BNHLS Subsampling Kernel based RV

Empirical Appendix - Results for 2004

OLE E. BARNDORFF-NIELSEN
The T.N. Thiele Centre for Mathematics in Natural Science,
Department of Mathematical Sciences,
University of Aarhus, Ny Munkegade, DK-8000 Aarhus C, Denmark
oebn@imf.au.dk

PETER REINHARD HANSEN
Department of Economics, Stanford University,
Landau Economics Building, 579 Serra Mall,
Stanford, CA 94305-6072, USA
peter.hansen@stanford.edu

ASGER LUNDE
Department of Marketing and Statistics,
Aarhus School of Business,
Fuglesangs Alle 4, DK-8210 Aarhus V, Denmark
ALunde@asb.dk

NEIL SHEPHARD
Nuffield College, University of Oxford, Oxford OX1 1NF, UK
neil.shephard@nuffield.ox.ac.uk

This version: September 1, 2006

Contents

1. Tables and Figures for AA

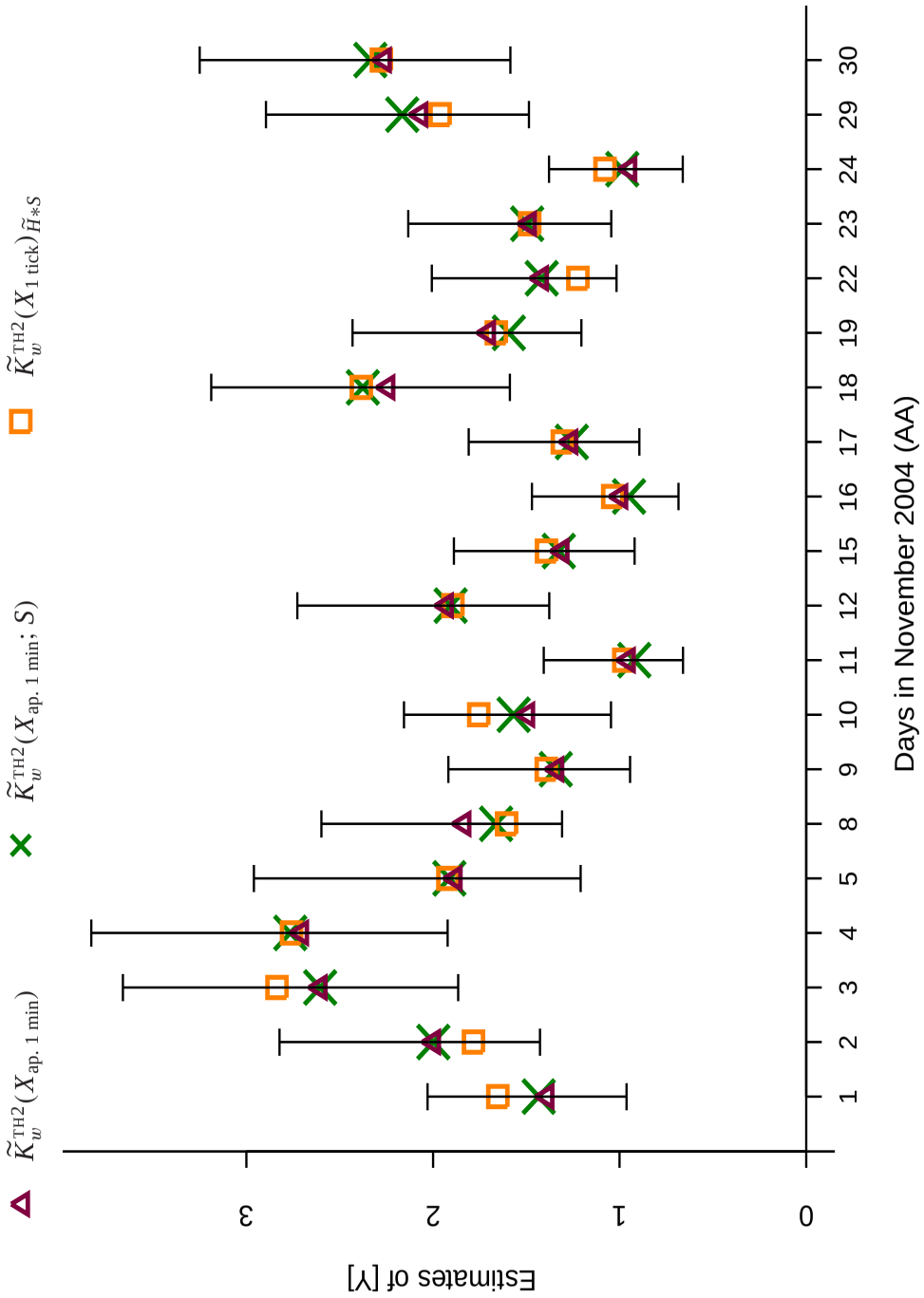

Figure 1: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 1: Summary statistics for subsampled $[Y]$ estimators, AA year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	2.486	1.450 (3.219)	5.275	1.000	0.41	0.31	0.28	0.08
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	2.460	1.436 (3.213)	5.275	0.993	0.43	0.32	0.28	0.09
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	2.418	1.331 (3.089)	50.44	0.979	0.45	0.33	0.32	0.11
