)	0.083 (0.09)	0.112 (0.11)	0.083 (0.09)	0.083 (0.06)	0.093 (0.07)	0.087 (0.11)	0.078 (0.04)	0.829 (0.06)	0.084 (0.06)	0.082 (0.07)	0.161 (0.09)	0.083 (0.09)
$p_t - b_t$		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.056 (0.09)	0.092 (0.11)	0.087 (0.06)	0.079 (0.14)	0.091 (0.07)	0.091 (0.09)	0.085 (0.23)	0.082 (0.06)	0.091 (0.11)	0.080 (0.07)	0.086 (0.09)	0.091 (0.23)	0.046 (0.06)	0.082 (0.14)	0.087 (0.07)	0.082 (0.09)	0.091 (0.11)	0.077 (0.06)	0.086 (0.14)	0.090 (0.07)	0.081 (0.09)	0.083 (0.23)	0.075 (0.06)	0.083 (0.11)	0.153 (0.07)
		$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$
		0.079 (0.07)	0.082 (0.11)	0.084 (0.14)	0.084 (0.09)	0.088 (0.06)	0.086 (0.09)	0.087 (0.07)	0.087 (0.06)	0.088 (0.11)	0.090 (0.23)	0.087 (0.09)	0.086 (0.14)	0.089 (0.07)	0.089 (0.11)	0.078 (0.09)	0.088 (0.09)	0.089 (0.06)	0.074 (0.23)	0.091 (0.07)	0.083 (0.09)	0.796 (0.09)	0.087 (0.11)	0.080 (0.23)	0.089 (0.06)	0.092 (0.07)

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, LRCX, AMAT, KLAC, XLNX, STM, MCHP, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 35: Estimated parameters for KLAC

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.077 (0.14)	0.084 (0.05)	0.079 (0.07)	0.082 (0.20)	0.087 (0.10)	0.084 (0.14)	0.082 (0.05)	0.082 (0.07)	0.082 (0.20)	0.088 (0.10)	0.078 (0.14)	0.090 (0.05)	0.091 (0.07)	0.084 (0.20)	0.081 (0.10)	0.089 (0.14)	0.084 (0.05)	0.082 (0.07)	0.081 (0.20)	0.089 (0.10)	0.084 (0.14)	0.078 (0.05)	0.083 (0.07)	0.084 (0.10)	0.084 (0.10)
		$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$
		0.071 (0.20)	0.922 (0.22)	-0.025 (0.14)	0.103 (0.05)	0.108 (0.07)	0.071 (0.10)	0.086 (0.10)	-0.006 (0.14)	0.084 (0.05)	0.083 (0.07)	0.081 (0.20)	0.088 (0.10)	0.065 (0.14)	0.084 (0.05)	0.076 (0.07)	0.083 (0.20)	0.087 (0.10)	0.022 (0.14)	0.086 (0.05)	0.083 (0.07)	0.771 (0.10)	0.175 (0.20)	0.081 (0.14)	0.101 (0.05)	0.083 (0.07)
$p_t - b_t$		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.093 (0.05)	0.077 (0.09)	0.080 (0.14)	0.082 (0.07)	0.087 (0.20)	0.078 (0.05)	0.077 (0.20)	0.074 (0.14)	0.092 (0.07)	0.079 (0.10)	0.089 (0.05)	0.021 (0.20)	0.090 (0.14)	0.080 (0.07)	0.110 (0.10)	0.075 (0.05)	0.090 (0.20)	0.075 (0.14)	0.076 (0.07)	0.091 (0.10)	0.081 (0.05)	0.075 (0.20)	0.073 (0.14)	0.085 (0.07)	0.076 (0.05)
		$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$
		0.083 (0.07)	0.670 (0.14)	0.086 (0.10)	0.079 (0.05)	0.085 (0.20)	0.079 (0.07)	0.085 (0.14)	0.077 (0.10)	0.085 (0.05)	0.079 (0.20)	0.083 (0.07)	0.090 (0.14)	0.084 (0.10)	0.084 (0.05)	0.081 (0.20)	0.085 (0.07)	0.090 (0.14)	0.082 (0.05)	0.088 (0.20)	0.081 (0.10)	0.795 (0.10)	0.081 (0.14)	0.075 (0.05)	0.087 (0.20)	0.080 (0.10)

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, LRCX, ADI, AMAT, XLNX, STM, MCHP, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 36: Estimated parameters for XLNX

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.079 (0.06)	0.087 (0.10)	0.078 (0.20)	0.082 (0.08)	0.079 (0.11)	0.075 (0.06)	0.080 (0.10)	0.090 (0.20)	0.079 (0.08)	0.090 (0.11)	0.083 (0.06)	0.085 (0.10)	0.081 (0.20)	0.077 (0.08)	0.089 (0.11)	0.089 (0.06)	0.070 (0.10)	0.091 (0.20)	0.077 (0.08)	0.084 (0.11)	0.078 (0.06)	0.084 (0.10)	0.083 (0.08)	0.084 (0.20)	0.087 (0.11)
		$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$
		0.077 (0.11)	0.092 (0.22)	0.077 (0.08)	0.084 (0.20)	0.088 (0.10)	0.160 (0.06)	0.060 (0.11)	-0.006 (0.08)	0.084 (0.20)	0.087 (0.10)	0.089 (0.11)	0.078 (0.06)	0.086 (0.08)	0.077 (0.)	0.087 (0.10)	0.083 (0.06)	0.086 (0.11)	0.077 (0.08)	0.088 (0.20)	0.076 (0.10)	0.789 (0.11)	0.092 (0.06)	0.087 (0.08)	0.088 (0.06)	0.083 (0.10)
$p_t - b_t$		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.078 (0.20)	0.079 (0.06)	0.085 (0.10)	0.084 (0.11)	0.077 (0.20)	0.086 (0.06)	0.080 (0.10)	0.085 (0.08)	0.135 (0.11)	0.077 (0.20)	0.079 (0.10)	0.085 (0.06)	0.065 (0.08)	0.084 (0.11)	0.076 (0.20)	0.091 (0.10)	0.079 (0.06)	0.088 (0.08)	0.085 (0.11)	0.092 (0.05)	0.077 (0.08)	0.090 (0.10)	0.086 (0.08)	0.075 (0.11)	0.087 (0.06)
		$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$
		0.077 (0.10)	0.093 (0.20)	0.088 (0.08)	0.096 (0.11)	0.158 (0.06)	0.081 (0.11)	0.086 (0.10)	0.080 (0.10)	0.078 (0.11)	0.086 (0.08)	0.078 (0.11)	0.090 (0.08)	0.084 (0.06)	0.081 (0.10)	0.077 (0.06)	0.089 (0.11)	0.077 (0.08)	0.088 (0.20)	0.080 (0.06)	0.087 (0.10)	0.790 (0.11)	0.090 (0.08)	0.171 (0.10)	0.080 (0.20)	0.090 (0.06)

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, LRCX, ADI, AMAT, KLAC, STM, MCHP, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 37: Estimated parameters for STM

var																											
$a_t - p_t$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$		
	0.079 (0.08)	0.087 (0.20)	0.078 (0.11)	0.082 (0.21)	0.079 (0.23)	0.075 (0.08)	0.080 (0.20)	0.090 (0.11)	0.079 (0.23)	0.090 (0.21)	0.083 (0.08)	0.085 (0.20)	0.081 (0.11)	0.077 (0.23)	0.089 (0.21)	0.089 (0.08)	0.070 (0.20)	0.091 (0.11)	0.077 (0.23)	0.084 (0.21)	0.078 (0.08)	0.084 (0.20)	0.083 (0.11)	0.084 (0.23)	0.087 (0.08)		
	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$		
	0.077 (0.21)	0.092 (0.08)	0.077 (0.23)	0.087 (0.20)	0.088 (0.21)	0.160 (0.21)	0.060 (0.)	-0.006 (0.20)	0.084 (0.23)	0.087 (0.11)	0.089 (0.08)	0.078 (0.23)	0.086 (0.20)	0.077 (0.23)	0.087 (0.21)	0.083 (0.11)	0.086 (0.08)	0.077 (0.20)	0.088 (0.11)	0.076 (0.23)	0.789 (0.11)	0.092 (0.08)	0.087 (0.20)	0.088 (0.23)	0.083 (0.21)		
$p_t - b_t$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$		
	0.078 (0.11)	0.079 (0.08)	0.085 (0.31)	0.084 (0.31)	0.077 (0.20)	0.08 <sup>6</sup> (0.08)	0.080 (0.08)	0.085 (0.31)	0.135 (0.11)	0.077 (0.20)	0.079 (0.08)	0.085 (0.08)	0.065 (0.23)	0.084 (0.11)	0.076 (0.20)	0.091 (0.08)	0.079 (0.08)	0.088 (0.11)	0.085 (0.31)	0.092 (0.20)	0.077 (0.08)	0.090 (0.08)	0.086 (0.11)	0.075 (0.08)	0.087 (0.20)		
	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$		
	0.077 (0.20)	0.093 (0.11)	0.088 (0.31)	0.084 (0.10)	0.158 (0.21)	0.081 (0.08)	0.086 (0.31)	0.080 (0.31)	0.078 (0.11)	0.086 (0.31)	0.078 (0.20)	0.090 (0.21)	0.084 (0.31)	0.081 (0.08)	0.077 (0.31)	0.089 (0.11)	0.077 (0.20)	0.088 (0.31)	0.080 (0.11)	0.087 (0.08)	0.790 (0.11)	0.090 (0.31)	0.171 (0.20)	0.080 (0.31)	0.087 (0.08)		

Table 38: Estimated parameters for MCHP

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.084 (0.23)	0.083 (0.10)	0.083 (0.20)	0.085 (0.09)	0.011 (0.10)	0.084 (0.23)	0.106 (0.23)	0.078 (0.20)	0.120 (0.04)	0.089 (0.09)	0.087 (0.23)	0.053 (0.10)	0.086 (0.20)	0.091 (0.04))	0.078 (0.09)	0.121 (0.23)	0.109 (0.10)	0.034 (0.20)	0.084 (0.07)	0.163 (0.07)	0.105 (0.23)	0.012 (0.10)	0.115 (0.20)	0.064 (0.07)	0.090 (0.09)
		$\phi_{ab}^{i13}$ (0.04))	$\phi_{aa}^{i14}$ (0.097)	$\phi_{ab}^{i14}$ (0.10)	$\phi_{aa}^{i15}$ (0.09)	$\phi_{ab}^{i15}$ (0.12)	$\phi_{aa}^{i16}$ (0.04))	$\phi_{ab}^{i16}$ (0.23)	$\phi_{aa}^{i17}$ (0.20)	$\phi_{ab}^{i17}$ (0.10)	$\phi_{aa}^{i18}$ (0.092)	$\phi_{ab}^{i18}$ (0.20)	$\phi_{aa}^{i19}$ (0.055)	$\phi_{ab}^{i19}$ (0.20)	$\phi_{aa}^{i20}$ (0.10)	$\phi_{ab}^{i20}$ (0.09)	$\phi_{aa}^{i21}$ (0.092)	$\phi_{ab}^{i21}$ (0.23)	$\phi_{aa}^{i22}$ (0.20)	$\phi_{ab}^{i22}$ (0.09)	$\phi_{aa}^{i23}$ (0.10)	$\phi_{ab}^{i23}$ (0.20)	$\phi_{aa}^{i24}$ (0.124)	$\phi_{ab}^{i24}$ (0.20)	$\phi_{aa}^{i25}$ (0.090)	$\phi_{ab}^{i25}$ (0.04))
$p_t - b_t$		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.081 (0.09)	0.091 (0.20)	0.095 (0.10)	0.083 (0.23)	0.122 (0.07)	0.064 (0.09)	0.123 (0.07)	0.068 (0.10)	0.085 (0.23)	0.093 (0.07)	0.076 (0.20)	0.098 (0.07)	0.086 (0.10)	0.084 (0.23)	0.053 (0.09)	0.144 (0.20)	0.043 (0.07)	0.113 (0.10)	-0.006 (0.23)	0.138 (0.09)	0.040 (0.20)	0.133 (0.10)	0.105 (0.07)	0.074 (0.23)	0.173 (0.07)
		$\phi_{bb}^{i13}$ (0.23)	$\phi_{ba}^{i14}$ (0.10)	$\phi_{bb}^{i14}$ (0.09)	$\phi_{ba}^{i15}$ (0.07)	$\phi_{bb}^{i15}$ (0.20)	$\phi_{ba}^{i16}$ (0.23)	$\phi_{bb}^{i16}$ (0.09)	$\phi_{ba}^{i17}$ (0.10)	$\phi_{bb}^{i17}$ (0.07)	$\phi_{ba}^{i18}$ (0.093)	$\phi_{bb}^{i18}$ (0.23)	$\phi_{ba}^{i19}$ (0.20)	$\phi_{bb}^{i19}$ (0.09)	$\phi_{ba}^{i20}$ (0.10)	$\phi_{bb}^{i20}$ (0.04))	$\phi_{ba}^{i21}$ (0.23)	$\phi_{bb}^{i21}$ (0.20)	$\phi_{ba}^{i22}$ (0.04))	$\phi_{bb}^{i22}$ (0.10)	$\phi_{ba}^{i23}$ (0.07)	$\phi_{bb}^{i23}$ (0.23)	$\phi_{ba}^{i24}$ (0.09)	$\phi_{bb}^{i24}$ (0.20)	$\phi_{ba}^{i25}$ (0.07)	$\phi_{bb}^{i25}$ (0.10)

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, LRCX, ADI, AMAT, KLAC, XLNX, STM, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 39: Estimated parameters for SWKS

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.082 (0.04))	0.086 (0.05)	0.080 (0.08)	0.083 (0.10)	0.083 (0.25)	0.004 (0.04))	0.038 (0.10)	0.084 (0.08)	0.086 (0.25)	0.086 (0.05)	0.080 (0.04))	0.068 (0.10)	0.087 (0.08)	0.087 (0.25)	0.071 (0.05)	0.081 (0.04))	0.083 (0.10)	0.084 (0.08)	0.083 (0.25)	0.082 (0.05)	0.093 (0.04))	0.033 (0.10)	0.083 (0.08)	0.086 (0.05)	0.072 (0.04))
		$\phi_{ab}^{i13}$ (0.05)	$\phi_{aa}^{i14}$ (0.10)	$\phi_{ab}^{i14}$ (0.083)	$\phi_{aa}^{i15}$ (0.08)	0.087 (0.25)	0.083 (0.08)	0.085 (0.10)	0.084 (0.04))	0.094 (0.22)	0.154 (0.25)	0.081 (0.05)	0.086 (0.08)	0.088 (0.04))	0.085 (0.25)	0.085 (0.25)	0.091 (0.05)	0.081 (0.08)	0.090 (0.04))	0.086 (0.10)	0.087 (0.04)	0.785 (0.05)	0.088 (0.08)	0.091 (0.04))	0.081 (0.10)	0.085 (0.05)
$p_t - b_t$		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.092 (0.25)	0.073 (0.08)	0.086 (0.04))	0.082 (0.08)	0.083 (0.05)	0.054 (0.15)	0.001 (0.08)	0.032 (0.04))	0.085 (0.05)	0.096 (0.10)	0.078 (0.25)	0.089 (0.10)	0.086 (0.04))	0.089 (0.11)	0.033 (0.10)	0.079 (0.05)	0.085 (0.08)	-0.006 (0.04))	0.083 (0.08)	0.079 (0.25)	0.084 (0.05)	0.113 (0.05)	0.058 (0.04))	0.083 (0.08)	0.083 (0.10)
		$\phi_{bb}^{i13}$ (0.095)	$\phi_{ba}^{i14}$ (0.083)	$\phi_{bb}^{i14}$ (0.089)	$\phi_{ba}^{i15}$ (0.082)	$\phi_{bb}^{i15}$ (0.082)	$\phi_{ba}^{i16}$ (0.089)	$\phi_{bb}^{i16}$ (0.083)	$\phi_{ba}^{i17}$ (0.089)	$\phi_{bb}^{i17}$ (0.083)	$\phi_{ba}^{i18}$ (0.171)	$\phi_{bb}^{i18}$ (0.098)	$\phi_{ba}^{i19}$ (0.087)	$\phi_{bb}^{i19}$ (0.075)	$\phi_{ba}^{i20}$ (0.088)	$\phi_{bb}^{i20}$ (0.081)	$\phi_{ba}^{i21}$ (0.087)	$\phi_{bb}^{i21}$ (0.089)	$\phi_{ba}^{i22}$ (0.085)	$\phi_{bb}^{i22}$ (0.089)	$\phi_{ba}^{i23}$ (0.086)	$\phi_{bb}^{i23}$ (0.085)	$\phi_{ba}^{i24}$ (0.092)	$\phi_{bb}^{i24}$ (0.090)	$\phi_{ba}^{i25}$ (0.079)	$\phi_{bb}^{i25}$ (0.083)

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, LRCX, ADI, AMAT, KLAC, XLNX, STM, MCHP, CDNS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 40: Estimated parameters for CDNS

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.056 (0.25)	0.079 (0.11)	0.086 (0.16)	0.074 (0.19)	0.084 (0.14)	0.085 (0.11)	0.078 (0.25)	0.080 (0.05)	0.075 (0.16)	0.091 (0.19)	0.086 (0.16)	0.042 (0.25)	0.011 (0.11)	0.083 (0.05)	0.082 (0.19)	0.082 (0.19)	0.086 (0.25)	0.086 (0.16)	0.077 (0.11)	0.085 (0.05)	0.079 (0.05)	0.083 (0.25)	0.086 (0.16)	0.076 (0.05)	0.083 (0.11)
		$\phi_{ab}^{i13}$ (0.16)	$\phi_{aa}^{i14}$ (0.091)	$\phi_{ab}^{i14}$ (0.25)	$\phi_{aa}^{i15}$ (0.083)	$\phi_{ab}^{i15}$ (0.11)	$\phi_{aa}^{i16}$ (0.082)	$\phi_{ab}^{i16}$ (0.092)	$\phi_{aa}^{i17}$ (0.091)	$\phi_{ab}^{i17}$ (0.076)	$\phi_{aa}^{i18}$ (0.080)	$\phi_{ab}^{i18}$ (0.085)	$\phi_{aa}^{i19}$ (0.089)	$\phi_{ab}^{i19}$ (0.082)	$\phi_{aa}^{i20}$ (0.087)	$\phi_{ab}^{i20}$ (0.170)	$\phi_{aa}^{i21}$ (0.069)	$\phi_{ab}^{i21}$ (0.086)	$\phi_{aa}^{i22}$ (0.23)	$\phi_{ab}^{i22}$ (0.081)	$\phi_{aa}^{i23}$ (0.144)	$\phi_{ab}^{i23}$ (0.082)	$\phi_{aa}^{i24}$ (0.0785)	$\phi_{ab}^{i24}$ (0.091)	$\phi_{aa}^{i25}$ (0.085)	$\phi_{ab}^{i25}$ (0.079)
$p_t - b_t$		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.087 (0.25)	0.081 (0.16)	0.080 (0.19)	0.088 (0.09)	0.091 (0.05)	0.071 (0.11)	0.085 (0.25)	0.145 (0.19)	0.083 (0.25)	0.090 (0.05)	0.086 (0.16)	0.080 (0.11)	0.087 (0.25)	0.083 (0.19)	0.082 (0.05)	0.083 (0.16)	0.080 (0.11)	0.084 (0.19)	0.091 (0.25)	0.084 (0.05)	0.073 (0.16)	0.083 (0.11)	0.088 (0.19)	0.089 (0.19)	0.079 (0.25)
		$\phi_{bb}^{i13}$ (0.092)	$\phi_{ba}^{i14}$ (0.085)	$\phi_{bb}^{i14}$ (0.11)	$\phi_{ba}^{i15}$ (0.078)	$\phi_{bb}^{i15}$ (0.089)	$\phi_{ba}^{i16}$ (0.075)	$\phi_{bb}^{i16}$ (0.083)	$\phi_{ba}^{i17}$ (0.089)	$\phi_{bb}^{i17}$ (0.083)	$\phi_{ba}^{i18}$ (0.090)	$\phi_{bb}^{i18}$ (0.082)	$\phi_{ba}^{i19}$ (0.078)	$\phi_{bb}^{i19}$ (0.083)	$\phi_{ba}^{i20}$ (0.087)	$\phi_{bb}^{i20}$ (0.070)	$\phi_{ba}^{i21}$ (0.164)	$\phi_{bb}^{i21}$ (0.061)	$\phi_{ba}^{i22}$ (0.082)	$\phi_{bb}^{i22}$ (0.086)	$\phi_{ba}^{i23}$ (0.077)	$\phi_{bb}^{i23}$ (0.088)	$\phi_{ba}^{i24}$ (0.074)	$\phi_{bb}^{i24}$ (0.090)	$\phi_{ba}^{i25}$ (0.089)	$\phi_{bb}^{i25}$ (0.16)

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, LRCX, ADI, AMAT, KLAC, XLNX, STM, MCHP, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

Table 41: Estimated parameters for MXIM

var																												
$a_t - p_t$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$			
	0.078 (0.19)	0.086 (0.04)	0.075 (0.09)	0.084 (0.15)	0.082 (0.09)	0.095 (0.04)	0.084 (0.19)	0.092 (0.21)	0.075 (0.09)	0.078 (0.15)	0.094 (0.04)	0.098 (0.21)	0.082 (0.19)	0.082 (0.21)	0.082 (0.09)	0.082 (0.04)	0.090 (0.21)	0.089 (0.15)	0.078 (0.19)	0.028 (0.09)	0.079 (0.04)	0.133 (0.21)	0.084 (0.05)	0.089 (0.15)	0.079 (0.19)			
	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$			
	0.086 (0.09)	0.079 (0.21)	0.086 (0.04)	0.061 (0.15)	0.112 (0.19)	0.084 (0.19)	0.082 (0.21)	0.123 (0.04)	0.082 (0.09)	0.083 (0.15)	0.079 (0.19)	0.094 (0.21)	0.083 (0.04)	0.146 (0.15)	0.050 (0.09)	0.062 (0.19)	0.083 (0.21)	0.083 (0.04)	0.078 (0.15)	0.085 (0.09)	0.840 (0.19)	0.122 (0.21)	0.082 (0.04)	0.079 (0.15)	0.081 (0.09)			
	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$			
$p_t - b_t$	0.078 (0.21)	0.087 (0.09)	0.081 (0.19)	0.082 (0.09)	0.086 (0.04)	0.080 (0.21)	0.077 (0.09)	0.091 (0.19)	0.041 (0.15)	0.087 (0.04)	0.085 (0.21)	0.076 (0.09)	0.067 (0.19)	0.088 (0.04)	0.076 (0.15)	0.090 (0.21)	0.056 (0.09)	0.082 (0.19)	0.082 (0.04)	0.172 (0.09)	0.027 (0.21)	0.084 (0.04)	0.086 (0.19)	0.081 (0.09)	0.087 (0.15)			
	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$			
	0.073 (0.19)	0.087 (0.04)	0.084 (0.09)	0.090 (0.04)	0.079 (0.19)	0.087 (0.19)	0.084 (0.21)	0.079 (0.09)	0.086 (0.15)	0.086 (0.19)	0.051 (0.19)	0.080 (0.04)	0.082 (0.21)	0.102 (0.09)	0.139 (0.19)	0.079 (0.19)	0.085 (0.04)	0.091 (0.21)	0.077 (0.15)	0.085 (0.19)	0.785 (0.19)	0.086 (0.04)	0.092 (0.09)	0.089 (0.21)	0.078 (0.19)			

Table 42: Estimated parameters for TER

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.075 (0.04)	0.081 (0.06)	0.087 (0.13)	0.066 (0.13)	0.095 (0.15)	0.079 (0.04)	0.085 (0.15)	0.094 (0.13)	0.086 (0.18)	0.086 (0.15)	0.085 (0.06)	0.093 (0.15)	0.084 (0.18)	0.081 (0.13)	0.090 (0.06)	0.087 (0.04)	0.085 (0.06)	0.081 (0.15)	0.084 (0.18)	0.082 (0.13)	0.095 (0.04)	0.097 (0.06)	0.081 (0.15)	0.090 (0.06)	0.083 (0.04)
		$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$
		0.112 (0.18)	0.083 (0.04)	0.083 (0.06)	0.084 (0.13)	0.087 (0.18)	0.078 (0.04)	0.122 (0.04)	0.092 (0.06)	0.087 (0.13)	0.161 (0.15)	0.050 (0.15)	0.098 (0.04)	0.125 (0.06)	0.084 (0.13)	0.083 (0.15)	0.145 (0.15)	0.097 (0.04)	0.102 (0.06)	0.084 (0.13)	0.084 (0.15)	0.789 (0.16)	0.122 (0.04)	0.092 (0.06)	0.088 (0.13)	0.083 (0.18)
$p_t - b_t$		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.082 (0.06)	0.082 (0.13)	0.082 (0.15)	0.088 (0.04)	0.082 (0.15)	0.090 (0.06)	0.091 (0.13)	0.084 (0.04)	0.081 (0.06)	0.089 (0.18)	0.084 (0.06)	0.082 (0.15)	0.081 (0.13)	0.077 (0.18)	0.084 (0.13)	0.082 (0.06)	0.082 (0.04)	0.087 (0.13)	0.084 (0.18)	0.108 (0.04)	0.071 (0.06)	0.086 (0.15)	0.173 (0.12)	0.084 (0.18)	0.083 (0.15)
		$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$
		0.081 (0.15)	0.088 (0.04)	0.101 (0.13)	0.084 (0.06)	0.090 (0.15)	0.083 (0.13)	0.087 (0.15)	0.144 (0.04)	0.086 (0.06)	0.089 (0.18)	0.084 (0.06)	0.078 (0.13)	0.083 (0.18)	0.084 (0.04)	0.095 (0.15)	0.073 (0.06)	0.164 (0.13)	0.084 (0.04)	0.103 (0.15)	0.083 (0.19)	0.809 (0.06)	0.175 (0.04)	0.081 (0.15)	0.101 (0.13)	0.083 (0.06)

For  $\phi_{\cdot,j}^{i,j}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, LRCX, ADI, AMAT, KLAC, XLNX, STM, MCHP, SWKS, CDNS, MXIM, MRVL, QRVO, ON, OLED$

Table 43: Estimated parameters for MRVL

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.085 (0.06)	0.206 (0.18)	0.093 (0.26)	0.088 (0.07)	0.085 (0.09)	0.081 (0.06)	0.084 (0.18)	0.082 (0.26)	0.095 (0.07)	0.097 (0.09)	0.081 (0.06)	0.085 (0.18)	0.071 (0.07)	0.086 (0.26)	0.080 (0.09)	0.085 (0.06)	0.084 (0.18)	0.081 (0.07)	0.084 (0.26)	0.079 (0.09)	0.084 (0.06)	0.084 (0.18)	0.082 (0.07)	0.122 (0.04)	-0.025 (0.26)
		$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$
		0.090 (0.07)	0.083 (0.09)	0.112 (0.26)	0.083 (0.18)	0.083 (0.06)	0.084 (0.09)	0.087 (0.09)	0.078 (0.26)	0.122 (0.18)	0.084 (0.06)	0.083 (0.07)	0.161 (0.06)	0.083 (0.26)	0.086 (0.18)	0.081 (0.09)	0.071 (0.07)	0.083 (0.06)	0.162 (0.26)	0.098 (0.18)	0.082 (0.09)	0.799 (0.07)	0.091 (0.09)	0.080 (0.26)	0.084 (0.18)	0.083 (0.06)
$p_t - b_t$		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.067 (0.26)	0.085 (0.06)	0.083 (0.07)	0.097 (0.09)	0.923 (0.18)	0.021 (0.26)	0.092 (0.06)	0.116 (0.07)	0.097 (0.09)	0.081 (0.18)	0.088 (0.26)	0.060 (0.07)	0.095 (0.06)	0.084 (0.09)	0.082 (0.18)	0.085 (0.26)	0.080 (0.07)	0.086 (0.06)	0.085 (0.09)	0.093 (0.18)	0.074 (0.26)	0.094 (0.06)	0.095 (0.09)	0.086 (0.07)	0.084 (0.18)
		$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$
		0.072 (0.18)	0.084 (0.26)	0.081 (0.06)	0.093 (0.07)	0.081 (0.26)	0.099 (0.26)	0.094 (0.18)	0.085 (0.06)	0.082 (0.09)	0.090 (0.07)	0.084 (0.09)	0.080 (0.26)	0.081 (0.18)	0.091 (0.09)	0.078 (0.07)	0.084 (0.09)	0.083 (0.26)	0.125 (0.06)	0.164 (0.18)	0.084 (0.07)	0.788 (0.09)	0.082 (0.26)	0.106 (0.06)	0.085 (0.06)	0.089 (0.18)

For  $\phi_{\cdot,j}^{i,j}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, LRCX, ADI, AMAT, KLAC, XLNX, STM, MCHP, SWKS, CDNS, MXIM, TER, QRVO, ON, OLED$

Table 44: Estimated parameters for QRVO

var		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$
$a_t - p_t$		0.067 (0.11)	0.085 (0.10)	0.083 (0.20)	0.097 (0.09)	0.923 (0.04)	0.021 (0.11)	0.092 (0.20)	0.116 (0.10)	0.097 (0.09)	0.081 (0.20)	0.088 (0.11)	0.060 (0.03)	0.095 (0.10)	0.084 (0.09)	0.082 (0.20)	0.085 (0.11)	0.080 (0.32)	0.086 (0.10)	0.085 (0.09)	0.093 (0.20)	0.074 (0.11)	0.094 (0.20)	0.095 (0.10)	0.086 (0.09)	0.084 (0.11)
		$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$
		0.072 (0.20)	0.084 (0.09)	0.081 (0.11)	0.093 (0.10)	0.081 (0.25)	0.099 (0.10)	0.094 (0.09)	0.085 (0.11)	0.082 (0.08)	0.090 (0.21)	0.084 (0.10)	0.080 (0.09)	0.081 (0.11)	0.091 (0.05)	0.078 (0.20)	0.095 (0.20)	0.084 (0.09)	0.125 (0.11)	0.164 (0.20)	0.084 (0.06)	0.788 (0.10)	0.082 (0.09)	0.106 (0.11)	0.085 (0.20)	0.089 (0.20)
$p_t - b_t$		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$
		0.085 (0.10)	0.206 (0.11)	0.093 (0.20)	0.088 (0.09)	0.085 (0.07)	0.081 (0.10)	0.084 (0.11)	0.082 (0.07)	0.095 (0.09)	0.097 (0.20)	0.081 (0.10)	0.085 (0.11)	0.071 (0.07)	0.086 (0.09)	0.080 (0.20)	0.085 (0.10)	0.084 (0.11)	0.081 (0.08)	0.084 (0.09)	0.079 (0.20)	0.084 (0.10)	0.084 (0.11)	0.082 (0.08)	0.122 (0.09)	-0.025 (0.20)
		$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$
		0.090 (0.11)	0.083 (0.09)	0.112 (0.10)	0.083 (0.10)	0.083 (0.11)	0.084 (0.11)	0.087 (0.09)	0.078 (0.10)	0.122 (0.01)	0.084 (0.11)	0.083 (0.11)	0.161 (0.09)	0.083 (0.10)	0.086 (0.20)	0.081 (0.20)	0.084 (0.11)	0.071 (0.09)	0.162 (0.10)	0.098 (0.20)	0.082 (0.24)	0.799 (0.10)	0.091 (0.09)	0.080 (0.11)	0.084 (0.11)	0.083 (0.10)

For  $\phi_{\cdot,j}^{i,j}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, LRCX, ADI, AMAT, KLAC, XLNX, STM, MCHP, SWKS, CDNS, MXIM, TER, MRVL, ON, OLED$

Table 45: Estimated parameters for ON

var																											
$a_t - p_t$		$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$	
		0.083 (0.20)	0.083 (0.14)	0.095 (0.12)	0.083 (0.14)	0.089 (0.05)	0.082 (0.20)	0.082 (0.12)	0.089 (0.05)	0.086 (0.14)	0.087 (0.26)	0.081 (0.20)	0.087 (0.26)	0.089 (0.14)	0.085 (0.05)	0.089 (0.12)	0.086 (0.20)	0.085 (0.)	0.092 (0.26)	0.090 (0.05)	0.084 (0.12)	0.073 (0.20)	0.086 (0.14)	0.082 (0.26)	0.083 (0.05)	0.054 (0.12)	
		$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$	
		0.165 (0.05)	0.032 (0.14)	0.085 (0.12)	0.096 (0.26)	0.078 (0.24)	0.089 (0.14)	0.086 (0.12)	0.089 (0.20)	0.033 (0.26)	0.079 (0.05)	0.085 (0.14)	-0.006 (0.12)	0.089 (0.20)	0.083 (0.26)	0.083 (0.05)	0.088 (0.06)	0.087 (0.14)	0.075 (0.20)	0.088 (0.12)	0.079 (0.05)	0.083 (0.14)	0.165 (0.12)	0.060 (0.20)	0.079 (0.05)	0.125 (0.12)	
$p_t - b_t$		$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$	
		0.033 (0.12)	0.083 (0.26)	0.086 (0.14)	0.072 (0.05)	0.090 (0.04)	0.103 (0.12)	0.083 (0.20)	0.082 (0.14)	0.087 (0.05)	0.083 (0.26)	0.088 (0.12)	0.085 (0.20)	0.085 (0.14)	0.091 (0.09)	0.081 (0.05)	0.090 (0.12)	0.086 (0.20)	0.087 (0.14)	0.078 (0.26)	0.088 (0.05)	0.082 (0.12)	0.086 (0.20)	0.080 (0.14)	0.083 (0.26)	0.083 (0.05)	
		$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$	
		0.004 (0.14)	0.038 (0.26)	0.084 (0.05)	0.086 (0.05)	0.086 (0.20)	0.080 (0.12)	0.068 (0.14)	0.087 (0.26)	0.087 (0.05)	0.071 (0.20)	0.081 (0.12)	0.083 (0.26)	0.085 (0.12)	0.092 (0.04)	0.091 (0.20)	0.083 (0.12)	0.084 (0.26)	0.081 (0.14)	0.086 (0.05)	0.083 (0.20)	0.791 (0.05)	0.093 (0.20)	0.165 (0.14)	0.081 (0.12)	0.085 (0.05)	

Table 46: Estimated parameters for OLED

var																											
$a_t - p_t$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$		
	0.083 (0.26)	0.074 (0.07)	0.089 (0.10)	0.083 (0.28)	0.088 (0.05)	0.074 (0.26)	0.106 (0.10)	0.091 (0.07)	0.089 (0.05)	0.114 (0.28)	0.089 (0.26)	0.116 (0.10)	0.081 (0.05)	0.091 (0.07)	0.085 (0.10)	0.088 (0.26)	0.021 (0.28)	0.173 (0.07)	0.085 (0.05)	0.086 (0.28)	0.077 (0.26)	0.084 (0.07)	0.108 (0.05)	0.064 (0.28)	0.077 (0.10)		
	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$		
	0.084 (0.05)	0.084 (0.26)	0.083 (0.28)	0.075 (0.07)	0.092 (0.05)	0.077 (0.10)	0.088 (0.26)	0.092 (0.28)	0.086 (0.07)	0.064 (0.05)	0.084 (0.10)	0.084 (0.26)	0.075 (0.28)	0.085 (0.07)	0.085 (0.05)	0.067 (0.10)	0.092 (0.26)	0.080 (0.28)	0.087 (0.07)	0.086 (0.05)	0.082 (0.10)	0.115 (0.26)	0.788 (0.05)	0.078 (0.07)	0.083 (0.28)		
	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$		
$p_t - b_t$	0.082 (0.10)	0.088 (0.28)	0.084 (0.26)	0.083 (0.07)	0.087 (0.05)	0.081 (0.07)	0.091 (0.07)	0.041 (0.26)	0.088 (0.10)	0.086 (0.05)	0.090 (0.28)	0.068 (0.10)	0.088 (0.26)	0.077 (0.07)	0.083 (0.05)	0.109 (0.28)	0.083 (0.10)	0.083 (0.26)	0.173 (0.07)	0.028 (0.28)	0.084 (0.10)	0.087 (0.07)	0.082 (0.26)	0.092 (0.28)	0.074 (0.05)		
	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$		
	0.087 (0.07)	0.084 (0.08)	0.091 (0.10)	0.080 (0.05)	0.086 (0.26)	0.084 (0.07)	0.080 (0.08)	0.086 (0.10)	0.087 (0.05)	0.052 (0.26)	0.084 (0.07)	0.081 (0.10)	0.094 (0.08)	0.063 (0.05)	0.090 (0.26)	0.080 (0.07)	0.086 (0.10)	0.092 (0.08)	0.078 (0.05)	0.086 (0.26)	0.079 (0.07)	0.092 (0.10)	0.797 (0.08)	0.079 (0.05)	0.083 (0.26)		

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, ASML, TXN, QCOM, MU, AVGO, NXPI, LRCX, ADI, AMAT, KLAC, XLNX, STM, MCHP, SWKS, CDNS, MXIM, TER, MRVL, QRVO, ON$

Table 47: Estimated parameters for ASML

var																											
$a_t - p_t$	$\phi_{aa}^i$	$\phi_{ab}^i$	$\phi_{aa}^{i2}$	$\phi_{ab}^{i2}$	$\phi_{aa}^{i3}$	$\phi_{ab}^{i3}$	$\phi_{aa}^{i4}$	$\phi_{ab}^{i4}$	$\phi_{aa}^{i5}$	$\phi_{ab}^{i5}$	$\phi_{aa}^{i6}$	$\phi_{ab}^{i6}$	$\phi_{aa}^{i7}$	$\phi_{ab}^{i7}$	$\phi_{aa}^{i8}$	$\phi_{ab}^{i8}$	$\phi_{aa}^{i9}$	$\phi_{ab}^{i9}$	$\phi_{aa}^{i10}$	$\phi_{ab}^{i10}$	$\phi_{aa}^{i11}$	$\phi_{ab}^{i11}$	$\phi_{aa}^{i12}$	$\phi_{ab}^{i12}$	$\phi_{aa}^{i13}$		
	0.080 (0.05)	0.089 (0.11)	0.086 (0.09)	0.082 (0.15)	0.083 (0.09)	0.083 (0.22)	0.082 (0.05)	0.091 (0.11)	0.923 (0.07)	0.140 (0.09)	0.079 (0.22)	0.085 (0.05)	0.134 (0.11)	0.089 (0.08)	0.082 (0.09)	0.083 (0.22)	0.079 (0.09)	0.081 (0.05)	0.084 (0.13)	0.088 (0.09)	0.133 (0.22)	0.145 (0.09)	0.087 (0.11)	0.084 (0.05)	0.083 (0.09)		
	$\phi_{ab}^{i13}$	$\phi_{aa}^{i14}$	$\phi_{ab}^{i14}$	$\phi_{aa}^{i15}$	$\phi_{ab}^{i15}$	$\phi_{aa}^{i16}$	$\phi_{ab}^{i16}$	$\phi_{aa}^{i17}$	$\phi_{ab}^{i17}$	$\phi_{aa}^{i18}$	$\phi_{ab}^{i18}$	$\phi_{aa}^{i19}$	$\phi_{ab}^{i19}$	$\phi_{aa}^{i20}$	$\phi_{ab}^{i20}$	$\phi_{aa}^{i21}$	$\phi_{ab}^{i21}$	$\phi_{aa}^{i22}$	$\phi_{ab}^{i22}$	$\phi_{aa}^{i23}$	$\phi_{ab}^{i23}$	$\phi_{aa}^{i24}$	$\phi_{ab}^{i24}$	$\phi_{aa}^{i25}$	$\phi_{ab}^{i25}$		
	0.154 (0.10)	0.083 (0.08)	0.084 (0.05)	0.082 (0.22)	0.083 (0.06)	0.088 (0.05)	0.088 (0.08)	0.082 (0.06)	0.087 (0.10)	0.078 (0.22)	0.088 (0.22)	0.080 (0.08)	0.088 (0.05)	0.081 (0.06)	0.078 (0.10)	0.088 (0.06)	0.078 (0.08)	0.086 (0.10)	0.075 (0.05)	0.088 (0.06)	0.785 (0.06)	0.090 (0.08)	0.080 (0.10)	0.086 (0.22)	0.077 (0.05)		
$p_t - b_t$	$\phi_{ba}^i$	$\phi_{bb}^i$	$\phi_{ba}^{i2}$	$\phi_{bb}^{i2}$	$\phi_{ba}^{i3}$	$\phi_{bb}^{i3}$	$\phi_{ba}^{i4}$	$\phi_{bb}^{i4}$	$\phi_{ba}^{i5}$	$\phi_{bb}^{i5}$	$\phi_{ba}^{i6}$	$\phi_{bb}^{i6}$	$\phi_{ba}^{i7}$	$\phi_{bb}^{i7}$	$\phi_{ba}^{i8}$	$\phi_{bb}^{i8}$	$\phi_{ba}^{i9}$	$\phi_{bb}^{i9}$	$\phi_{ba}^{i10}$	$\phi_{bb}^{i10}$	$\phi_{ba}^{i11}$	$\phi_{bb}^{i11}$	$\phi_{ba}^{i12}$	$\phi_{bb}^{i12}$	$\phi_{ba}^{i13}$		
	0.078 (0.06)	0.078 (0.05)	0.088 (0.10)	0.079 (0.08)	0.084 (0.10)	0.082 (0.06)	0.082 (0.05)	0.086 (0.10)	0.040 (0.08)	0.863 (0.06)	0.090 (0.10)	0.088 (0.05)	0.075 (0.22)	0.084 (0.08)	0.082 (0.22)	0.082 (0.10)	0.084 (0.05)	0.083 (0.06)	0.074 (0.08)	0.087 (0.06)	0.089 (0.22)	0.084 (0.05)	0.083 (0.06)	0.082 (0.08)	0.086 (0.10)		
	$\phi_{bb}^{i13}$	$\phi_{ba}^{i14}$	$\phi_{bb}^{i14}$	$\phi_{ba}^{i15}$	$\phi_{bb}^{i15}$	$\phi_{ba}^{i16}$	$\phi_{bb}^{i16}$	$\phi_{ba}^{i17}$	$\phi_{bb}^{i17}$	$\phi_{ba}^{i18}$	$\phi_{bb}^{i18}$	$\phi_{ba}^{i19}$	$\phi_{bb}^{i19}$	$\phi_{ba}^{i20}$	$\phi_{bb}^{i20}$	$\phi_{ba}^{i21}$	$\phi_{bb}^{i21}$	$\phi_{ba}^{i22}$	$\phi_{bb}^{i22}$	$\phi_{ba}^{i23}$	$\phi_{bb}^{i23}$	$\phi_{ba}^{i24}$	$\phi_{bb}^{i24}$	$\phi_{ba}^{i25}$	$\phi_{bb}^{i25}$		
	0.083 (0.06)	0.083 (0.22)	0.082 (0.08)	0.083 (0.10)	0.083 (0.05)	0.085 (0.08)	0.086 (0.06)	0.080 (0.10)	0.095 (0.22)	0.084 (0.05)	0.086 (0.05)	0.084 (0.08)	0.079 (0.06)	0.078 (0.10)	0.091 (0.05)	0.078 (0.10)	0.089 (0.05)	0.080 (0.08)	0.080 (0.06)	0.092 (0.22)	0.058 (0.10)	0.087 (0.22)	0.075 (0.05)	0.073 (0.08)	0.083 (0.06)		