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	2.200	1.343 (2.424)		0.890	0.31	0.15	0.15	0.00
$[X_{\text{5 minutes}}; 300]$	2.291	1.172 (2.694)		0.960	0.44	0.34	0.29	0.11
$[X_{\text{1 minutes}}; 60]$	2.087	0.971 (2.185)		0.846	0.39	0.34	0.27	0.10
AMZ (2005)								
$TSRV(K, J)$	2.319	1.353 (2.762)		0.900	0.39	0.27	0.17	0.05

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

2. Tables and Figures for AXP

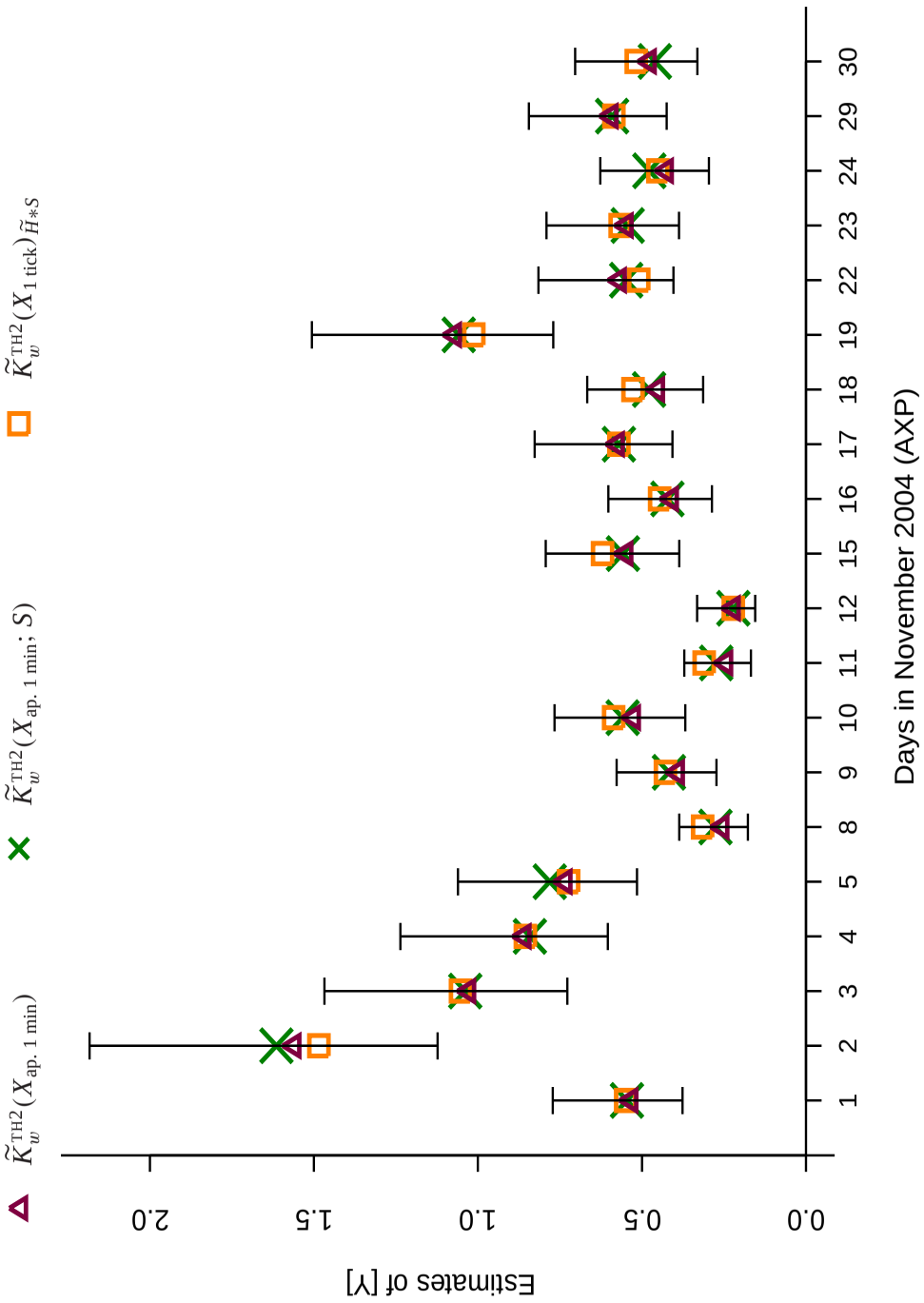

Figure 2: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 2: Summary statistics for subsampled $[Y]$ estimators, AXP year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	0.657	0.419 (0.987)	5.500	1.000	0.40	0.40	0.31	0.18
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	0.656	0.422 (0.994)	5.500	0.997	0.39	0.40	0.32	0.18
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	0.657	0.389 (0.923)	46.73	0.986	0.43	0.41	0.30	0.15
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.662	0.468 (1.047)		0.937	0.30	0.34	0.30	0.17
$[X_{\text{5 minutes}}; 300]$	0.655	0.374 (0.899)		0.986	0.45	0.43	0.31	0.15
$[X_{\text{1 minutes}}; 60]$	0.664	0.282 (0.646)		0.867	0.44	0.36	0.27	0.07
AMZ (2005)								
$TSRV(K, J)$	0.678	0.495 (1.128)		0.960	0.34	0.37	0.30	0.18