For  $\phi_{..}^{ij}$ ,  $i = INTC$  and  $j = TSM, INTC, NVDA, AMD, TXN, QCOM, MU, AVGO, NXPI, LRCX, AMAT, ADI, KLAC, XLNX, STM, MCHP, CDNS, SWKS, MXIM, TER, MRVL, QRVO, ON, OLED$

## Appendix C2

### Estimated GARCH Parameters for SMH and its Underlying Assets

ETF	$\kappa_{pf}^0$	$\kappa_{pf}$	$\kappa_{apf}^0$	$\kappa_{apf}$	$\kappa_{pbf}^0$	$\kappa_{pbf}$	$\tau_0^f$	$\tau_1^f$	$\tau_2^f$	$\tau_3^f$
SMH	-0.471 (0.008)	0.901 (0.025)	0.153 (0.048)	0.760 (0.022)	-0.833 (0.098)	0.767 (0.036)	0.136 (0.008)	0.925 (0.060)	-0.371 (0.025)	0.801 (0.022)
STOCK	$\kappa_p^0$	$\kappa_p$	$\kappa_{ap}^0$	$\kappa_{ap}$	$\kappa_{pb}^0$	$\kappa_{pb}$	$\tau_0$	$\tau_1$	$\tau_2$	$\tau_3$
TSM	-0.441 (0.045)	0.901 (0.003)	-0.657 (0.026)	0.930 (0.059)	-0.447 (0.057)	0.612 (0.027)	-0.541 (0.014)	0.629 (0.041)	-0.121 (0.039)	0.701 (0.15)
INTC	-0.514 (0.039)	0.694 (0.022)	-0.657 (0.044)	0.800 (0.011)	-0.447 (0.021)	0.819 (0.055)	-0.439 (0.056)	0.784 (0.028)	-0.033 (0.003)	0.306 (0.047)
NVDA	-0.404 (0.005)	0.672 (0.002)	-0.427 (0.051)	0.119 (0.013)	-0.587 (0.021)	0.838 (0.015)	-0.152 (0.047)	0.709 (0.037)	-0.229 (0.027)	0.216 (0.017)
AMD	-0.501 (0.026)	0.694 (0.036)	-0.507 (0.026)	0.172 (0.016)	-0.567 (0.0025)	0.156 (0.015)	-0.337 (0.035)	0.896 (0.045)	-0.305 (0.044)	0.266 (0.023)
ASML	-0.321 (0.039)	0.635 (0.057)	-0.387 (0.038)	0.854 (0.019)	-0.437 (0.010)	0.879 (0.029)	-0.010 (0.030)	0.931 (0.020)	-0.341 (0.013)	0.300 (0.024)
TXN	-0.301 (0.016)	0.695 (0.038)	-0.547 (0.049)	0.130 (0.056)	-0.467 (0.18)	0.135 (0.013)	-0.776 (0.015)	0.829 (0.026)	-0.590 (0.011)	0.590 (0.033)
QCOM	-0.321 (0.037)	0.637 (0.045)	-0.547 (0.058)	0.129 (0.005)	-0.487 (0.011)	0.135 (0.028)	0.139 (0.026)	0.519 (0.034)	-0.372 (0.032)	0.524 (0.003)
MU	-0.484 (0.030)	0.632 (0.059)	-0.345 (0.043)	0.091 (0.037)	-0.587 (0.028)	0.088 (0.019)	0.119 (0.028)	0.870 (0.008)	-0.276 (0.002)	0.486 (0.022)
AVGO	-0.241 (0.028)	-0.757 (0.038)	-0.841 (0.036)	0.557 (0.019)	-0.773 (0.032)	0.853 (0.023)	-0.651 (0.045)	0.633 (0.018)	-0.221 (0.026)	0.629 (0.020)
NXPI	-0.341 (0.045)	0.654 (0.022)	-0.506 (0.006)	0.180 (0.018)	-0.577 (0.001)	0.846 (0.004)	-0.273 (0.008)	0.898 (0.043)	0.023 (0.028)	0.043 (0.017)
LRCX	-0.504 (0.009)	0.622 (0.006)	-0.467 (0.003)	0.859 (0.023)	-0.597 (0.031)	0.836 (0.004)	-0.398 (0.034)	0.173 (0.021)	-0.593 (0.027)	0.413 (0.035)
AMAT	-0.56 (0.056)	0.672 (0.003)	-0.487 (0.021)	0.153 (0.001)	-0.657 (0.036)	0.841 (0.023)	-0.711 (0.034)	0.783 (0.005)	-0.162 (0.007)	0.627 (0.027)
ADI	-0.160 (0.059)	-0.677 (0.029)	-0.876 (0.016)	0.441 (0.030)	-0.521 (0.002)	0.675 (0.033)	-0.235 (0.022)	0.654 (0.014)	-0.410 (0.017)	0.606 (0.023)
KLAC	-0.451 (0.051)	0.676 (0.031)	-0.502 (0.057)	0.862 (0.039)	-0.566 (0.032)	0.179 (0.005)	-0.238 (0.001)	0.746 (0.033)	-0.521 (0.044)	0.275 (0.047)
XLNX	-0.218 (0.021)	-0.356 (0.011)	-0.637 (0.002)	0.858 (0.005)	-0.565 (0.009)	0.068 (0.007)	-0.697 (0.004)	0.815 (0.002)	-0.587 (0.023)	0.151 (0.057)
STM	-0.134 (0.034)	-0.084 (0.013)	-0.384 (0.009)	0.665 (0.003)	-0.346 (0.038)	0.798 (0.031)	-0.134 (0.057)	0.569 (0.002)	-0.439 (0.039)	0.184 (0.002)
MCHP	-0.308 (0.002)	0.664 (0.034)	-0.267 (0.003)	0.155 (0.13)	-0.657 (0.045)	0.174 (0.023)	-0.488 (0.039)	0.864 (0.009)	-0.396 (0.004)	0.612 (0.002)
CDNS	-0.304 (0.020)	-0.578 (0.043)	-0.823 (0.056)	0.394 (0.012)	0.128 (0.030)	0.652 (0.039)	-0.264 (0.010)	0.877 (0.003)	-0.592 (0.009)	0.497 (0.057)
SWKS	-0.240 (0.001)	0.658 (0.011)	-0.577 (0.023)	0.149 (0.032)	-0.507 (0.002)	0.145 (0.008)	-0.174 (0.050)	0.706 (0.005)	-0.350 (0.040)	0.304 (0.004)
MXIM	-0.216 (0.017)	0.639 (0.047)	-0.467 (0.005)	0.150 (0.002)	-0.507 (0.001)	0.166 (0.043)	0.083 (0.034)	0.921 (0.056)	-0.015 (0.050)	0.926 (0.019)
TER	-0.576 (0.003)	0.675 (0.056)	-0.450 (0.027)	0.129 (0.30)	-0.767 (0.040)	0.129 (0.029)	-0.451 (0.009)	0.977 (0.031)	-0.545 (0.001)	0.550 (0.004)
MRVL	-0.346 (0.006)	0.631 (0.002)	-0.605 (0.004)	0.109 (0.58)	-0.374 (0.029)	0.115 (0.049)	-0.222 (0.057)	.963 (0.021)	-0.186 (0.029)	0.340 (0.030)
ON	-0.684 (0.023)	0.669 (0.010)	-0.587 (0.034)	0.088 (0.043)	-0.345 (0.045)	0.593 (0.021)	-0.269 (0.019)	0.970 (0.023)	-0.576 (0.011)	0.664 (0.033)
OLED	-0.304 (0.045)	0.629 (0.032)	-0.588 (0.049)	0.879 (0.030)	-0.804 (0.029)	0.183 (0.019)	-0.094 (0.015)	0.819 (0.035)	-0.089 (0.040)	0.180 (0.056)

Appendix D1

Table 1: Estimated Correlation Coefficients for DIA and its Underlying Assets

	$\epsilon_m^1$	$\epsilon_p^1$	$\epsilon_a^1$	$\epsilon_b^1$	$\epsilon_m^2$	$\epsilon_p^2$	$\epsilon_a^2$	$\epsilon_b^2$	$\epsilon_m^3$	$\epsilon_p^3$	$\epsilon_a^3$	$\epsilon_b^3$	$\epsilon_m^4$	$\epsilon_p^4$	$\epsilon_a^4$	$\epsilon_b^4$	$\epsilon_m^5$	$\epsilon_p^5$	$\epsilon_a^5$	$\epsilon_b^5$	$\epsilon_m^6$	$\epsilon_p^6$	$\epsilon_a^6$	$\epsilon_b^6$	$\epsilon_m^7$	$\epsilon_p^7$	$\epsilon_a^7$	$\epsilon_b^7$	$\epsilon_m^8$	$\epsilon_p^8$	$\epsilon_a^8$	$\epsilon_b^8$	
$\epsilon_m^1$	1																																
$\epsilon_p^1$	-0.49	1																															
$\epsilon_a^1$	-0.43	0.23	1																														
$\epsilon_b^1$	-0.34	0.26		1																													
$\epsilon_m^2$	0.87				1																												
$\epsilon_p^2$	-0.34				-0.33	1																											
$\epsilon_a^2$					-0.45	0.22	1																										
$\epsilon_b^2$					-0.41	-0.39	0.24	1																									
$\epsilon_m^3$	0.48				0.45				1																								
$\epsilon_p^3$	-0.47				-0.15				-0.23	1																							
$\epsilon_a^3$									-0.46	0.28	1																						
$\epsilon_b^3$									-0.43	0.22		1																					
$\epsilon_m^4$	0.65				0.56				0.40				1																				
$\epsilon_p^4$	-0.47				-0.36				-0.21				-0.30	1																			
$\epsilon_a^4$													-0.44	0.23	1																		
$\epsilon_b^4$													-0.48	0.25		1																	
$\epsilon_m^5$	0.36				0.53				0.31				0.42				1																
$\epsilon_p^5$	-0.33				-0.26				-0.42				-0.32				-0.43	1															
$\epsilon_a^5$																	-0.38	0.21	1														
$\epsilon_b^5$																	-0.42	0.17		1													
$\epsilon_m^6$	0.56				0.49				0.38				0.21				0.30				1												
$\epsilon_p^6$	-0.52				-0.37				-0.43				-0.32				-0.50				-0.43	1											
$\epsilon_a^6$																				-0.45	0.32	1											
$\epsilon_b^6$																				-0.50	0.27		1										
$\epsilon_m^7$	0.23				0.46				0.54				0.45				0.38			0.42					1								
$\epsilon_p^7$	-0.43				-0.32				-0.43				-0.36				-0.51			-0.29				-0.37	1								
$\epsilon_a^7$																							-0.49	0.19	1								
$\epsilon_b^7$																							-0.308	0.11		1							
$\epsilon_m^8$	0.39				0.55				0.27				0.43				0.45			0.11			0.28				1						
$\epsilon_p^8$	-0.32				-0.22				-0.35				-0.43				-0.39			-0.43			-0.54				-0.46	1					
$\epsilon_a^8$																											-0.41	0.23	1				
$\epsilon_b^8$																											-0.57	0.21			1		



Table 2: Continued

	$\epsilon_m^9$	$\epsilon_p^9$	$\epsilon_a^9$	$\epsilon_b^9$	$\epsilon_m^{10}$	$\epsilon_p^{10}$	$\epsilon_a^{10}$	$\epsilon_b^{10}$	$\epsilon_m^{11}$	$\epsilon_p^{11}$	$\epsilon_a^{11}$	$\epsilon_b^{11}$	$\epsilon_m^{12}$	$\epsilon_p^{12}$	$\epsilon_a^{12}$	$\epsilon_b^{12}$	$\epsilon_m^{13}$	$\epsilon_p^{13}$	$\epsilon_a^{13}$	$\epsilon_b^{13}$	$\epsilon_m^{14}$	$\epsilon_p^{14}$	$\epsilon_a^{14}$	$\epsilon_b^{14}$	$\epsilon_m^{15}$	$\epsilon_p^{15}$	$\epsilon_a^{15}$	$\epsilon_b^{15}$	$\epsilon_m^{16}$	$\epsilon_p^{16}$	$\epsilon_a^{16}$	$\epsilon_b^{16}$
$\epsilon_m^9$	1																															
$\epsilon_p^9$	-0.25	1																														
$\epsilon_a^9$	-0.46	0.321	1																													
$\epsilon_b^9$	-0.47	0.11		1																												
$\epsilon_m^{10}$	0.50				1																											
$\epsilon_p^{10}$	-0.27				-0.43	1																										
$\epsilon_a^{10}$					-0.32	0.11	1																									
$\epsilon_b^{10}$					-0.46	0.28		1																								
$\epsilon_m^{11}$	0.25				0.34				1																							
$\epsilon_p^{11}$	-0.32				-0.21				-0.26	1																						
$\epsilon_a^{11}$									-0.48	0.18	1																					
$\epsilon_b^{11}$									-0.54	0.27		1																				
$\epsilon_m^{12}$	0.45				0.52				0.38				1																			
$\epsilon_p^{12}$	-0.32				-0.33				-0.21				-0.35	1																		
$\epsilon_a^{12}$													-0.435	0.215	1																	
$\epsilon_b^{12}$													-0.354	0.178		1																
$\epsilon_m^{13}$	0.57				0.65				0.55				0.65				1															
$\epsilon_p^{13}$	-0.35				-0.42				-0.21				-0.34				-0.35	1														
$\epsilon_a^{13}$																	-0.476	0.321	1													
$\epsilon_b^{13}$																	-0.547	0.301		1												
$\epsilon_m^{14}$	0.36				0.47				0.29				0.41				0.38				1											
$\epsilon_p^{14}$	-0.32				-0.34				-0.45				-0.33				-0.43				-0.32	1										
$\epsilon_a^{14}$																					-0.43	0.12	1									
$\epsilon_b^{14}$																					-0.45	0.20		1								
$\epsilon_m^{15}$	0.43				0.49				0.30				0.42				0.46				0.36				1							
$\epsilon_p^{15}$	-0.27				-0.45				-0.38				-0.27				-0.29				-0.12				-0.22	1						
$\epsilon_a^{15}$																								-0.453	0.101	1						
$\epsilon_b^{15}$																								-4.76	0.332		1					
$\epsilon_m^{16}$	0.45				0.31				0.23				0.49				0.34				0.45				0.39					1		
$\epsilon_p^{16}$	-0.26				-0.31				-0.22				-0.43				-0.36				-0.19				-0.43					-0.27	1	
$\epsilon_a^{16}$																													-0.543	0.275	1	
$\epsilon_b^{16}$																													-0.412	0.212		1

Table 3: Continued

	$\epsilon_m^{17}$	$\epsilon_p^{17}$	$\epsilon_a^{17}$	$\epsilon_b^{17}$	$\epsilon_m^{18}$	$\epsilon_p^{18}$	$\epsilon_a^{18}$	$\epsilon_b^{18}$	$\epsilon_m^{19}$	$\epsilon_p^{19}$	$\epsilon_a^{19}$	$\epsilon_b^{19}$	$\epsilon_m^{20}$	$\epsilon_p^{20}$	$\epsilon_a^{20}$	$\epsilon_b^{20}$	$\epsilon_m^{21}$	$\epsilon_p^{21}$	$\epsilon_a^{21}$	$\epsilon_b^{21}$	$\epsilon_m^{22}$	$\epsilon_p^{22}$	$\epsilon_a^{22}$	$\epsilon_b^{22}$	$\epsilon_m^{23}$	$\epsilon_p^{23}$	$\epsilon_a^{23}$	$\epsilon_b^{23}$	$\epsilon_m^{24}$	$\epsilon_p^{24}$	$\epsilon_a^{24}$	$\epsilon_b^{24}$	
$\epsilon_m^{17}$	1																																
$\epsilon_p^{17}$	-0.206	1																															
$\epsilon_a^{17}$	-0.396	0.210	1																														
$\epsilon_b^{17}$	-0.333	0.198		1																													
$\epsilon_m^{18}$	0.703				1																												
$\epsilon_p^{18}$	-0.366				-0.482	1																											
$\epsilon_a^{18}$					-0.343	0.246	1																										
$\epsilon_b^{18}$					-0.289	0.186		1																									
$\epsilon_m^{19}$	0.659				0.743				1																								
$\epsilon_p^{19}$	-0.217				-0.422				-0.229	1																							
$\epsilon_a^{19}$									-0.216	0.206	1																						
$\epsilon_b^{19}$									-0.300	0.199		1																					
$\epsilon_m^{20}$	0.802				0.653				0.587				1																				
$\epsilon_p^{20}$	-0.209				-0.212				-0.187				-0.149	1																			
$\epsilon_a^{20}$													-0.345	0.249	1																		
$\epsilon_b^{20}$													-0.401	0.222		1																	
$\epsilon_m^{21}$	0.701				0.811				0.532				0.598				1																
$\epsilon_p^{21}$	-0.290				-0.318				-0.235				-0.189				-0.208	1															
$\epsilon_a^{21}$																	-0.254	0.107	1														
$\epsilon_b^{21}$																	-0.432	0.226		1													
$\epsilon_m^{22}$	0.765				0.465				0.632				0.611				0.540				1												
$\epsilon_p^{22}$	-0.220				-0.298				-0.309				-0.216				-0.327				-0.375	1											
$\epsilon_a^{22}$																					-0.342	0.188	1										
$\epsilon_b^{22}$																					-0.410	0.201		1									
$\epsilon_m^{23}$	0.765				0.496				0.456				0.666				0.253				0.453				1								
$\epsilon_p^{23}$	-0.236				-0.284				-0.243				-0.342				-0.207				-0.217				-0.198	1							
$\epsilon_a^{23}$																									-0.401	0.231	1						
$\epsilon_b^{23}$																									-0.348	0.198		1					
$\epsilon_m^{24}$	0.543				0.627				0.499				0.437				0.654				0.498				0.675				1				
$\epsilon_p^{24}$	-0.178				-0.186				-0.342				-0.208				-0.243				-0.165				-0.284				-0.253	1			
$\epsilon_a^{24}$																													-0.364	0.211	1		
$\epsilon_b^{24}$																													-0.386	0.189		1	