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

3. Tables and Figures for BA

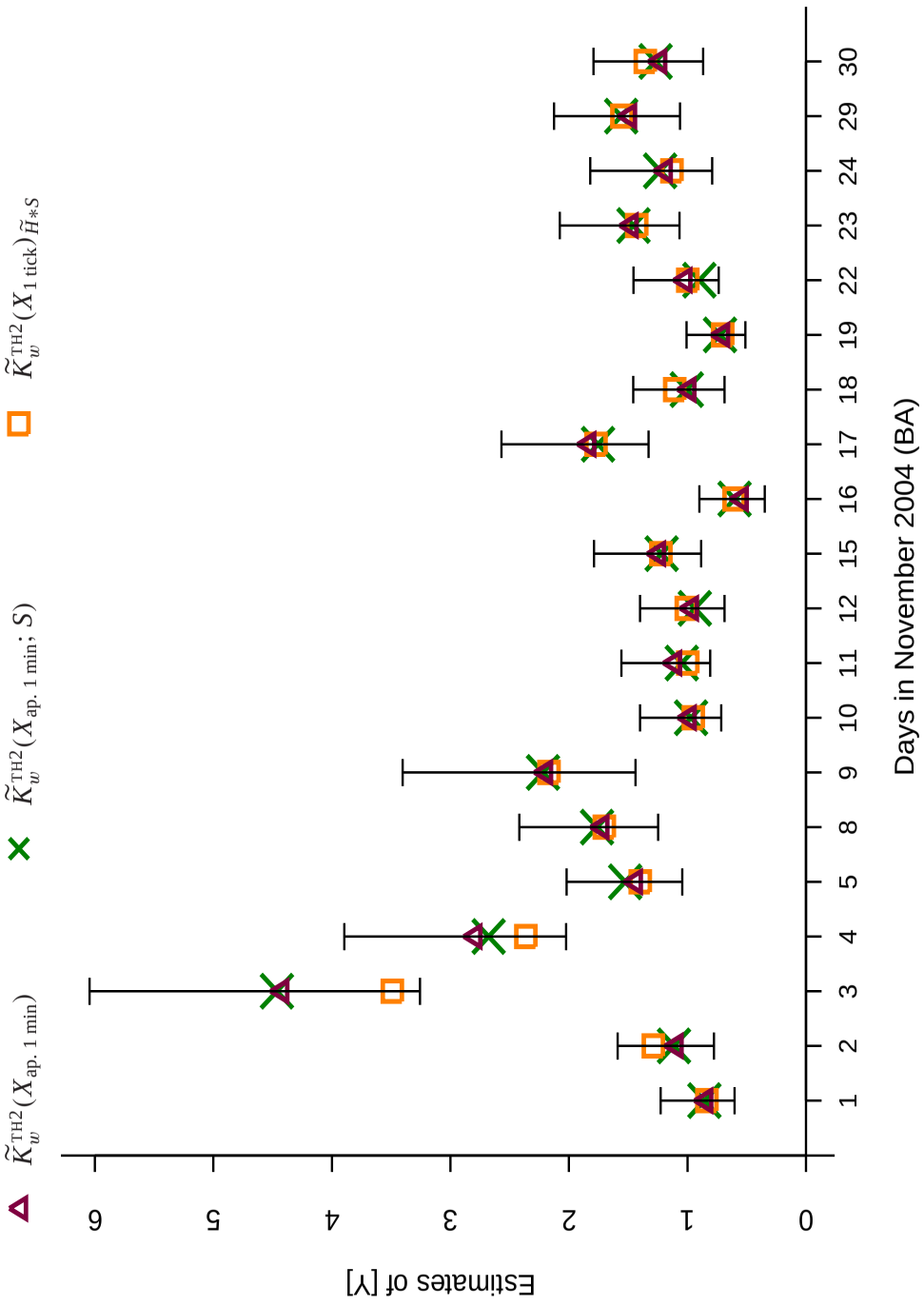

Figure 3: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 3: Summary statistics for subsampled $[Y]$ estimators, BA year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.520	0.858 (1.682)	5.256	1.000	0.28	0.27	0.11	0.24
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.506	0.825 (1.643)	5.256	0.987	0.30	0.28	0.15	0.20
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.491	0.776 (1.643)	48.51	0.981	0.34	0.32	0.19	0.23
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.445	0.917 (1.429)		0.888	0.20	0.11	0.00	0.16
$[X_{\text{5 minutes}}; 300]$	1.506	0.802 (1.650)		0.983	0.33	0.30	0.17	0.23
$[X_{\text{1 minutes}}; 60]$	1.497	0.666 (1.745)		0.830	0.51	0.47	0.40	0.31
AMZ (2005)								
$TSRV(K, J)$	1.503	0.860 (1.569)		0.885	0.27	0.23	0.10	0.12

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

4. Tables and Figures for C

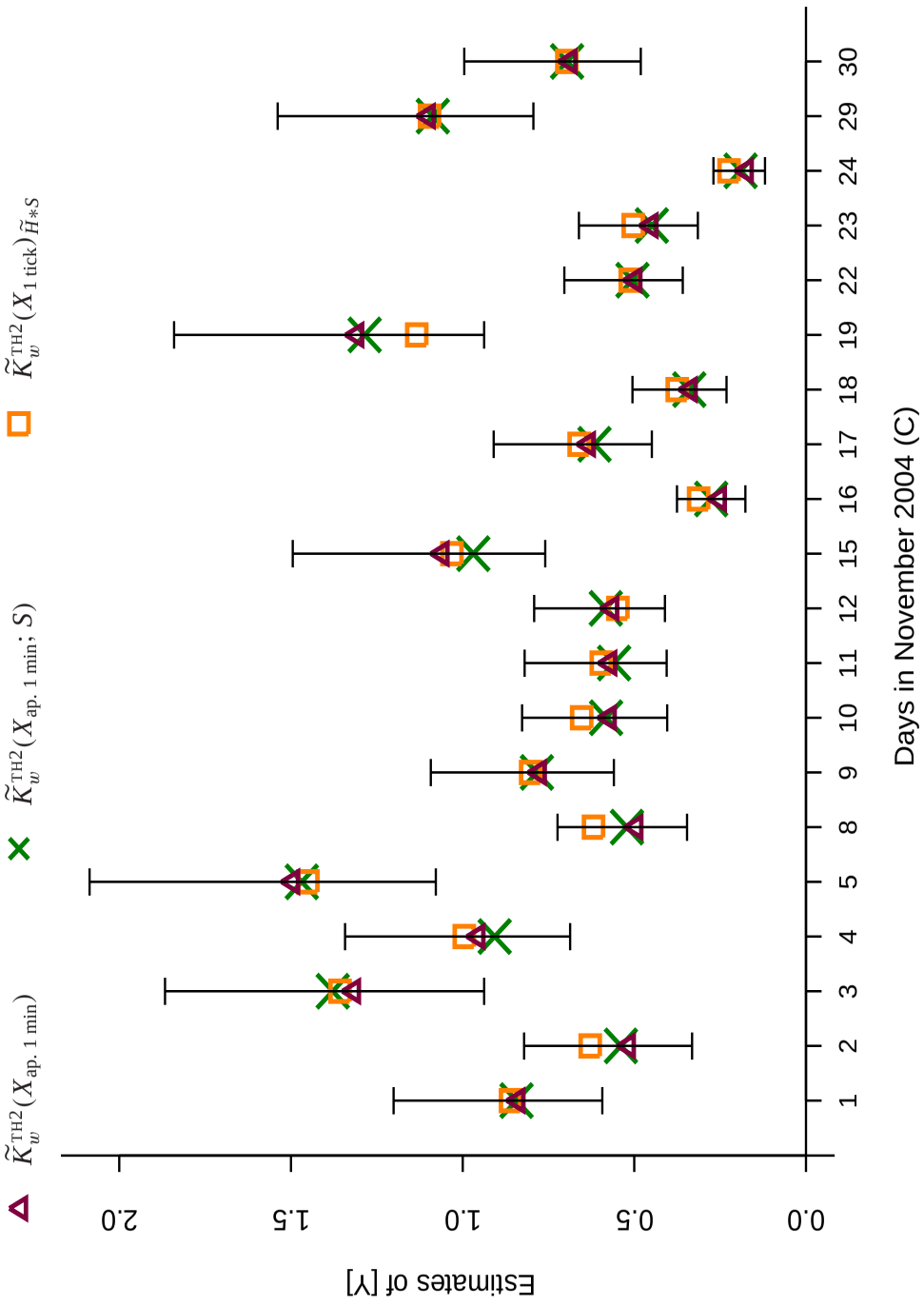

Figure 4: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 4: Summary statistics for subsampled $[Y]$ estimators, C year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	0.908	0.548 (1.161)	5.755	1.000	0.37	0.25	0.23	0.17
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	0.895	0.534 (1.145)	5.755	0.996	0.38	0.26	0.23	0.19
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	0.935	0.518 (1.168)	79.63	0.989	0.43	0.31	0.26	0.19
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.868	0.569 (1.156)		0.953	0.29	0.21	0.22	0.19
$[X_{\text{5 minutes}}; 300]$	0.913	0.480 (1.114)		0.978	0.46	0.36	0.30	0.18
$[X_{\text{1 minutes}}; 60]$	1.020	0.442 (1.133)		0.832	0.57	0.49	0.35	0.20
AMZ (2005)								
$TSRV(K, J)$	0.911	0.595 (1.244)		0.961	0.32	0.24	0.24	0.22