Table 4: Continued

	$\epsilon_m^{25}$	$\epsilon_p^{25}$	$\epsilon_a^{25}$	$\epsilon_b^{25}$	$\epsilon_m^{26}$	$\epsilon_p^{26}$	$\epsilon_a^{26}$	$\epsilon_b^{26}$	$\epsilon_m^{27}$	$\epsilon_p^{27}$	$\epsilon_a^{27}$	$\epsilon_b^{27}$	$\epsilon_m^{28}$	$\epsilon_p^{28}$	$\epsilon_a^{28}$	$\epsilon_b^{28}$	$\epsilon_m^{29}$	$\epsilon_p^{29}$	$\epsilon_a^{29}$	$\epsilon_b^{29}$	$\epsilon_m^{30}$	$\epsilon_p^{30}$	$\epsilon_a^{30}$	$\epsilon_b^{30}$	$\epsilon_\nu$	$\epsilon_p^f$	$\epsilon_a^f$	$\epsilon_b^f$
$\epsilon_m^{25}$	1																											
$\epsilon_p^{25}$	-0.38	1																										
$\epsilon_a^{25}$	-0.49	0.27	1																									
$\epsilon_b^{25}$	-0.33	0.38		1																								
$\epsilon_m^{26}$	0.23				1																							
$\epsilon_p^{26}$	-0.36				-0.18	1																						
$\epsilon_a^{26}$					-0.44	0.14	1																					
$\epsilon_b^{26}$					-0.39	0.28		1																				
$\epsilon_m^{27}$	0.39				0.43				1																			
$\epsilon_p^{27}$	-0.24				-0.32				-0.39	1																		
$\epsilon_a^{27}$									-0.26	0.23	1																	
$\epsilon_b^{27}$									-0.35	0.25		1																
$\epsilon_m^{28}$	0.54				0.44				0.42				1															
$\epsilon_p^{28}$	-0.23				-0.25				-0.32				-0.23	1														
$\epsilon_a^{28}$													-0.42	0.24	1													
$\epsilon_b^{28}$													-0.29	0.21		1												
$\epsilon_m^{29}$	0.45				0.43				0.54				0.50				1											
$\epsilon_p^{29}$	-0.25				-0.34				-0.35				-0.18				-0.30	1										
$\epsilon_a^{29}$																	-0.43	0.23	1									
$\epsilon_b^{29}$																	-0.34	0.12		1								
$\epsilon_m^{30}$	0.39				0.46				0.56				0.34				0.53				1							
$\epsilon_p^{30}$	-0.24				-0.30				-0.28				-0.27				-0.24				-0.22	1						
$\epsilon_a^{30}$																					-0.45	0.28	1					
$\epsilon_b^{30}$																					-0.30	0.16		1				
$\epsilon_\nu$	0.36				0.48				0.23				0.47				0.25				0.39				1			
$\epsilon_p^f$																									-0.45	1		
$\epsilon_a^f$																									-0.32	0.32	1	
$\epsilon_b^f$																									-0.38	0.21		1

Table 5: Continued

	$\epsilon_m^1$	$\epsilon_m^2$	$\epsilon_m^3$	$\epsilon_m^4$	$\epsilon_m^5$	$\epsilon_m^6$	$\epsilon_m^7$	$\epsilon_m^8$	$\epsilon_m^9$	$\epsilon_m^{10}$	$\epsilon_m^{11}$	$\epsilon_m^{12}$	$\epsilon_m^{13}$	$\epsilon_m^{14}$	$\epsilon_m^{15}$	$\epsilon_m^{16}$	$\epsilon_m^{17}$	$\epsilon_m^{18}$	$\epsilon_m^{19}$	$\epsilon_m^{20}$	$\epsilon_m^{21}$	$\epsilon_m^{22}$	$\epsilon_m^{23}$	$\epsilon_m^{24}$	$\epsilon_m^{25}$	$\epsilon_m^{26}$	$\epsilon_m^{27}$	$\epsilon_m^{28}$	$\epsilon_m^{29}$	$\epsilon_m^{30}$	$\epsilon_\nu$
$\epsilon_m^9$	0.46	0.34	0.46	0.26	0.54	0.28	0.38	0.30	0.34	0.42	0.37	0.19	0.58	0.24	0.19	0.29	0.49	0.46	0.37	0.46	0.40	0.35	0.29	0.36	0.42	0.37	0.33	0.56	0.45	0.40	0.87
$\epsilon_p^9$	-0.20	-0.45	-0.29	-0.26	-0.18	-0.12	-0.11	-0.23	-0.23	-0.29	-0.34	0.35	-0.22	0.25	-0.23	-0.46	-0.19	-0.37	-0.37	-0.30	-0.23	-0.22	-0.19	-0.32	-0.25	-0.32	-0.22	-0.38	-0.32	-0.23	-0.34
$\epsilon_m^{10}$	0.36	0.43	0.22	0.35	0.44	0.37	0.21	0.33	0.46	0.39	0.29	0.31	0.60	0.25	0.28	0.34	0.53	0.33	0.27	0.39	0.42	0.42	0.47	0.26	0.42	0.44	0.18	0.12	0.55	0.11	0.15
$\epsilon_p^{10}$	-0.31	-0.48	-0.22	-0.33	-0.28	-0.32	-0.43	-0.21	-0.24	-0.27	-0.12	-0.38	-0.19	-0.39	-0.27	-0.36	-0.23	-0.41	-0.11	-0.31	-0.34	-0.49	-0.35	-0.29	-0.21	-0.19	-0.14	-0.22	-0.23	-0.27	-0.30
$\epsilon_m^{11}$	0.51	0.24	0.39	0.19	0.54	0.22	0.15	0.29	0.62	0.36	0.33	0.15	0.54	0.23	0.31	0.22	0.36	0.37	0.12	0.32	0.25	0.11	0.28	0.34	0.52	0.43	0.26	0.24	0.42	0.29	0.38
$\epsilon_p^{11}$	-0.35	-0.11	-0.38	-0.24	-0.31	-0.29	-0.19	-0.27	-0.25	-0.22	-0.12	-0.18	-0.21	-0.39	-0.27	0-0.15	-0.35	-0.36	-0.28	-0.19	-0.26	-0.28	-0.39	-0.37	-0.28	-0.23	-0.17	-0.22	-0.26	-0.13	-0.33
$\epsilon_m^{12}$	0.46	0.18	0.32	0.23	0.40	0.11	0.45	0.37	0.42	0.28	0.41	0.37	0.18	0.38	0.20	0.15	0.36	0.43	0.49	0.35	0.65	0.29	0.21	0.24	0.43	0.28	0.39	0.33	0.46	0.13	0.22
$\epsilon_p^{12}$	-0.25	-0.43	-0.42	-0.38	-0.21	-0.49	-0.15	-0.38	-0.27	-0.27	-0.12	-0.38	-0.26	-0.35	-0.47	-0.33	-0.27	-0.23	-0.32	-0.44	-0.36	-0.18	-0.28	-0.37	-0.27	-0.11	-0.47	-0.42	-0.29	-0.49	-0.32
$\epsilon_m^{13}$	0.55	0.42	0.44	0.25	0.49	0.33	0.21	0.18	0.36	0.27	0.29	0.42	0.33	0.23	0.35	0.25	0.43	0.19	0.39	0.26	0.50	0.11	0.43	0.48	0.43	0.24	0.14	0.16	0.42	0.17	0.38
$\epsilon_p^{13}$	-0.25	-0.22	-0.38	-0.17	-0.21	-0.39	-0.42	-0.28	-0.24	-0.32	-0.42	-0.18	-0.29	-0.46	-0.47	-0.26	-0.24	-0.21	-0.32	-0.38	-0.27	0.31	-0.11	-0.29	-0.26	-0.47	-0.13	-0.38	-0.25	-0.33	-0.23
$\epsilon_m^{14}$	0.66	0.34	0.52	0.28	0.43	0.45	0.53	0.41	0.54	0.33	0.52	0.43	0.42	0.36	0.58	0.60	0.35	0.43	0.42	0.45	0.49	0.49	0.36	0.46	0.38	0.47	0.52	0.34	0.28	0.38	0.35
$\epsilon_p^{14}$	-0.11	-0.23	-0.32	-0.29	-0.37	-0.25	-0.23	-0.35	-0.22	-0.23	-0.08	-0.24	-0.21	-0.09	-0.12	-0.23	-0.39	-0.29	-0.23	-0.27	-0.19	-0.23	-0.34	-0.30	-0.16	-0.26	-0.21	-0.26	-0.25	-0.27	-0.21
$\epsilon_m^{15}$	0.54	0.36	0.33	0.19	0.47	0.28	0.27	0.46	0.42	0.36	0.29	0.39	0.52	0.24	0.23	0.27	0.31	0.21	0.30	0.20	0.40	0.33	0.35	0.41	0.52	0.45	0.28	0.32	0.45	0.25	0.22
$\epsilon_p^{15}$	-0.25	-0.46	-0.36	-0.21	-0.38	-0.35	-0.41	-0.46	-0.24	-0.34	-0.39	-0.29	-0.31	-0.36	-0.28	-0.22	-0.28	-0.20	-0.23	-0.33	-0.24	-0.27	-0.25	-0.37	-0.46	-0.23	-0.21	-0.35	-0.34	-0.28	-0.19
$\epsilon_m^{16}$	0.42	0.44	0.27	0.24	0.33	0.35	0.41	0.26	0.43	0.36	0.29	0.22	0.47	0.31	0.47	0.27	0.46	0.37	0.32	0.24	0.35	0.21	0.39	0.32	0.45	0.38	0.28	0.25	0.35	0.33	0.29
$\epsilon_p^{16}$	-0.35	-0.12	-0.18	-0.43	-0.31	-0.47	-0.19	-0.13	-0.32	-0.35	-0.46	-0.41	-0.21	-0.45	-0.28	-0.25	-0.23	-0.27	-0.29	-0.22	-0.24	-0.34	-0.39	-0.38	-0.26	-0.33	-0.36	-0.22	-0.21	-0.28	-0.21
$\epsilon_m^{17}$	0.45	0.26	0.36	0.35	0.37	0.25	0.45	0.34	0.48	0.33	0.39	0.31	42	0.24	0.47	0.43	0.46	0.21	0.39	0.28	0.45	0.26	0.29	0.27	0.23	0.33	0.32	0.37	0.36	0.22	0.37
$\epsilon_p^{17}$	-0.15	-0.41	-0.22	-0.44	-0.38	-0.49	-0.45	-0.28	-0.24	-0.32	-0.17	-0.25	-0.35	-0.38	-0.36	-0.26	-0.13	-0.22	-0.31	-0.27	-0.23	-0.29	-0.21	-0.34	-0.25	-0.31	-0.21	-0.33	-0.24	-0.26	-0.23
$\epsilon_m^{18}$	0.45	0.47	0.18	0.29	0.43	0.39	0.33	0.22	0.46	0.26	0.36	0.34	0.32	0.23	0.42	0.47	0.46	0.35	0.34	0.31	0.40	0.29	0.27	0.41	0.38	0.34	0.33	0.21	0.28	0.23	0.35
$\epsilon_p^{18}$	-0.25	-0.45	-0.35	-0.48	-0.21	-0.17	-0.39	-0.47	-0.26	-0.22	-0.17	-0.37	-0.23	-0.25	-0.44	-0.42	-0.14	-0.28	-0.31	-0.37	-0.22	-0.33	-0.28	-0.26	-0.16	-0.24	-0.42	-0.34	-0.19	-0.24	-0.29
$\epsilon_m^{19}$	0.35	0.48	0.12	0.25	0.43	0.37	0.16	0.21	0.32	0.41	0.11	0.17	0.36	0.47	0.22	0.17	0.46	0.23	0.34	0.28	0.45	0.21	0.47	0.44	0.52	0.28	0.22	0.27	0.35	0.33	0.39
$\epsilon_p^{19}$	-0.32	-0.48	-0.42	-0.46	-0.24	-0.23	-0.19	-0.33	-0.27	-0.15	-0.17	-0.26	-0.28	-0.39	-0.21	-0.48	-0.23	-0.47	-0.22	-0.33	-0.27	-0.35	-0.28	-0.24	-0.26	-0.35	-0.21	-0.38	-0.22	-0.19	-0.26
$\epsilon_m^{20}$	0.42	0.12	0.47	0.16	0.45	0.13	0.43	0.24	0.41	0.23	0.15	0.49	0.42	0.26	0.41	0.41	0.25	0.21	0.36	0.29	0.37	0.46	0.22	0.15	0.43	0.38	0.23	0.17	0.13	0.45	0.43
$\epsilon_p^{20}$	-0.26	0.16	-0.28	-0.13	-0.24	-0.45	-0.41	-0.11	-0.29	-0.21	-0.32	-0.25	-0.27	-0.44	-0.49	-0.19	-0.22	-0.24	-0.17	-0.13	-0.26	-0.27	-0.33	-0.37	-0.23	-0.28	-0.41	-0.43	-0.28	-0.28	-0.15
$\epsilon_m^{21}$	0.55	0.12	0.33	0.22	0.34	0.25	0.39	0.43	0.52	0.49	0.15	0.26	0.44	0.34	0.12	0.14	0.36	0.46	0.34	0.25	0.42	0.27	0.43	0.31	0.43	0.38	0.21	0.33	0.47	0.45	0.33
$\epsilon_p^{21}$	-0.35	-0.46	-0.33	-0.44	-0.11	-0.43	-0.17	-0.26	-0.13	-0.48	-0.21	-0.28	-0.13	-0.22	-0.45	-0.17	-0.15	-0.24	-0.31	-0.37	-0.23	-0.47	-0.43	-0.35	-0.12	-0.26	-0.14	-0.32	-0.19	-0.26	-0.21
$\epsilon_m^{22}$	0.41	0.46	0.18	0.36	0.42	0.22	0.44	0.21	0.40	0.25	0.37	0.34	56	0.41	0.21	0.49	0.46	0.42	0.13	0.36	0.51	0.29	0.17	0.35	0.42	0.26	0.17	0.35	0.40	0.47	0.39
$\epsilon_p^{22}$	-0.26	-0.47	-0.19	-0.14	-0.28	-0.46	-0.44	-0.48	-0.29	-0.23	-0.29	-0.15	-0.25	-0.11	-0.48	-0.27	-0.23	-0.28	-0.17	-0.31	-0.32	-0.22	-0.46	-0.23	-0.28	-0.13	-0.34	-0.28	-0.20	-0.17	-0.19
$\epsilon_m^{23}$	0.36	0.33	0.21	0.37	0.63	0.26	0.15	0.43	0.46	0.49	0.35	0.33	0.48	0.31	0.41	0.11	0.43	0.22	0.44	0.47	0.42	0.28	0.37	0.21	0.38	0.15	0.26	0.33	0.42	0.45	0.29
$\epsilon_p^{23}$	-0.22	-0.43	-0.13	-0.37	-0.21	-0.26	-0.39	-0.29	-0.20	-0.34	-0.22	-0.11	-0.19	-0.46	-0.42	-0.38	-0.14	-0.37	-0.26	-0.35	-0.31	-0.16	-0.27	-0.48	-0.24	-0.13	-0.44	-0.43	-0.15	-0.32	-0.21
$\epsilon_m^{24}$	0.44	0.48	0.47	0.15	0.37	0.33	0.36	0.18	0.38	0.16	0.31	0.42	0.22	0.49	0.34	0.24	0.63	0.22	0.41	0.29	0.32	0.21	0.49	0.47	0.28	0.27	0.35	0.11	0.31	0.24	0.41
$\epsilon_p^{24}$	-0.19	-0.31	-0.39	-0.14	-0.29	-0.23	-0.11	-0.46	-0.27	-0.17	-0.22	-0.45	-0.39	-0.21	-0.14	-0.33	-0.24	-0.26	-0.31	-0.44	-0.35	-0.41	-0.47	-0.13	-0.24	-0.32	-0.45	-0.19	-0.33	-0.21	-0.22
$\epsilon_m^{25}$	0.44	0.17	0.41	0.38	0.37	0.25	0.19	0.21	0.38	0.33	0.24	0.49	0.22	0.32	0.18	0.27	0.63	0.32	0.21	0.41	0.32	0.45	0.35	0.38	0.28	0.29	0.22	0.31	0.31	0.28	0.47
$\epsilon_p^{25}$	-0.19	-0.22	-0.43	-0.23	-0.29	-0.21	-0.41	-0.17	-0.27	-0.31	-0.45	-0.35	-0.39	-0.32	-0.34	-0.29	-0.24	-0.19	-0.31	-0.33	-0.35	-0.11	-0.47	-0.22	-0.24	0.17	0.22	0.17	-0.33	-0.21	-0.32
$\epsilon_m^{26}$	0.44	0.26	0.27	0.29	0.37	0.39	0.23	0.22	0.38	0.16	0.18	0.38	0.22	0.35	0.36	0.47	0.63	0.43	0.27	0.22	0.32	0.47	0.16	0.11	0.28	0.42	0.34	0.28	0.31	0.31	0.44
$\epsilon_p^{26}$	-0.19	-0.18	-0.48	-0.19	-0.29	-0.49	-0.26	-0.12	-0.27	-0.31	-0.36	-0.37	-0.39	-0.32	-0.35	-0.46	-0.24	-0.12	-0.39	-0.29	-0.35	-0.34	-0.21	-0.44	-0.24	-0.11	-0.23	-0.17	-0.33	-0.32	-0.29
$\epsilon_m^{27}$	0.44	0.29	0.39	0.35	0.37	0.47	0.44	0.47	0.38	0.24	0.13	0.41	0.22	0.39	0.43	0.38	0.63	0.37	0.32	0.18	0.32	0.22	0.38	0.19	0.28	0.14	0.31	0.41	0.31	0.32	0.29
$\epsilon_p^{27}$	-0.19	-0.21	-0.14	-0.47	-0.29	-0.36	-0.23	-0.49	-0.27	-0.39	-0.42	-0.44	-0.39	-0.15	-0.27	-0.11	-0.24	-0.29	-0.37	-0.33	-0.35	-0.21	-0.48	-0.36	-0.24	-0.26	-0.17	-0.46	-0.33	-0.31	0.31
$\epsilon_m^{28}$	0.44	0.16	0.11	0.39	0.37	0.32	0.47	0.46	0.38	0.28	0.33	0.26	0.22	0.26	0.49	0.29	0.63	0.34	0.14	0.45	0.32	0.21	0.37	0.35	0.28	0.46	0.31	0.42	0.31	0.22	0.33
$\epsilon_p^{28}$	-0.19	-0.27	-0.34	-0.31	-0.29	-0.23	-0.48	-0.43	-0.27	-0.28	-0.28	-0.33	-0.39	-0.21	-0.13	-0.27	-0.24	-0.29	-0.11	-0.15	-0.35	-0.23	-0.33	-0.27	-0.24	-0.42	-0.26	-0.19			

Appendix D2

Table 1: Estimated Correlation Coefficients for SMH ETF and its underlying assets