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

5. Tables and Figures for CAT

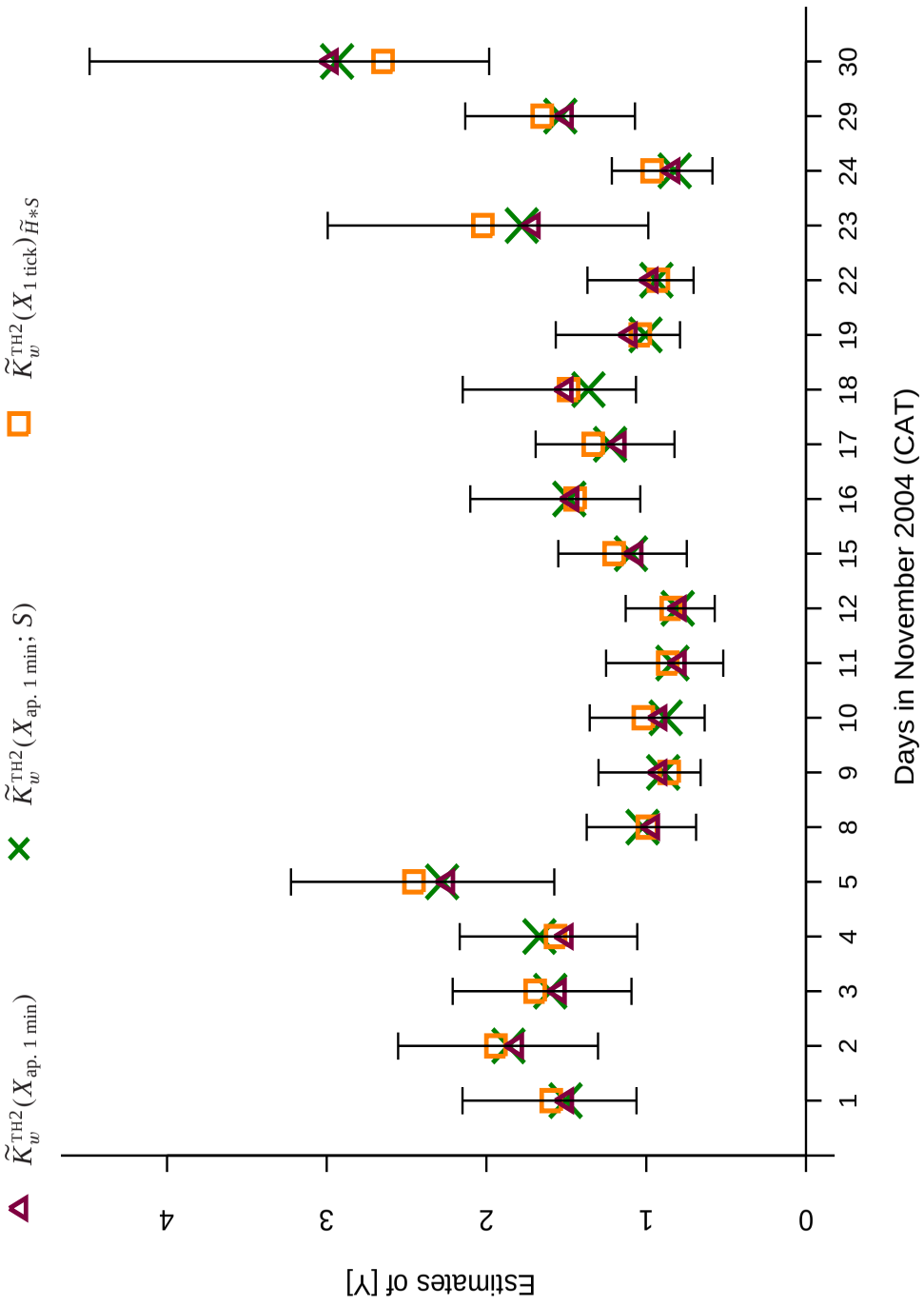

Figure 5: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 5: Summary statistics for subsampled $[Y]$ estimators, CAT year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.599	1.061 (1.915)	5.036	1.000	0.36	0.24	0.11	-0.00
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.591	1.054 (1.897)	5.036	0.996	0.35	0.23	0.11	0.01
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.593	0.987 (1.868)	48.10	0.990	0.39	0.25	0.13	0.02
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.534	1.126 (1.920)		0.912	0.36	0.20	0.08	0.00
$[X_{\text{5 minutes}}; 300]$	1.574	1.036 (1.911)		0.987	0.35	0.26	0.12	0.01
$[X_{\text{1 minutes}}; 60]$	1.563	0.824 (1.841)		0.911	0.45	0.34	0.25	0.11
AMZ (2005)								
$TSRV(K, J)$	1.627	1.022 (1.968)		0.892	0.48	0.25	0.14	0.02