	$\epsilon_m^1$	$\epsilon_p^1$	$\epsilon_a^1$	$\epsilon_b^1$	$\epsilon_m^2$	$\epsilon_p^2$	$\epsilon_a^2$	$\epsilon_b^2$	$\epsilon_m^3$	$\epsilon_p^3$	$\epsilon_a^3$	$\epsilon_b^3$	$\epsilon_m^4$	$\epsilon_p^4$	$\epsilon_a^4$	$\epsilon_b^4$	$\epsilon_m^5$	$\epsilon_p^5$	$\epsilon_a^5$	$\epsilon_b^5$	$\epsilon_m^6$	$\epsilon_p^6$	$\epsilon_a^6$	$\epsilon_b^6$	$\epsilon_m^7$	$\epsilon_p^7$	$\epsilon_a^7$	$\epsilon_b^7$	$\epsilon_m^8$	$\epsilon_p^8$	$\epsilon_a^8$	$\epsilon_b^8$	
$\epsilon_m^1$	1																																
$\epsilon_p^1$	-0.32	1																															
$\epsilon_a^1$	-0.37	0.21	1																														
$\epsilon_b^1$	-0.34	0.34		1																													
$\epsilon_m^2$	0.33				1																												
$\epsilon_p^2$	-0.45				-0.33	1																											
$\epsilon_a^2$					-0.13	0.42	1																										
$\epsilon_b^2$					-0.37	-0.29	0.24	1																									
$\epsilon_m^3$	0.48				0.27				1																								
$\epsilon_p^3$	-0.29				-0.39				-0.37	1																							
$\epsilon_a^3$									-0.25	0.39	1																						
$\epsilon_b^3$									-0.34	0.32		1																					
$\epsilon_m^4$	0.39				0.27				0.43				1																				
$\epsilon_p^4$	-0.16				-0.38				-0.21				-0.34	1																			
$\epsilon_a^4$													-0.44	0.23	1																		
$\epsilon_b^4$													-0.48	0.25		1																	
$\epsilon_m^5$	0.29				0.53				0.31				0.42				1																
$\epsilon_p^5$	-0.27				-0.26				-0.42				-0.32				-0.43	1															
$\epsilon_a^5$																	-0.38	0.21	1														
$\epsilon_b^5$																	-0.42	0.17		1													
$\epsilon_m^6$	0.45				0.49				0.38				0.21				0.30				1												
$\epsilon_p^6$	-0.27				-0.37				-0.43				-0.32				-0.50				-0.43	1											
$\epsilon_a^6$																				-0.45	0.32	1											
$\epsilon_b^6$																				-0.50	0.27		1										
$\epsilon_m^7$	0.49				0.46				0.44				0.45				0.38			0.42				1									
$\epsilon_p^7$	-0.21				-0.32				-0.43				-0.36				-0.51			-0.29				-0.37	1								
$\epsilon_a^7$																								-0.49	0.19	1							
$\epsilon_b^7$																								-0.38	0.12		1						
$\epsilon_m^8$	0.33				0.55				0.27				0.43				0.45			0.11				0.28				1					
$\epsilon_p^8$	-0.26				-0.42				-0.45				-0.13				-0.44			-0.23				-0.24				-0.36	1				
$\epsilon_a^8$																												-0.41	0.23	1			
$\epsilon_b^8$																												-0.57	0.21		1		

Table 2: Continued

	$\epsilon_m^9$	$\epsilon_p^9$	$\epsilon_a^9$	$\epsilon_b^9$	$\epsilon_m^{10}$	$\epsilon_p^{10}$	$\epsilon_a^{10}$	$\epsilon_b^{10}$	$\epsilon_m^{11}$	$\epsilon_p^{11}$	$\epsilon_a^{11}$	$\epsilon_b^{11}$	$\epsilon_m^{12}$	$\epsilon_p^{12}$	$\epsilon_a^{12}$	$\epsilon_b^{12}$	$\epsilon_m^{13}$	$\epsilon_p^{13}$	$\epsilon_a^{13}$	$\epsilon_b^{13}$	$\epsilon_m^{14}$	$\epsilon_p^{14}$	$\epsilon_a^{14}$	$\epsilon_b^{14}$	$\epsilon_m^{15}$	$\epsilon_p^{15}$	$\epsilon_a^{15}$	$\epsilon_b^{15}$	$\epsilon_m^{16}$	$\epsilon_p^{16}$	$\epsilon_a^{16}$	$\epsilon_b^{16}$
$\epsilon_m^9$	1																															
$\epsilon_p^9$	-0.22	1																														
$\epsilon_a^9$	-0.13	0.21	1																													
$\epsilon_b^9$	-0.34	0.43		1																												
$\epsilon_m^{10}$	0.25				1																											
$\epsilon_p^{10}$	-0.36				-0.23	1																										
$\epsilon_a^{10}$					-0.33	0.21	1																									
$\epsilon_b^{10}$					-0.43	0.16		1																								
$\epsilon_m^{11}$	0.34				0.38				1																							
$\epsilon_p^{11}$	-0.313				-0.41				-0.25	1																						
$\epsilon_a^{11}$									-0.27	0.43	1																					
$\epsilon_b^{11}$									-0.43	0.29		1																				
$\epsilon_m^{12}$	0.15				0.36				0.48				1																			
$\epsilon_p^{12}$	-0.33				-0.44				-0.26				-0.34	1																		
$\epsilon_a^{12}$													-0.28	0.35	1																	
$\epsilon_b^{12}$													-0.24	0.48		1																
$\epsilon_m^{13}$	0.26				0.31				0.44				0.15				1															
$\epsilon_p^{13}$	-0.27				-0.42				-0.21				-0.42				-0.27	1														
$\epsilon_a^{13}$																	-0.36	0.17	1													
$\epsilon_b^{13}$																	-0.28	0.45		1												
$\epsilon_m^{14}$	0.39				0.48				0.25				0.34				0.31				1											
$\epsilon_p^{14}$	-0.32				-0.34				-0.44				-0.23				-0.38				-0.31	1										
$\epsilon_a^{14}$																					-0.36	0.22	1									
$\epsilon_b^{14}$																					-0.24	0.45		1								
$\epsilon_m^{15}$	0.43				0.35				0.23				0.17				0.33				0.27				1							
$\epsilon_p^{15}$	-0.27				-0.42				-0.27				-0.46				-0.49				-0.19				-0.47	1						
$\epsilon_a^{15}$																								-0.53	0.11	1						
$\epsilon_b^{15}$																								-0.21	0.32		1					
$\epsilon_m^{16}$	0.25				0.41				0.23				0.28				0.34				0.16				0.39				1			
$\epsilon_p^{16}$	-0.26				-0.33				-0.19				-0.28				-0.47				-0.13				-0.41				-0.26	1		
$\epsilon_a^{16}$																												-0.33	0.44	1		
$\epsilon_b^{16}$																												-0.12	0.21		1	



Table 3: Continued

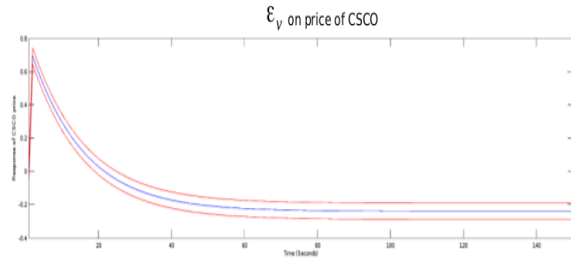
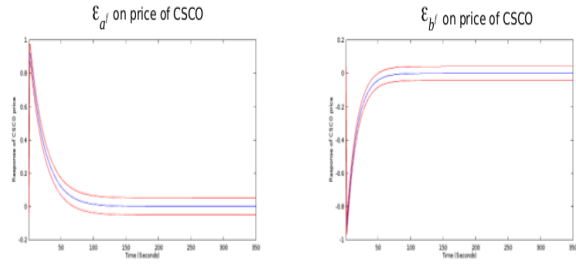
$\epsilon_m^{17}$	$\epsilon_p^{17}$	$\epsilon_a^{17}$	$\epsilon_b^{17}$	$\epsilon_m^{18}$	$\epsilon_p^{18}$	$\epsilon_a^{18}$	$\epsilon_b^{18}$	$\epsilon_m^{19}$	$\epsilon_p^{19}$	$\epsilon_a^{19}$	$\epsilon_b^{19}$	$\epsilon_m^{20}$	$\epsilon_p^{20}$	$\epsilon_a^{20}$	$\epsilon_b^{20}$	$\epsilon_m^{21}$	$\epsilon_p^{21}$	$\epsilon_a^{21}$	$\epsilon_b^{21}$	$\epsilon_m^{22}$	$\epsilon_p^{22}$	$\epsilon_a^{22}$	$\epsilon_b^{22}$	$\epsilon_m^{23}$	$\epsilon_p^{23}$	$\epsilon_a^{23}$	$\epsilon_b^{23}$	$\epsilon_m^{24}$	$\epsilon_p^{24}$	$\epsilon_a^{24}$	$\epsilon_b^{24}$	$\epsilon_m^{25}$	$\epsilon_p^{25}$	$\epsilon_a^{25}$	$\epsilon_b^{25}$	$\epsilon_\nu$	$\epsilon_p^f$	$\epsilon_a^f$	$\epsilon_b^f$	
$\epsilon_m^{17}$	1																																							
$\epsilon_p^{17}$	-0.46	1																																						
$\epsilon_a^{17}$	-0.35	0.21	1																																					
$\epsilon_b^{17}$	-0.17	0.18		1																																				
$\epsilon_m^{18}$	0.43				1																																			
$\epsilon_p^{18}$	-0.36				-0.42	1																																		
$\epsilon_a^{18}$					-0.31	0.26	1																																	
$\epsilon_b^{18}$					-0.28	0.16		1																																
$\epsilon_m^{19}$	0.39				0.23				1																															
$\epsilon_p^{19}$	-0.27				-0.22				-0.39	1																														
$\epsilon_a^{19}$									-0.21	0.26	1																													
$\epsilon_b^{19}$									-0.33	0.49		1																												
$\epsilon_m^{20}$	0.21				0.39				0.27				1																											
$\epsilon_p^{20}$	-0.29				-0.32				-0.27				-0.14	1																										
$\epsilon_a^{20}$									-0.32	0.27	1																													
$\epsilon_b^{20}$									-0.41	0.25					1																									
$\epsilon_m^{21}$	0.27				0.11				0.32				0.27			1																								
$\epsilon_p^{21}$	-0.29				-0.31				-0.27				-0.49			-0.16	1																							
$\epsilon_a^{21}$																-0.25	0.17	1																						
$\epsilon_b^{21}$																-0.32	0.23		1																					
$\epsilon_m^{22}$	0.13				0.49				0.32				0.41			0.22				1																				
$\epsilon_p^{22}$	-0.22				-0.23				-0.39				-0.21			-0.35				-0.16	1																			
$\epsilon_a^{22}$																				-0.34	0.18	1																		
$\epsilon_b^{22}$																				-0.33	0.21		1																	
$\epsilon_m^{23}$	0.39				0.39				0.16				0.21			0.24				0.33				1																
$\epsilon_p^{23}$	-0.26				-0.14				-0.43				-0.38			-0.27				-0.17				-0.38	1															
$\epsilon_a^{23}$																								-0.11	0.21	1														
$\epsilon_b^{23}$																								-0.33	0.15		1													
$\epsilon_m^{24}$	0.28				0.27				0.17				0.23			0.33				0.36				0.45					1											
$\epsilon_p^{24}$	-0.48				-0.21				-0.36				-0.25			-0.23				-0.16				-0.21					-0.29	1										
$\epsilon_a^{24}$																													-0.46	0.29	1									
$\epsilon_b^{24}$																								-0.21	0.49			1												
$\epsilon_m^{25}$	0.28				0.39				0.31				0.29			0.45				0.37				0.43					1											
$\epsilon_p^{25}$	-0.21				-0.27				-0.23				-0.19			-0.18				-0.28				-0.21					-0.38	1										
$\epsilon_a^{25}$																													-0.49	0.27	1									
$\epsilon_b^{25}$																													-0.53	0.39		1								
$\epsilon_\nu$	0.28				0.39				0.47				0.44			0.39				0.33				0.41				0.29								1				
$\epsilon_p^f$	-0.19				-0.16				-0.21				-0.29			-0.28				-0.22				-0.18				-0.25								-0.46	1			
$\epsilon_a^f$																																				-0.37	0.32	1		
$\epsilon_b^f$																																				-0.42	0.38		1	

Table 4: Continued

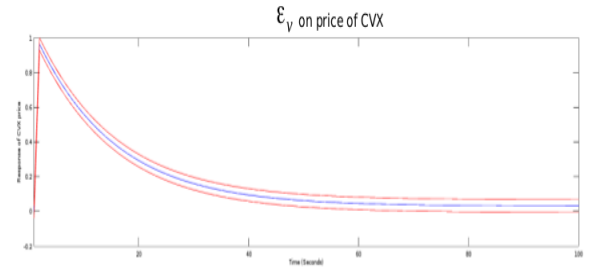
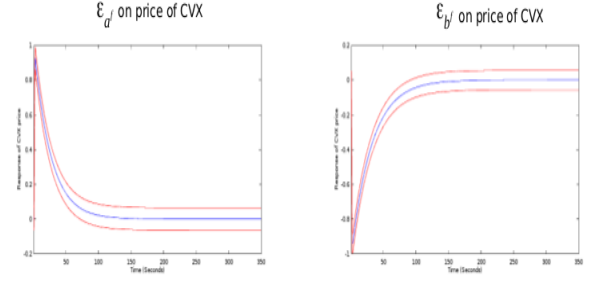
	$\epsilon_m^1$	$\epsilon_m^2$	$\epsilon_m^3$	$\epsilon_m^4$	$\epsilon_m^5$	$\epsilon_m^6$	$\epsilon_m^7$	$\epsilon_m^8$	$\epsilon_m^9$	$\epsilon_m^{10}$	$\epsilon_m^{11}$	$\epsilon_m^{12}$	$\epsilon_m^{13}$	$\epsilon_m^{14}$	$\epsilon_m^{15}$	$\epsilon_m^{16}$	$\epsilon_m^{17}$	$\epsilon_m^{18}$	$\epsilon_m^{19}$	$\epsilon_m^{20}$	$\epsilon_m^{21}$	$\epsilon_m^{22}$	$\epsilon_m^{23}$	$\epsilon_m^{24}$	$\epsilon_m^{25}$	$\epsilon_m^{26}$	$\epsilon_m^{27}$	$\epsilon_m^{28}$	$\epsilon_m^{29}$	$\epsilon_m^{30}$	$\epsilon_\nu$
$\epsilon_m^9$	0.46	0.34	0.46	0.26	0.54	0.28	0.38	0.30	0.34	0.42	0.37	0.19	0.58	0.24	0.19	0.29	0.49	0.46	0.37	0.46	0.40	0.35	0.29	0.36	0.42	0.37	0.33	0.56	0.45	0.40	0.87
$\epsilon_p^9$	-0.20	-0.45	-0.29	-0.26	-0.18	-0.12	-0.11	-0.23	-0.23	-0.29	-0.34	0.35	-0.22	0.25	-0.23	-0.46	-0.19	-0.37	-0.37	-0.30	-0.23	-0.22	-0.19	-0.32	-0.25	-0.32	-0.22	-0.38	-0.32	-0.23	-0.34
$\epsilon_m^{10}$	0.39	0.26	0.21	0.32	0.34	0.49	0.19	0.37	0.57	0.52	0.54	0.44	0.60	0.47	0.12	0.33	0.23	0.59	0.19	0.37	0.25	0.51	0.22	0.29	0.42	0.15	0.31	0.56	0.35	0.11	0.33
$\epsilon_p^{10}$	-0.31	-0.49	-0.37	-0.55	-0.28	-0.48	-0.51	-0.44	-0.38	-0.53	-0.45	-0.27	-0.12	-0.33	-0.51	-0.17	-0.23	-0.29	-0.39	-0.47	-0.19	-0.51	-0.26	-0.11	-0.57	-0.45	-0.29	-0.43	-0.23	-0.21	-0.23
$\epsilon_m^{11}$	0.51	0.38	0.26	0.22	0.54	0.31	0.16	0.44	0.62	0.59	0.17	0.41	0.39	0.27	0.11	0.23	0.58	0.36	0.28	0.52	0.45	0.22	0.37	0.21	0.29	0.46	0.29	0.53	0.42	0.31	0.37
$\epsilon_p^{11}$	-0.35	-0.54	-0.33	-0.48	-0.17	-0.29	-0.32	-0.58	-0.18	-0.41	-0.28	-0.49	-0.51	-0.47	-0.36	-0.43	-0.55	0.11	-0.23	-0.29	-0.56	-0.27	-0.58	-0.16	-0.37	-0.44	-0.21	-0.48	-0.26	-0.34	-0.23
$\epsilon_m^{12}$	0.46	0.26	0.49	0.22	0.29	0.47	0.19	0.31	0.42	0.56	0.29	0.51	32	0.25	0.47	0.21	0.36	0.16	0.48	0.22	0.65	0.41	0.27	0.11	0.43	0.33	0.52	0.37	0.21	0.45	0.38
$\epsilon_p^{12}$	-0.17	-0.29	-0.59	-0.33	-0.57	-0.39	-0.15	-0.45	-0.16	-0.32	-0.39	-0.47	-0.57	-0.31	-0.26	-0.19	-0.56	-0.26	-0.11	-0.59	-0.36	-0.47	-0.22	-0.52	-0.51	-0.31	-0.12	-0.32	-0.27	-0.21	-0.19
$\epsilon_m^{13}$	0.43	0.45	0.29	0.55	0.49	0.44	0.47	0.51	0.36	0.19	0.21	0.38	0.58	0.18	0.49	0.37	0.33	0.26	0.44	0.32	0.50	0.47	0.11	0.27	0.59	0.38	0.29	0.26	0.51	0.46	0.13
$\epsilon_p^{13}$	-0.33	-0.38	-0.21	-0.51	-0.13	-0.14	-0.22	-0.28	-0.34	-0.24	-0.39	-0.35	-0.19	-0.58	-0.15	-0.46	-0.31	-0.59	-0.56	-0.11	-0.48	-0.49	-0.51	-0.32	-0.41	-0.33	-0.12	-0.34	-0.55	-0.22	-18
$\epsilon_m^{14}$	0.66	0.34	0.61	0.28	0.47	0.45	0.53	0.43	0.54	0.33	0.41	0.43	0.42	0.36	0.58	0.60	0.35	0.43	0.42	0.45	0.49	0.52	0.36	0.46	0.38	0.47	0.62	0.34	0.28	0.38	0.39
$\epsilon_p^{14}$	-0.11	-0.23	-0.32	-0.29	-0.37	-0.25	-0.23	-0.35	-0.22	-0.13	-0.31	-0.24	-0.21	-0.22	-0.12	-0.23	-0.39	-0.29	-0.23	-0.27	-0.19	-0.23	-0.34	-0.30	-0.16	-0.26	-0.44	-0.56	-0.25	-0.39	-0.23
$\epsilon_m^{15}$	0.54	0.41	0.43	0.21	0.46	0.48	0.17	0.51	0.12	0.44	0.37	0.27	0.24	0.19	0.14	0.25	0.39	0.29	0.11	0.33	0.26	0.35	0.32	0.22	0.34	0.23	0.15	0.28	0.17	0.26	0.34
$\epsilon_p^{15}$	-0.25	-0.18	-0.46	-0.28	-0.52	-0.15	-0.51	-0.27	-0.33	-0.11	-0.19	-0.16	-0.43	-0.41	-0.21	-0.35	-0.25	-0.12	-0.46	-0.39	-0.24	-0.37	-0.22	-0.13	-0.21	-0.36	-0.26	-0.23	-0.45	-0.11	-0.24
$\epsilon_m^{16}$	0.48	0.37	0.16	0.36	0.38	0.18	0.42	0.22	0.17	0.12	0.15	0.47	0.33	0.41	0.26	0.33	0.29	0.25	0.43	0.23	0.39	0.44	0.37	0.21	0.24	0.28	0.17	0.11	0.29	0.41	0.38
$\epsilon_p^{16}$	-0.42	-0.47	-0.15	-0.35	-0.44	-0.43	-0.16	-0.49	-0.29	-0.39	-0.15	-0.41	-0.14	-0.35	-0.36	-0.27	-0.13	-0.38	-0.46	-0.22	-0.38	-0.26	-0.48	-0.33	-0.23	-0.11	-0.37	-0.21	-0.34	-0.23	-0.23
$\epsilon_m^{17}$	0.43	0.47	0.17	0.11	0.31	0.18	0.16	0.42	0.13	0.34	0.22	0.44	0.46	0.17	0.29	0.19	0.35	0.25	0.31	0.27	0.15	0.34	0.21	0.12	0.39	0.38	0.36	0.14	0.23	0.36	0.40
$\epsilon_p^{17}$	-0.45	-0.41	-0.19	-0.11	-0.18	-0.36	-0.49	-0.42	-0.24	-0.38	-0.29	-0.31	-0.27	-0.46	-0.21	-0.13	-0.44	-0.37	-0.35	-0.25	-0.24	-0.17	-0.37	-0.33	-0.38	-0.16	-0.27	-0.45	-0.22	-0.27	-0.23
$\epsilon_m^{18}$	0.25	0.48	0.28	0.35	0.13	0.22	0.26	0.29	0.49	0.39	0.31	0.48	0.32	0.14	0.41	0.28	0.23	0.44	0.17	0.35	0.12	0.31	0.36	0.22	0.27	0.26	0.43	0.11	0.29	0.45	0.37
$\epsilon_p^{18}$	-0.29	-0.13	-0.17	-0.48	-0.27	-0.38	-0.28	-0.35	-0.26	-0.24	-0.43	-0.39	-0.15	-0.26	-0.47	-0.21	-0.45	-0.24	-0.11	-0.28	-0.29	-0.37	-0.46	-0.32	-0.23	-0.46	-0.33	-0.27	-0.21	-0.25	-0.17
$\epsilon_m^{19}$	0.42	0.13	0.44	0.33	0.17	0.23	0.14	0.27	0.38	0.29	0.12	0.41	0.37	0.45	0.22	0.11	0.34	0.21	0.13	0.17	0.47	0.37	0.38	0.24	0.25	0.28	0.21	0.27	0.39	0.43	0.47
$\epsilon_p^{19}$	-0.39	-0.49	-0.29	-0.19	-0.38	-0.24	-0.13	-0.33	-0.27	-0.15	-0.48	-0.18	-0.14	-0.47	-0.25	-0.46	-0.43	-0.13	-0.31	-0.22	-0.37	-0.48	-0.16	-0.42	-0.24	-0.38	-0.12	-0.46	-0.23	-0.23	-0.23
$\epsilon_m^{20}$	0.44	0.16	0.33	0.11	0.38	0.32	0.27	0.48	0.29	0.41	0.16	0.43	0.24	0.25	0.11	0.32	0.27	0.36	0.47	0.22	0.39	0.15	0.35	0.27	0.37	0.45	0.31	0.22	0.24	0.31	0.46
$\epsilon_p^{20}$	-0.31	-0.18	-0.48	-0.15	-0.28	-0.44	-0.19	-0.46	-0.32	-0.38	-0.31	-0.36	-0.49	-0.14	-0.47	-0.29	-0.48	-0.16	-0.45	-0.22	-0.27	-0.35	-0.23	-0.11	-0.27	-0.13	-0.21	-0.34	-0.25	-0.21	-0.29
$\epsilon_m^{21}$	0.54	0.18	0.41	0.49	0.34	0.12	0.39	0.15	0.21	0.19	0.28	0.16	0.36	0.33	0.26	0.49	0.37	0.28	0.11	0.47	0.24	0.14	0.22	0.25	0.44	0.24	0.28	0.13	0.46	0.33	0.43
$\epsilon_p^{21}$	-0.25	-0.12	-0.45	-0.43	-0.13	-0.46	-0.39	-0.27	-0.32	-0.17	-0.46	-0.16	-0.42	-0.41	-0.19	-0.36	-0.47	-0.21	-0.11	-0.45	-0.39	-0.14	-0.31	-0.44	-0.42	-0.22	-0.16	-0.13	-0.32	-0.22	-0.13
$\epsilon_m^{22}$	0.35	0.29	0.36	0.15	0.39	0.22	0.31	0.27	0.46	0.18	0.21	0.41	0.35	0.16	0.29	0.38	0.47	0.25	0.33	0.48	0.19	0.21	0.19	0.16	0.45	0.35	0.23	0.11	0.23	0.31	0.47
$\epsilon_p^{22}$	-0.43	-0.28	-0.11	-0.46	-0.26	-0.49	-0.44	-0.18	-0.14	-0.22	-0.33	-0.34	-0.21	-0.32	-0.13	-0.45	-0.24	-0.19	-0.35	-0.15	-0.26	-0.13	-0.47	-0.37	-0.22	-0.17	-0.32	-0.37	-0.25	-0.20	-0.24
$\epsilon_m^{23}$	0.19	0.44	0.28	0.36	0.42	0.35	0.41	0.21	0.27	0.22	0.12	0.14	0.38	0.26	0.39	0.25	0.43	0.32	0.17	0.36	0.42	0.48	0.44	0.37	0.48	0.15	0.19	0.25	0.23	0.45	0.50
$\epsilon_p^{23}$	-0.42	-0.23	-0.18	-0.15	-0.13	-0.34	-0.48	-0.43	-0.24	-0.21	-0.35	-0.22	-0.49	-0.38	-0.27	-0.19	-0.36	-0.11	-0.26	-0.31	-0.49	-0.28	-0.14	-0.23	-0.31	-0.46	-0.11	-0.45	-0.31	0.27	-0.19
$\epsilon_m^{24}$	0.25	0.38	0.11	0.26	0.13	0.29	0.17	0.22	0.35	0.21	0.16	0.43	0.36	0.18	0.41	0.13	0.31	0.45	0.36	0.49	0.33	0.17	0.26	0.33	0.15	0.27	0.26	0.43	0.12	0.47	0.35
$\epsilon_p^{24}$	-0.35	-0.14	-0.42	-0.27	-0.39	-0.22	-0.15	-0.38	-0.17	-0.45	-0.29	-0.36	-0.19	-0.34	-0.43	-0.24	-0.21	-0.44	-0.25	-0.13	-0.41	-0.26	-0.16	-0.43	-0.22	-0.45	-0.24	-0.11	-0.35	-0.17	-0.27
$\epsilon_m^{25}$	0.49	0.16	0.32	0.44	0.48	0.25	0.39	0.11	0.24	0.22	0.42	0.31	0.13	0.35	0.28	0.19	0.36	0.27	0.37	0.45	0.23	0.26	0.35	0.11	0.35	0.33	0.24	0.15	0.39	0.34	0.39
$\epsilon_p^{25}$	-0.15	-0.14	-0.28	-0.38	-0.43	-0.36	-0.19	-0.33	-0.36	-0.41	-0.13	-0.22	-0.24	-0.23	-0.44	-0.29	-0.47	-0.45	-0.14	-0.27	-0.36	-0.31	-0.15	-0.11	-0.33	-0.26	-0.45	-0.32	-0.32	-0.22	-0.25
$\epsilon_\nu$	0.16	0.12	0.46	0.34	0.26	0.31	0.17	0.47	0.28	0.41	0.26	0.24	0.42	0.35	0.29	0.47	0.36	0.17	0.46	0.21	0.45	0.42	0.44	0.39	0.22	0.38	0.19	0.14	0.21	0.45	0.29
$\epsilon_{pf}$	-0.38	0.49	-0.27	-0.25	-0.35	-0.38	-0.29	-0.18	-0.14	-0.38	-0.15	-0.17	-0.46	-0.24	-0.42	-0.37	-0.22	-0.38	-0.11	-0.28	-0.21	-0.37	-0.33	-0.48	-0.23	-0.46	-0.34	-0.14	-0.34	-0.24	-0.29

# Appendix E1

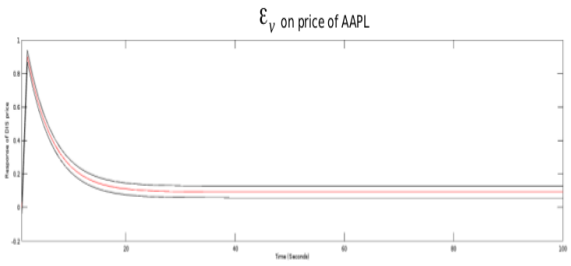
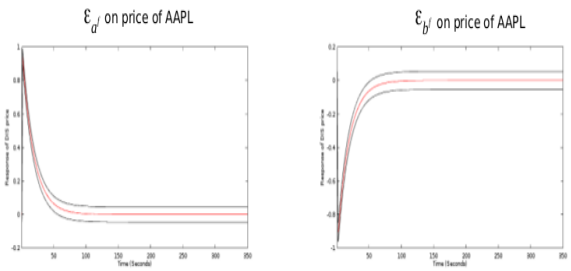
## Price Impulse Responses for Selected Underlying Assets of DIA



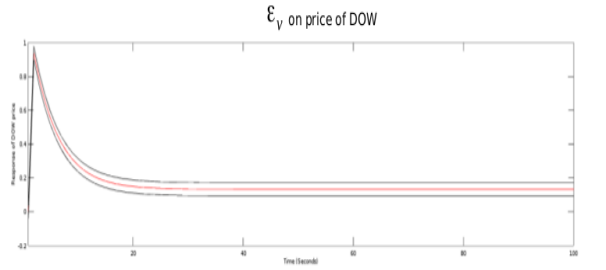
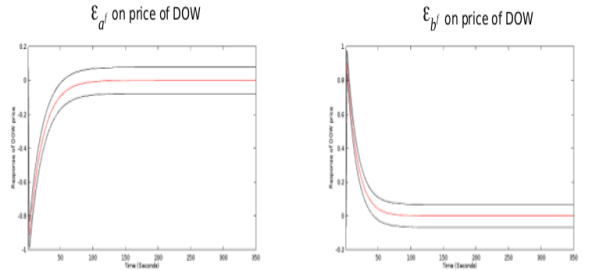
(a)



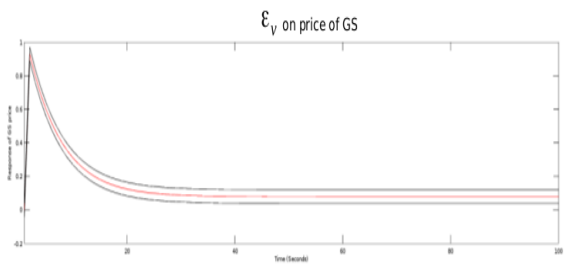
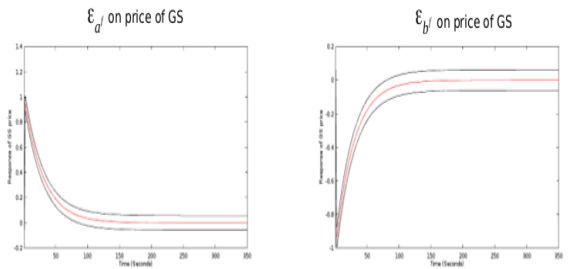
(b)



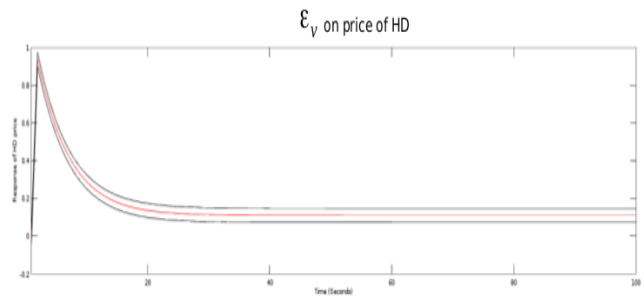
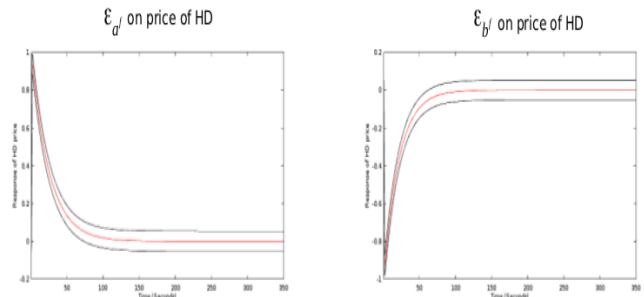
(c)



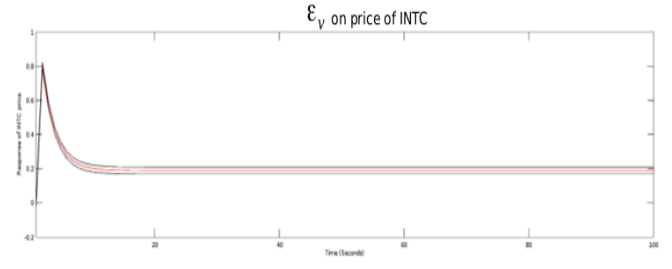
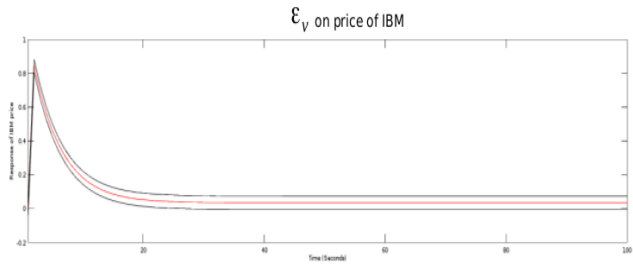
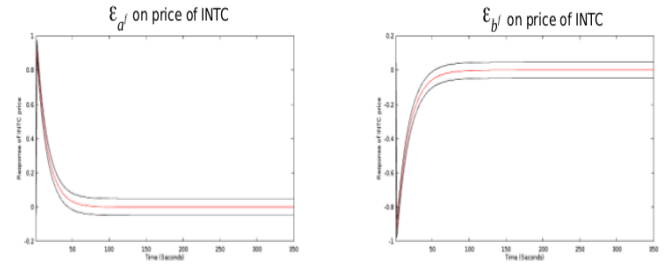
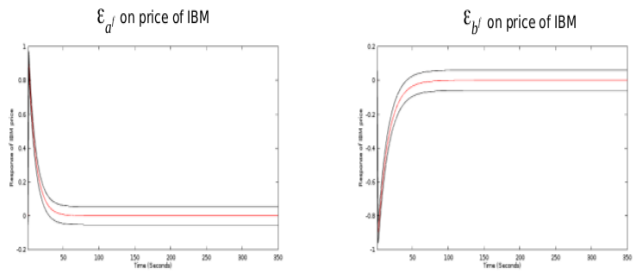
(d)



(e)

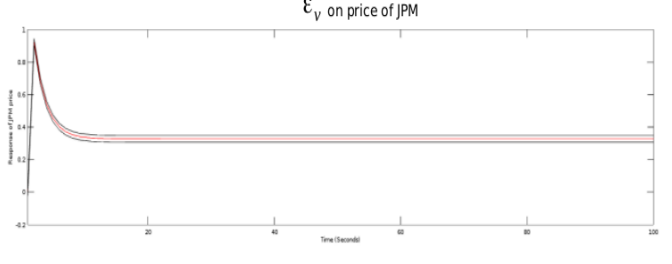
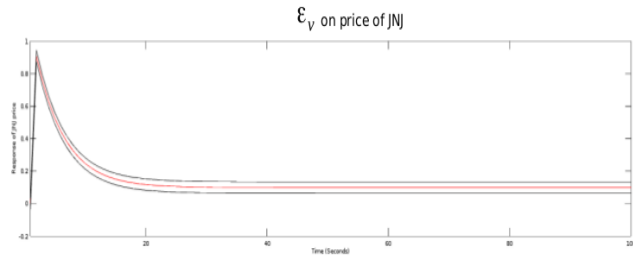
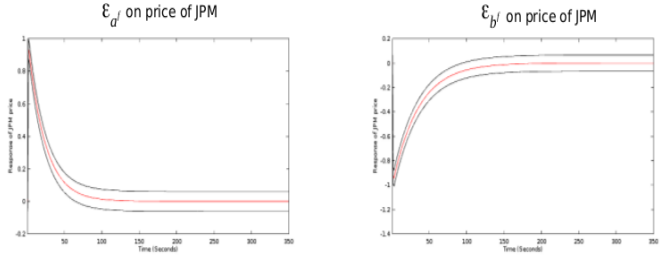
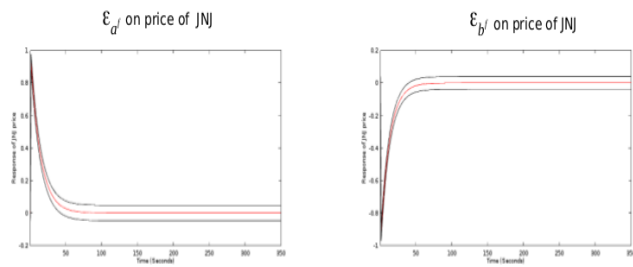


(f)



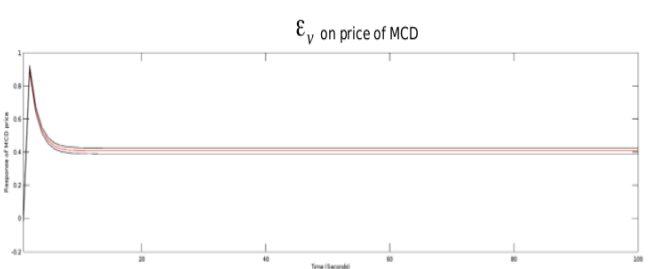
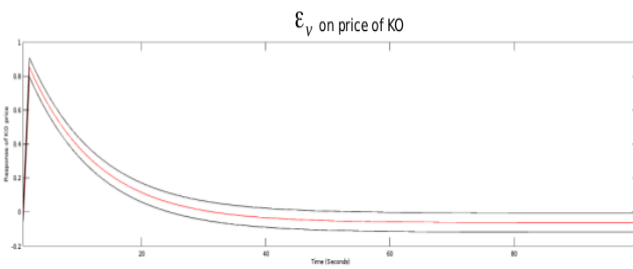
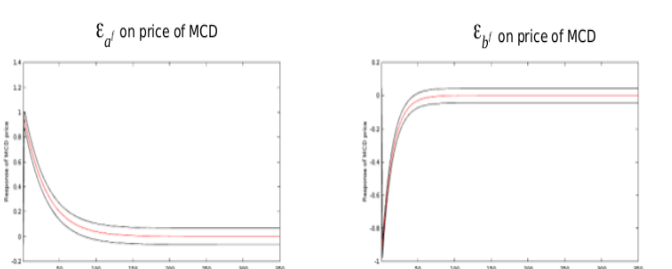
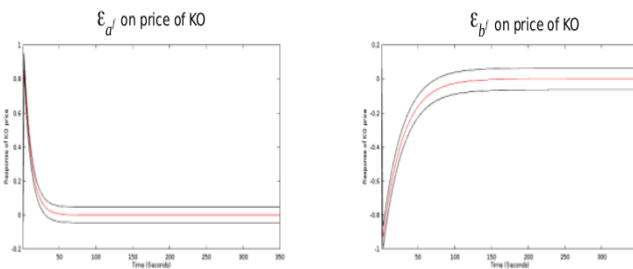
(g)

(h)



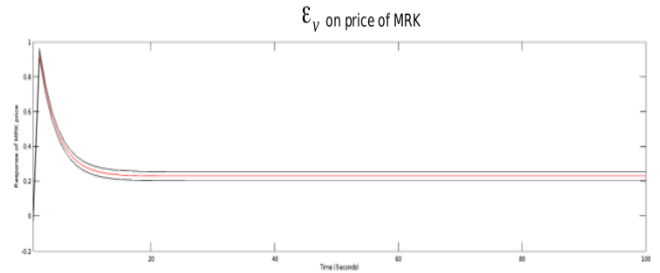
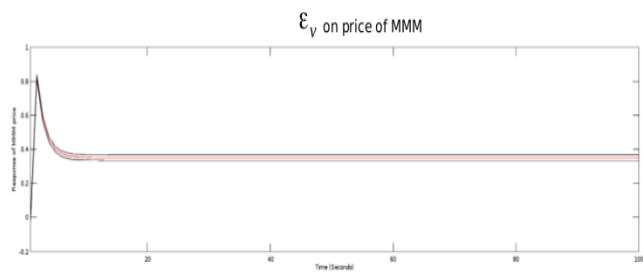
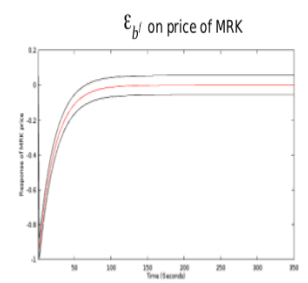
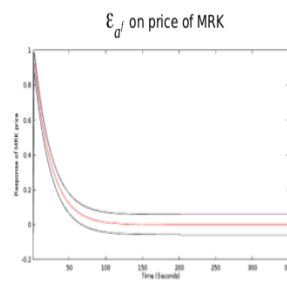
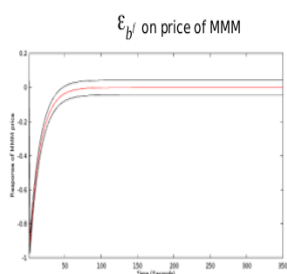
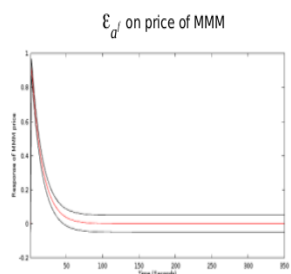
(i)

(j)