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

6. Tables and Figures for DD

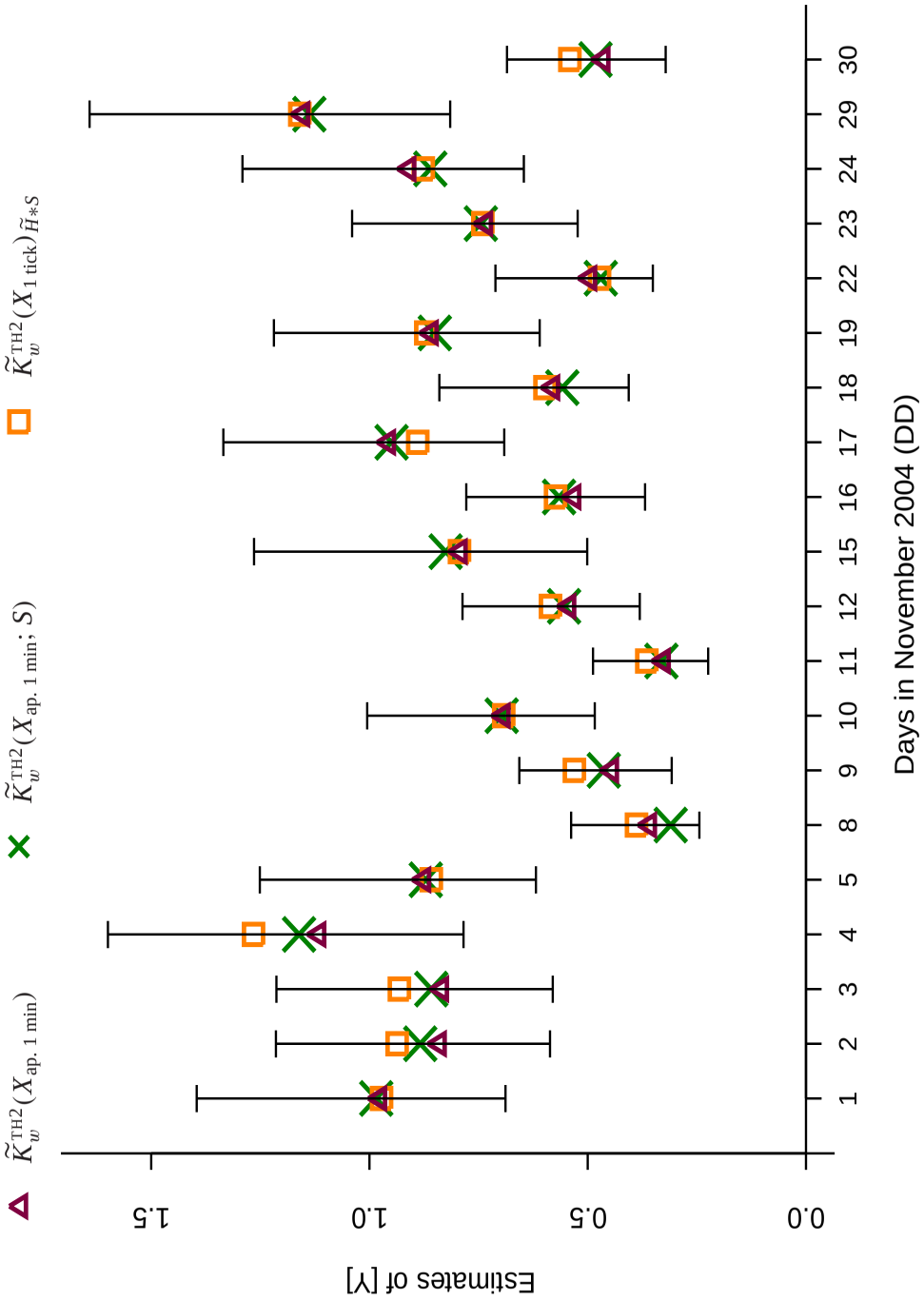

Figure 6: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 6: Summary statistics for subsampled $[Y]$ estimators, DD year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.027	0.514 (1.173)	5.719	1.000	0.47	0.38	0.23	0.13
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.023	0.508 (1.171)	5.719	0.995	0.47	0.37	0.24	0.12
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.059	0.483 (1.208)	53.49	0.977	0.53	0.46	0.33	0.15
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.987	0.564 (1.126)		0.893	0.36	0.23	0.11	0.12
$[X_{\text{5 minutes}}; 300]$	1.055	0.472 (1.148)		0.979	0.52	0.42	0.30	0.14
$[X_{\text{1 minutes}}; 60]$	1.226	0.452 (1.225)		0.791	0.57	0.54	0.43	0.17
AMZ (2005)								
$TSRV(K, J)$	1.025	0.567 (1.176)		0.943	0.38	0.23	0.15	0.11

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

7. Tables and Figures for DIS

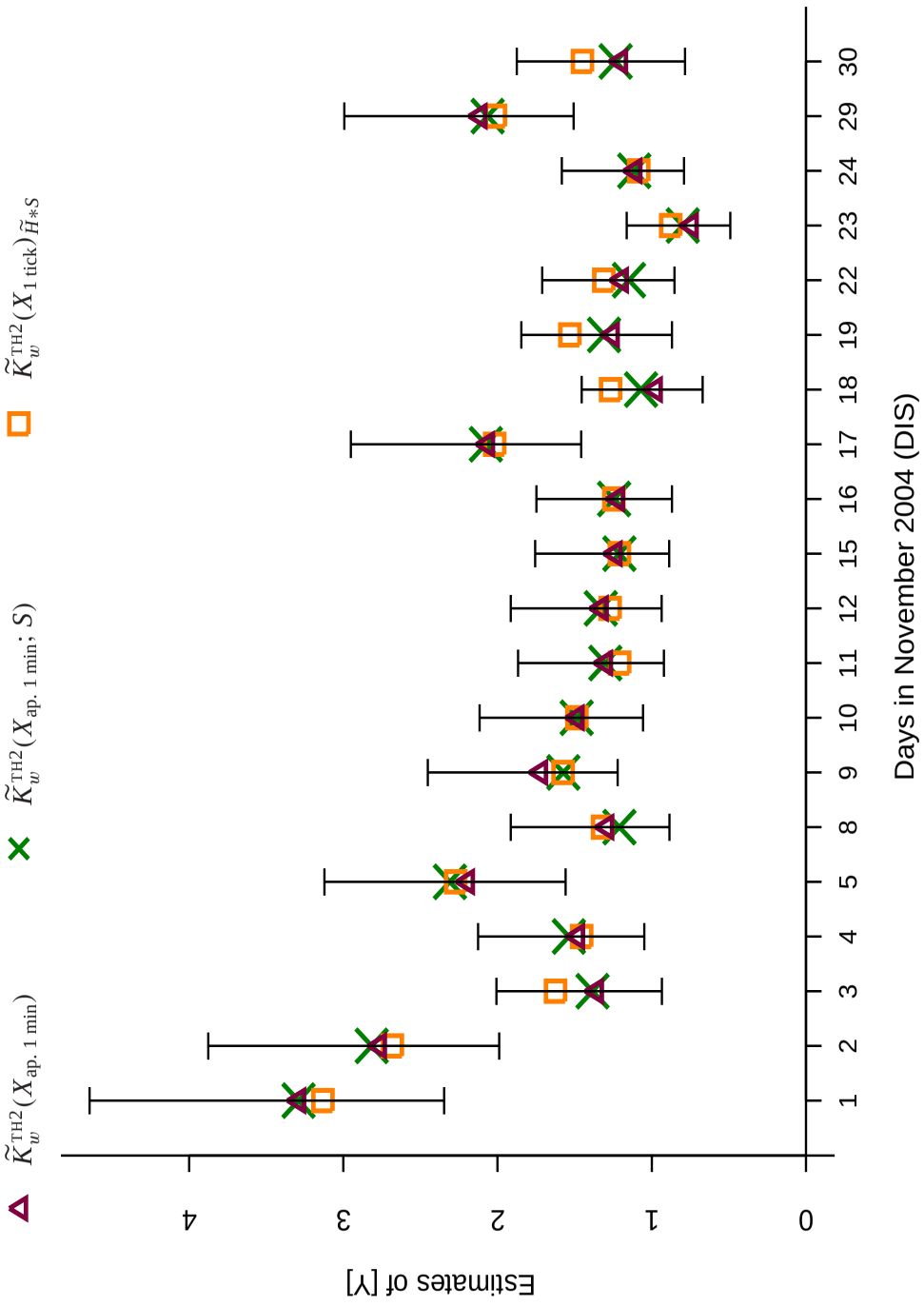

Figure 7: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 7: Summary statistics for subsampled $[Y]$ estimators, DIS year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.492	0.894 (1.825)	6.554	1.000	0.40	0.30	0.18	0.10
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.484	0.903 (1.845)	6.554	0.995	0.40	0.30	0.19	0.10
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.560	0.888 (1.886)	69.10	0.986	0.42	0.33	0.22	0.12
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.344	0.899 (1.701)		0.896	0.26	0.23	0.13	0.08
$[X_{\text{5 minutes}}; 300]$	1.574	0.841 (1.849)		0.982	0.46	0.34	0.23	0.12
$[X_{\text{1 minutes}}; 60]$	2.023	0.888 (2.254)		0.836	0.56	0.45	0.39	0.17
AMZ (2005)								
$TSRV(K, J)$	1.400	0.987 (1.932)		0.958	0.32	0.27	0.17	0.11