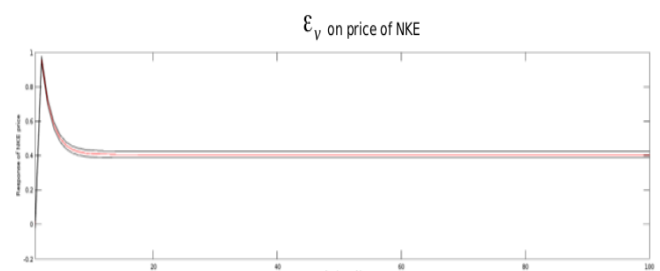
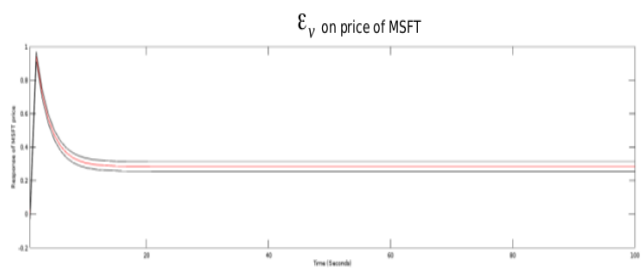
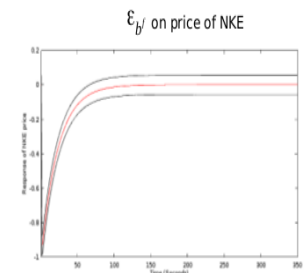
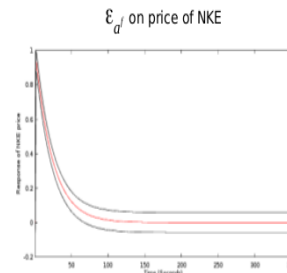
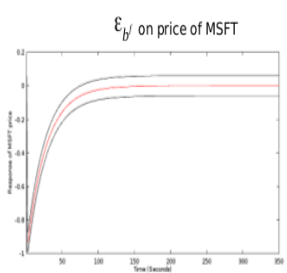
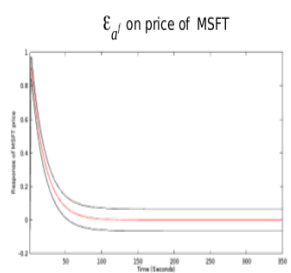
(k)

(l)



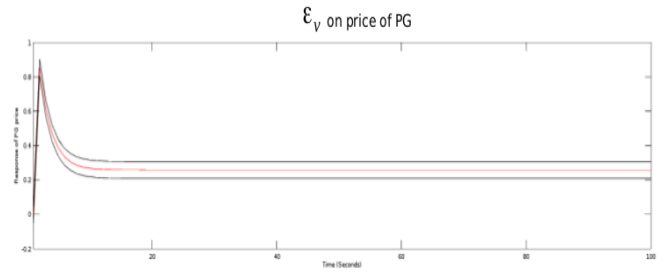
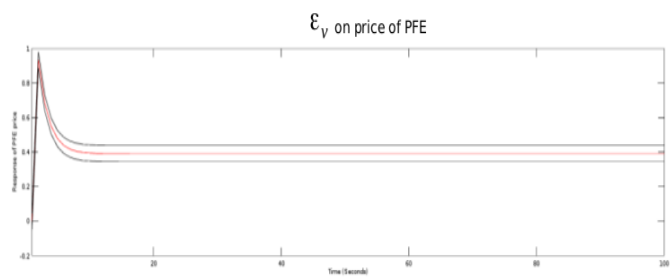
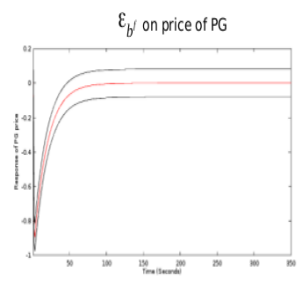
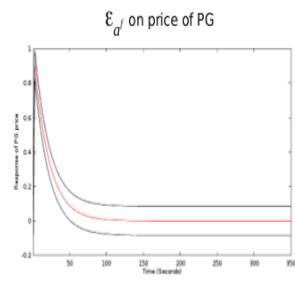
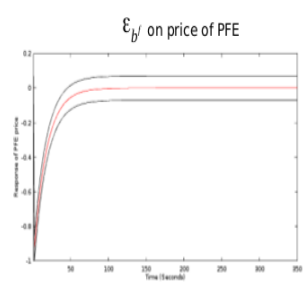
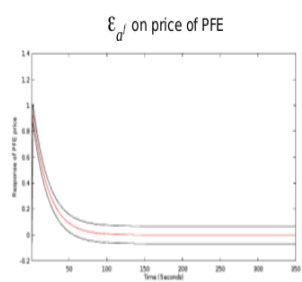
(m)

(n)



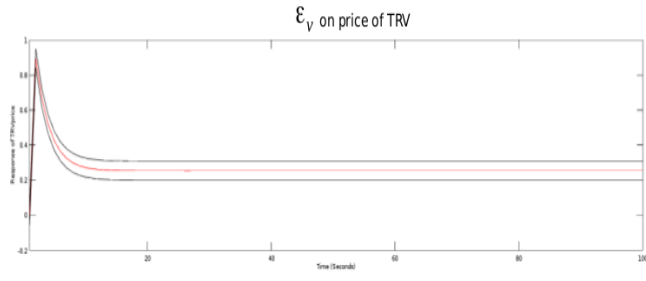
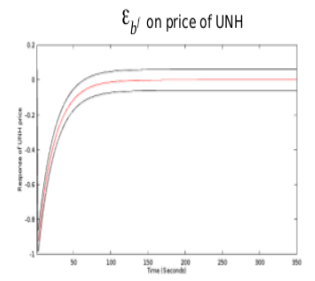
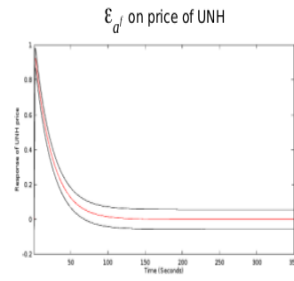
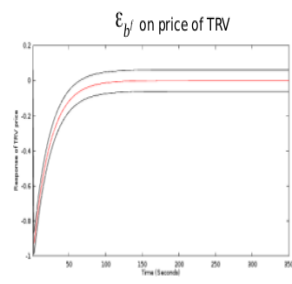
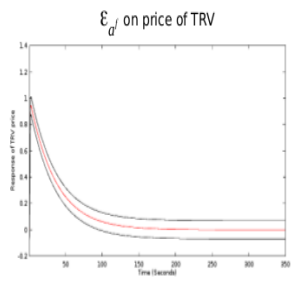
(o)

(p)

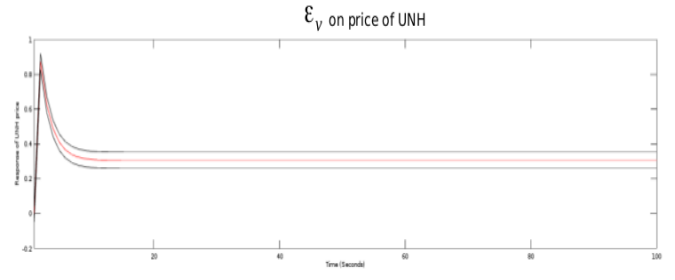


(q)

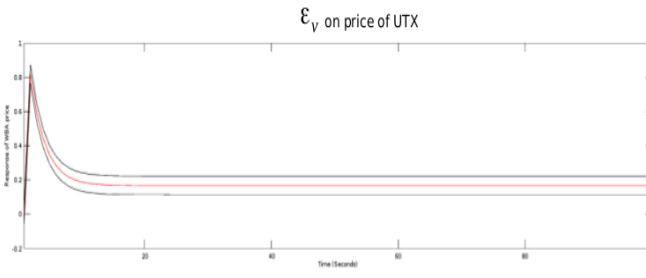
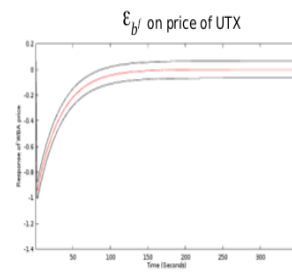
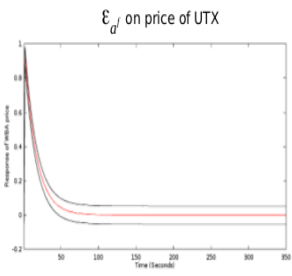
(r)



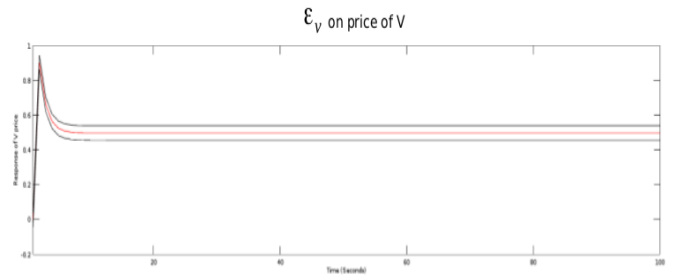
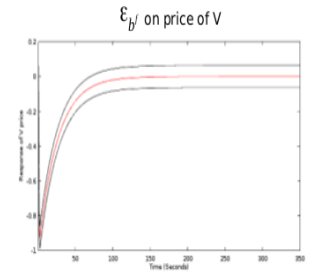
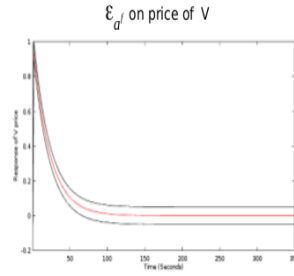
(s)



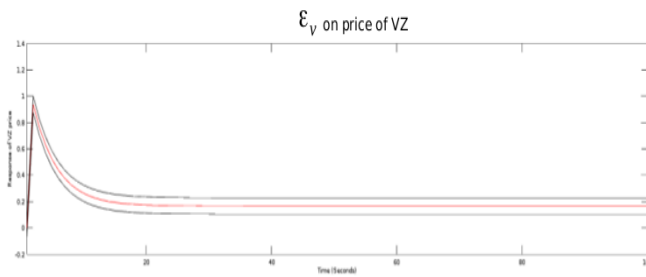
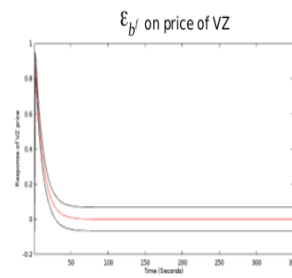
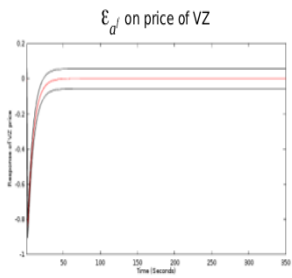
(t)



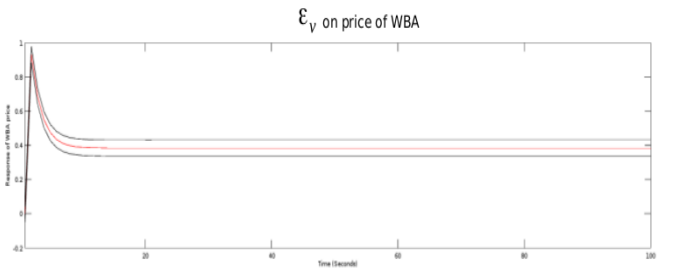
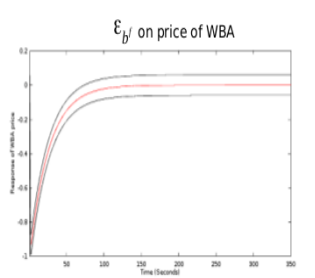
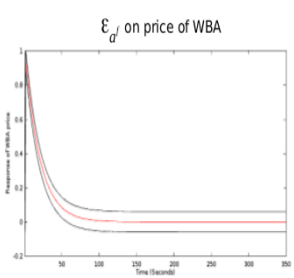
(u)



(v)

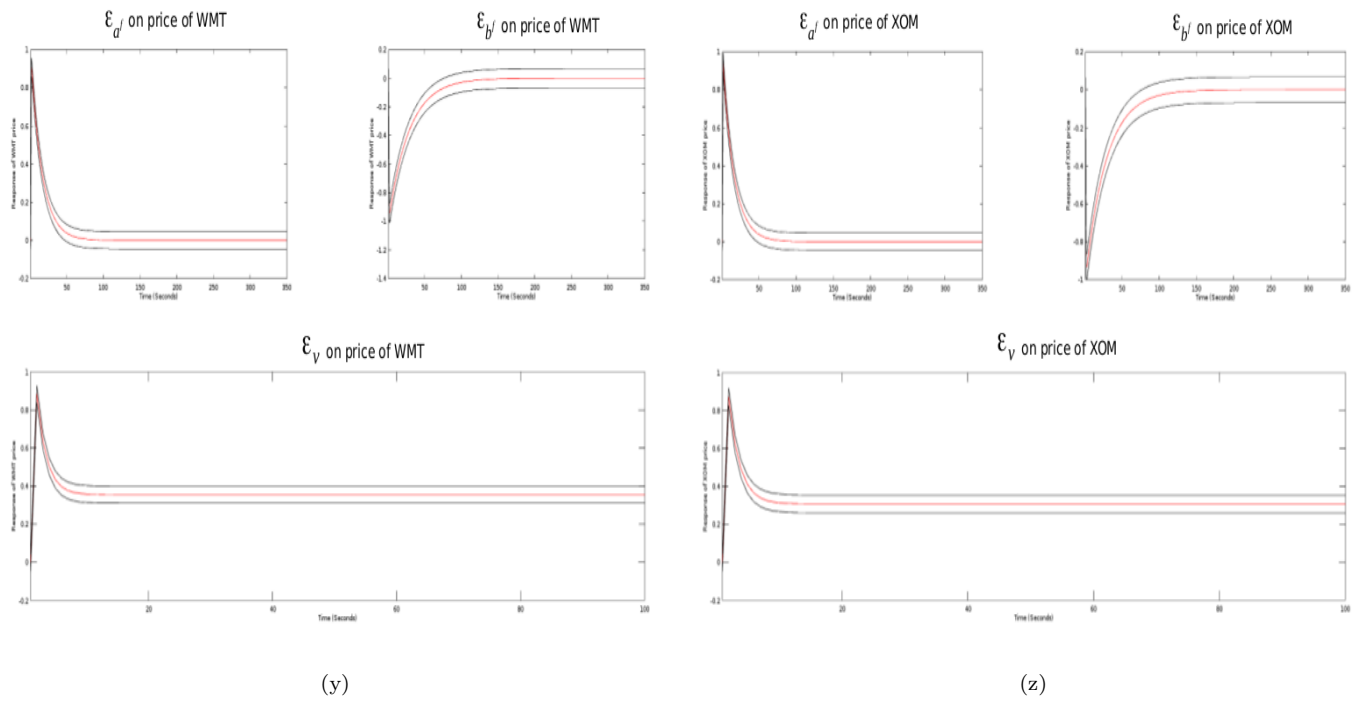


(w)



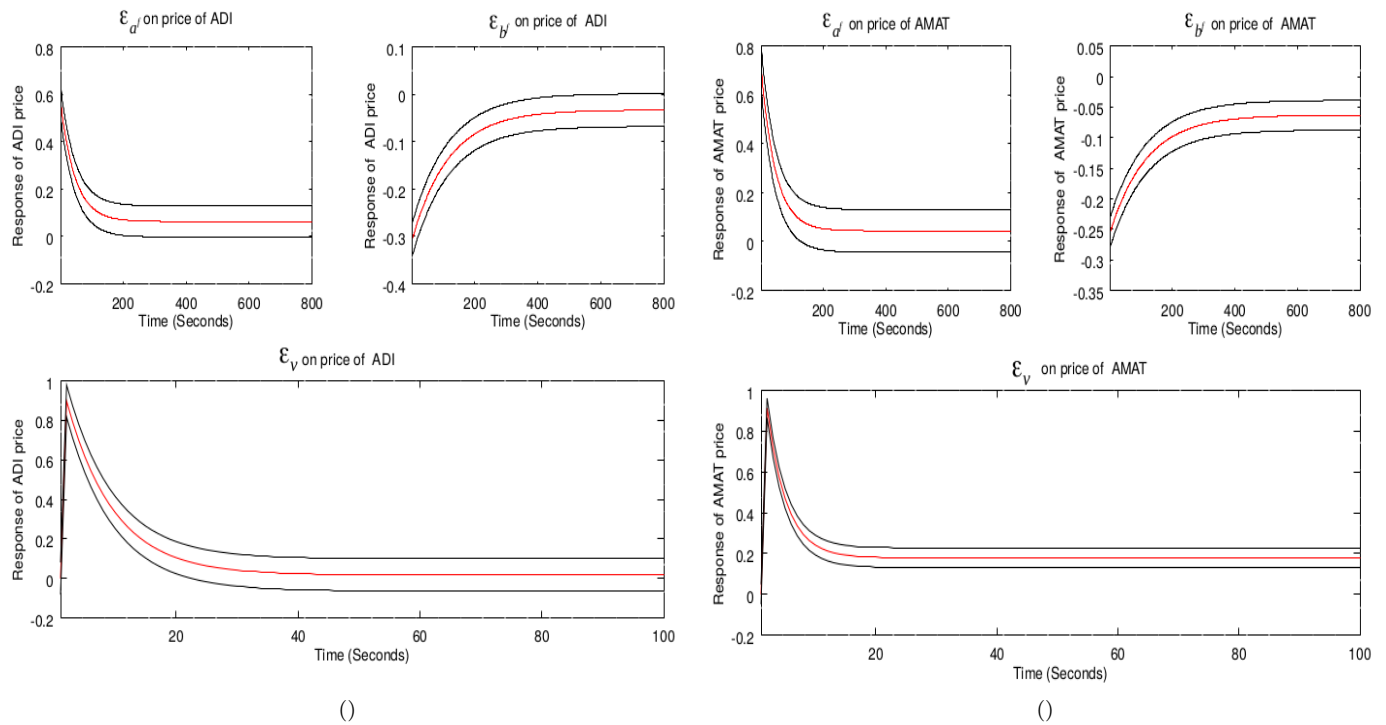
(x)

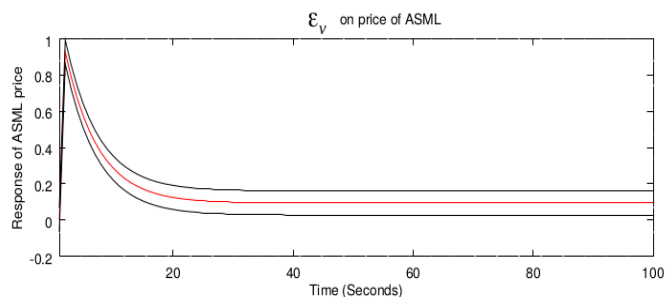
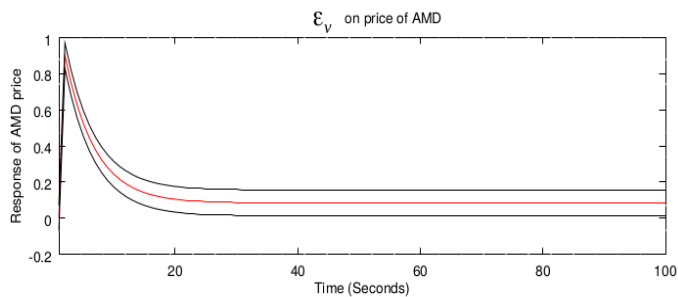
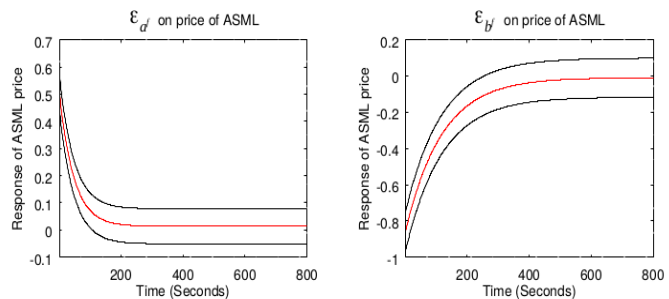
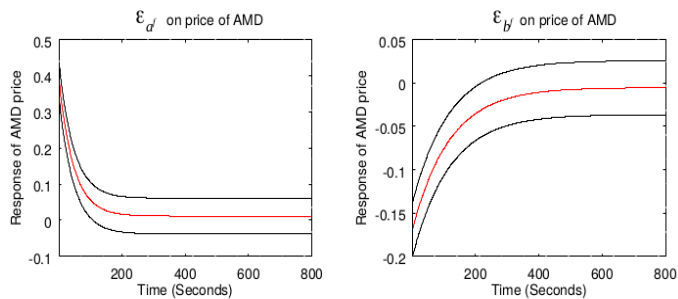




## Appendix E2

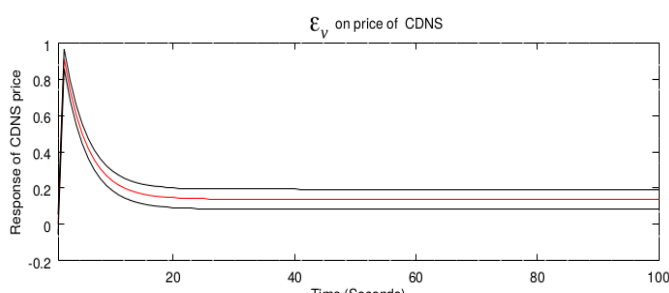
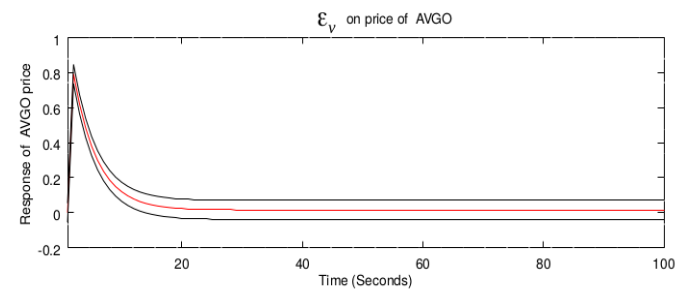
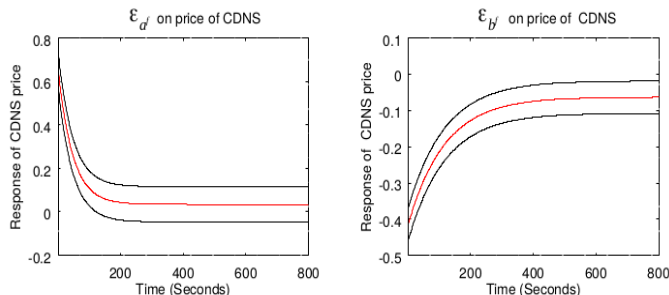
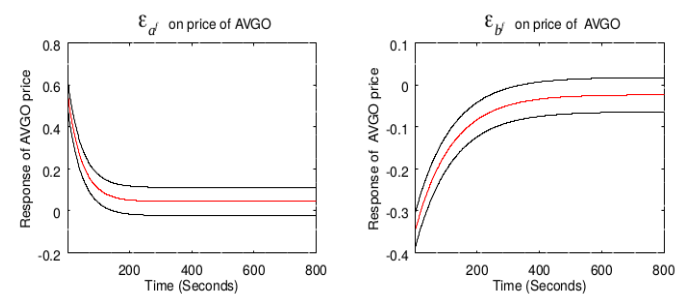
### Price Impulse Responses for Selected Underlying Assets of SMH





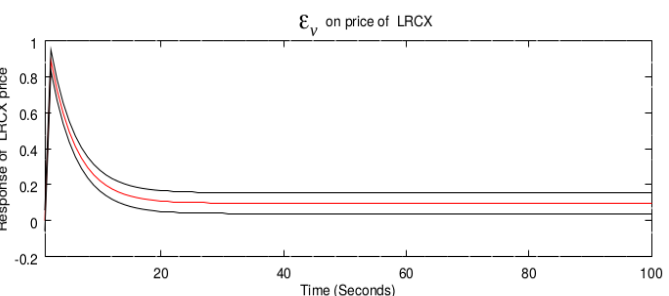
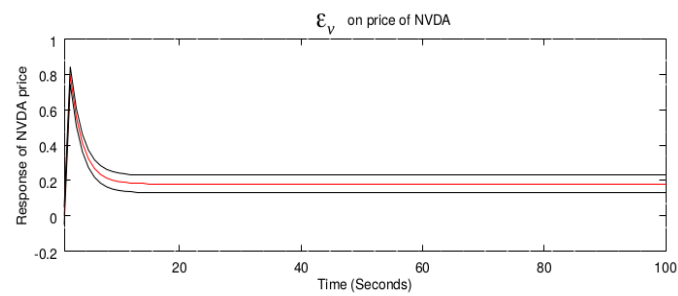
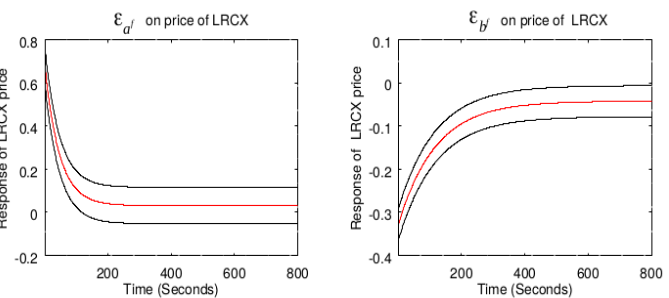
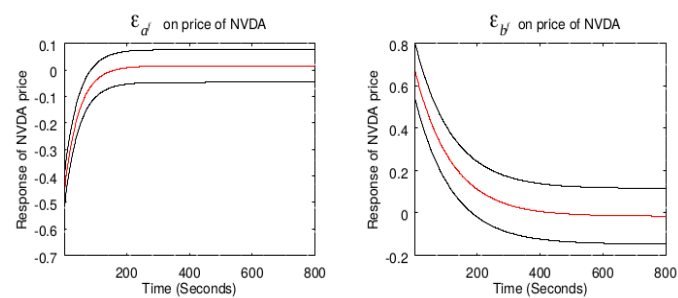
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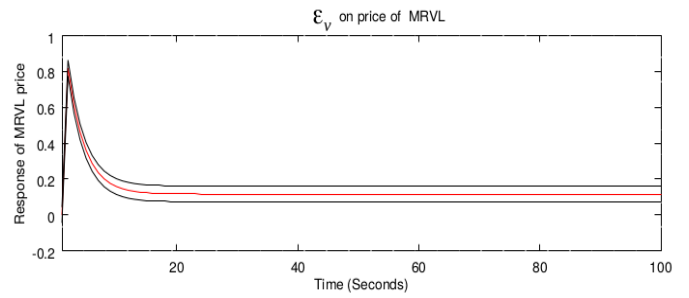
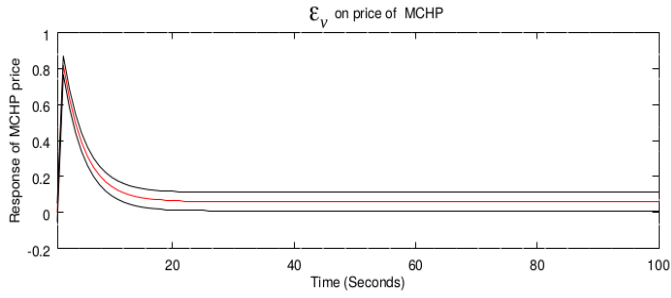
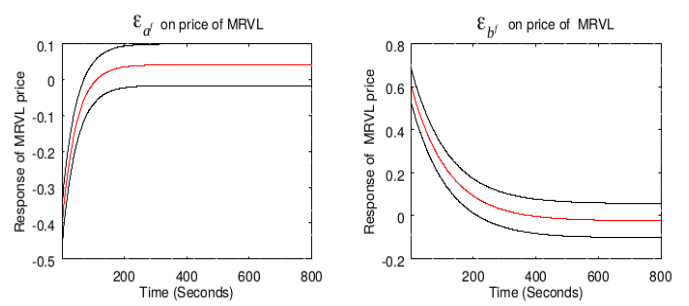
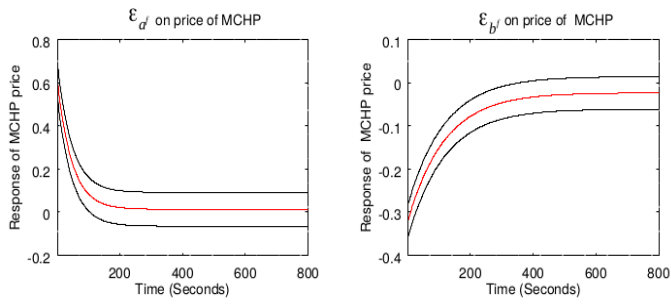
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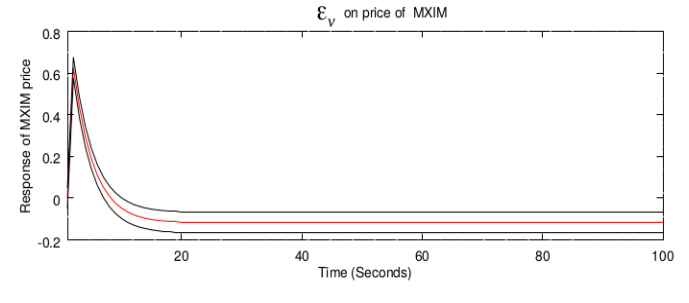
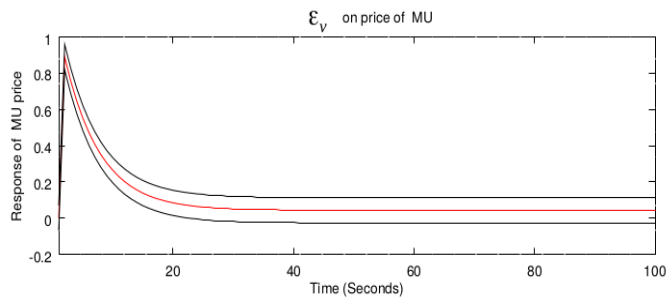
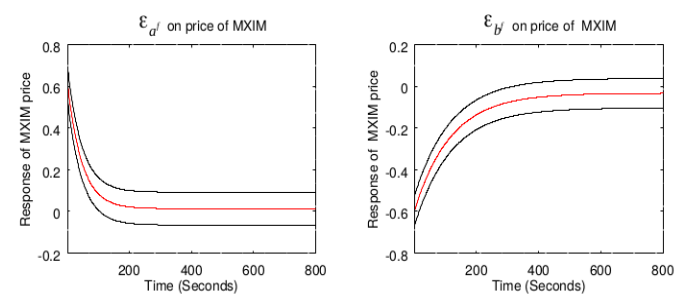
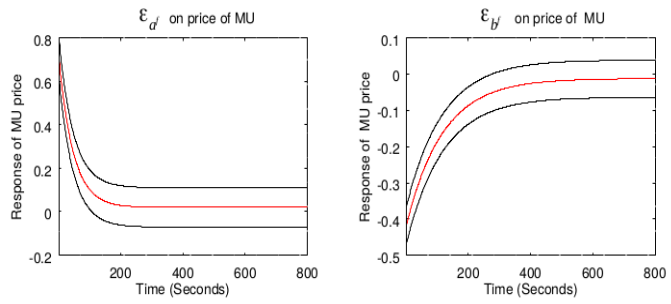
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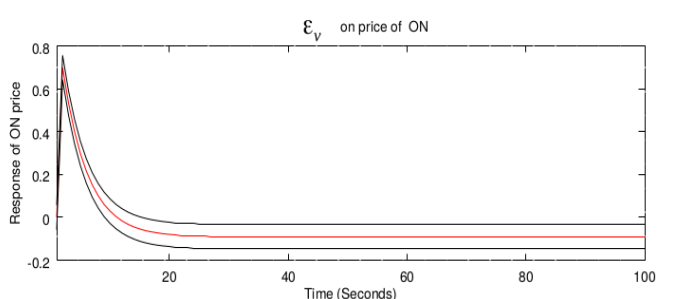
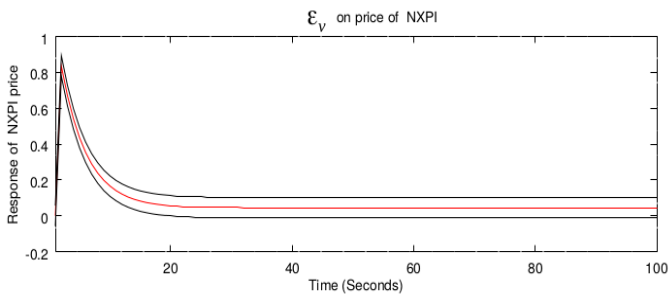
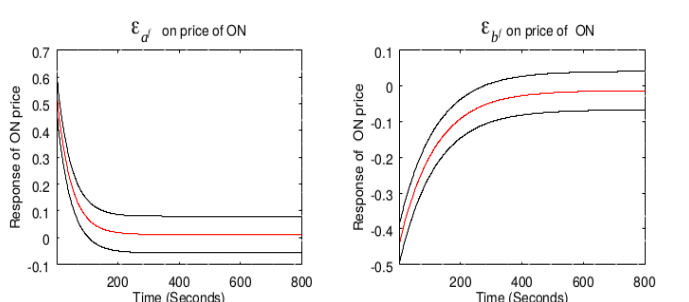
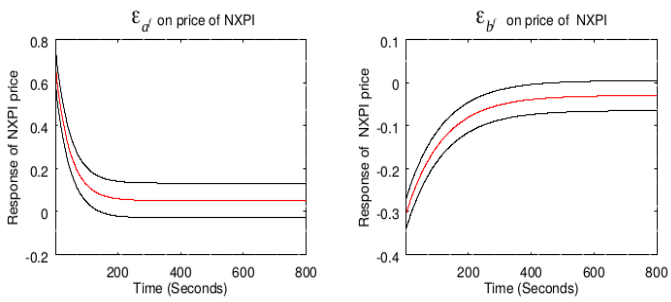
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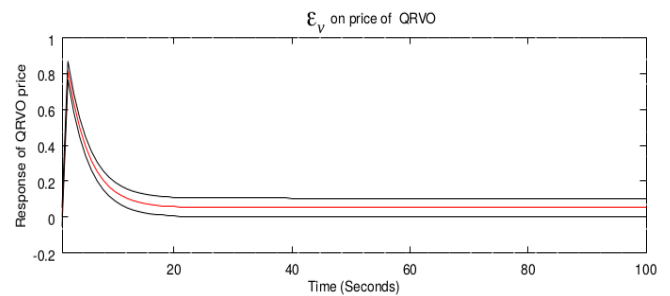
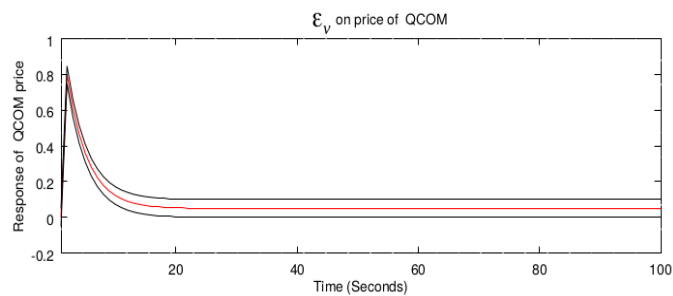
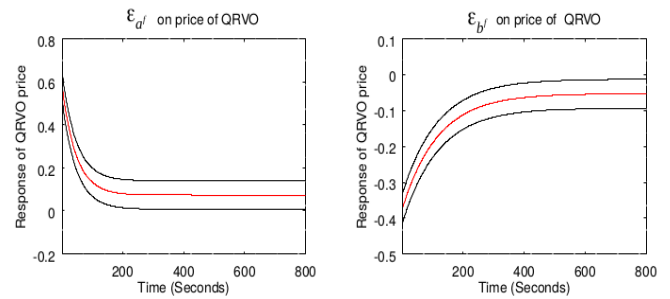
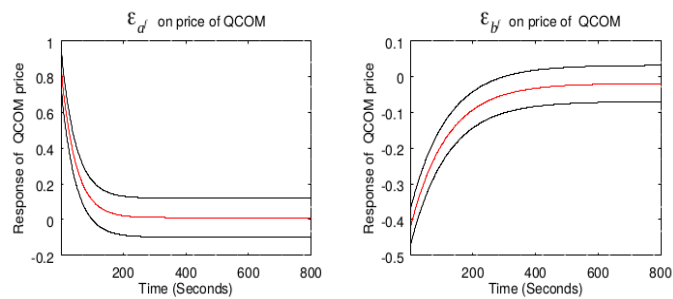
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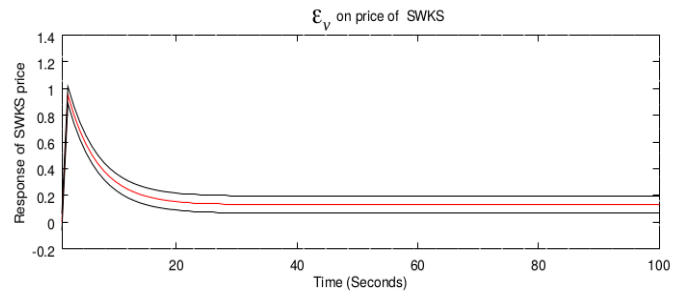
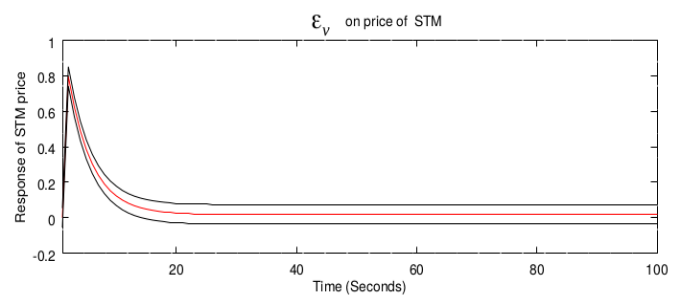
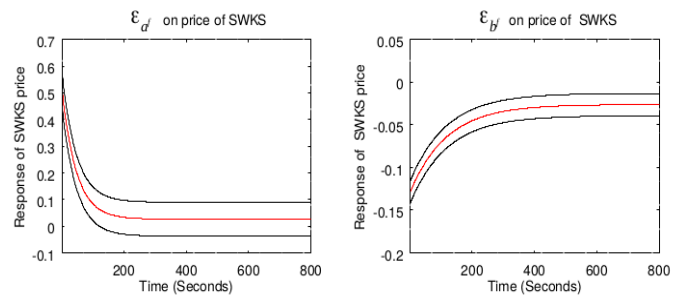
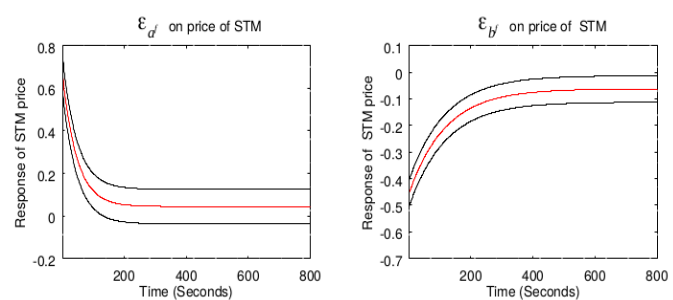
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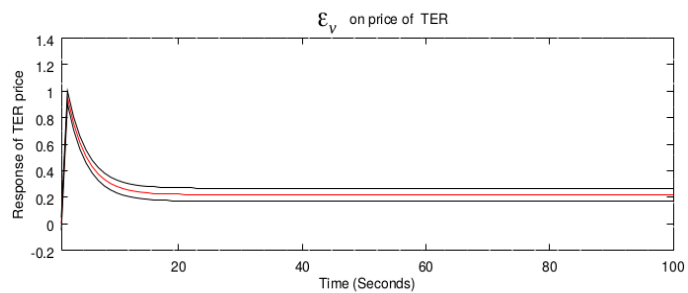
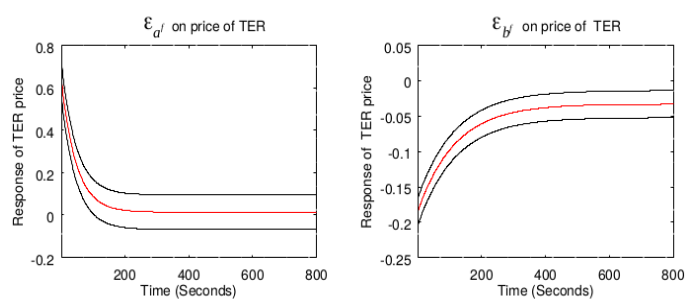
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