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

8. Tables and Figures for EK

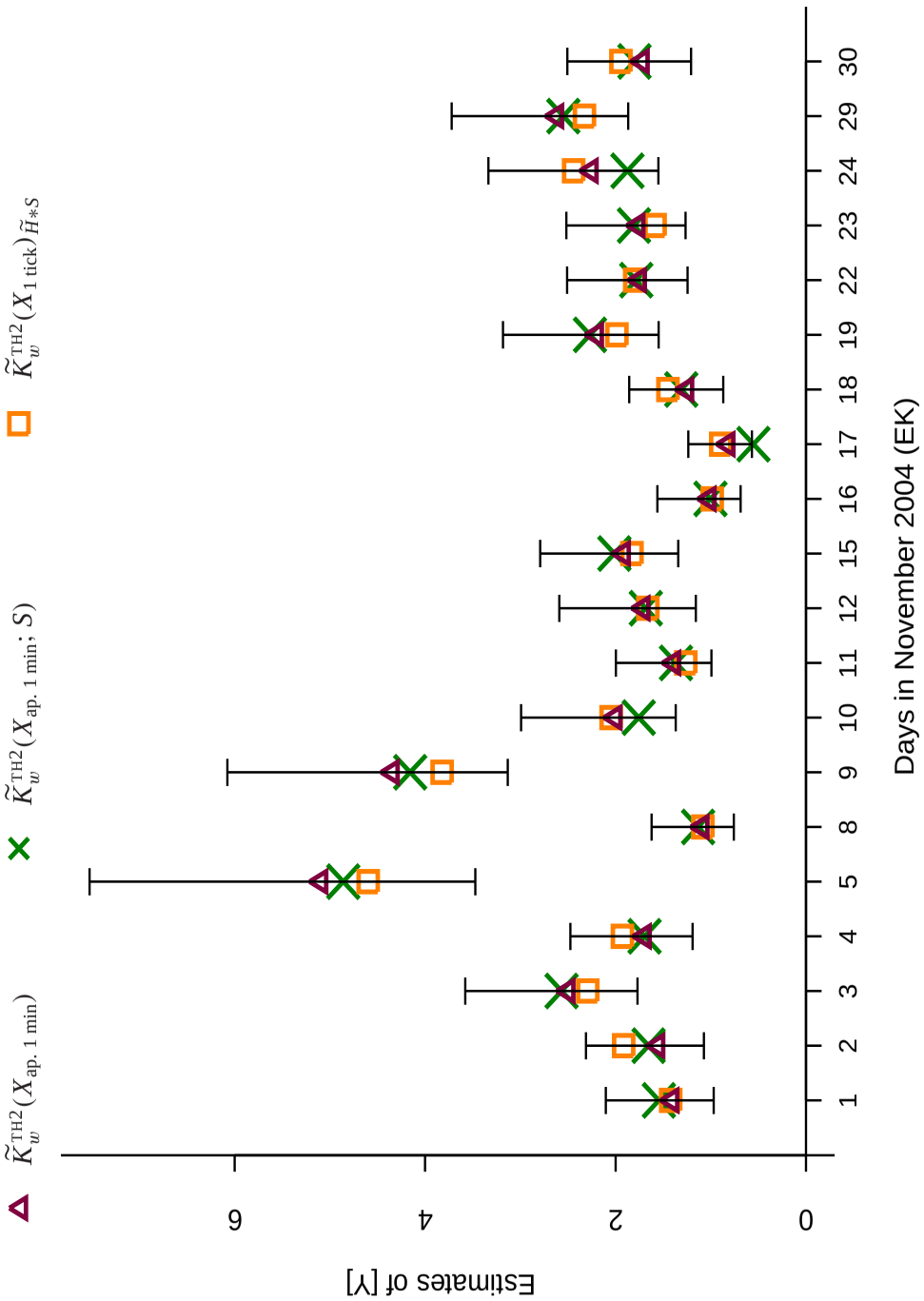

Figure 8: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 8: Summary statistics for subsampled $[Y]$ estimators, EK year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	2.406	2.711 (3.761)	5.394	1.000	0.20	0.05	0.04	-0.01
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	2.381	2.659 (3.705)	5.394	0.998	0.21	0.05	0.04	-0.00
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	2.295	2.253 (3.247)	34.63	0.993	0.25	0.05	0.05	-0.01
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	2.340	3.231 (4.126)		0.959	0.19	0.01	0.04	-0.02
$[X_{\text{5 minutes}}; 300]$	2.288	2.083 (2.961)		0.982	0.25	0.05	0.05	-0.01
$[X_{\text{1 minutes}}; 60]$	2.090	1.540 (2.229)		0.955	0.27	0.02	0.05	-0.03
AMZ (2005)								
$TSRV(K, J)$	2.378	3.189 (4.183)		0.974	0.19	0.02	0.04	-0.00

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

9. Tables and Figures for GE

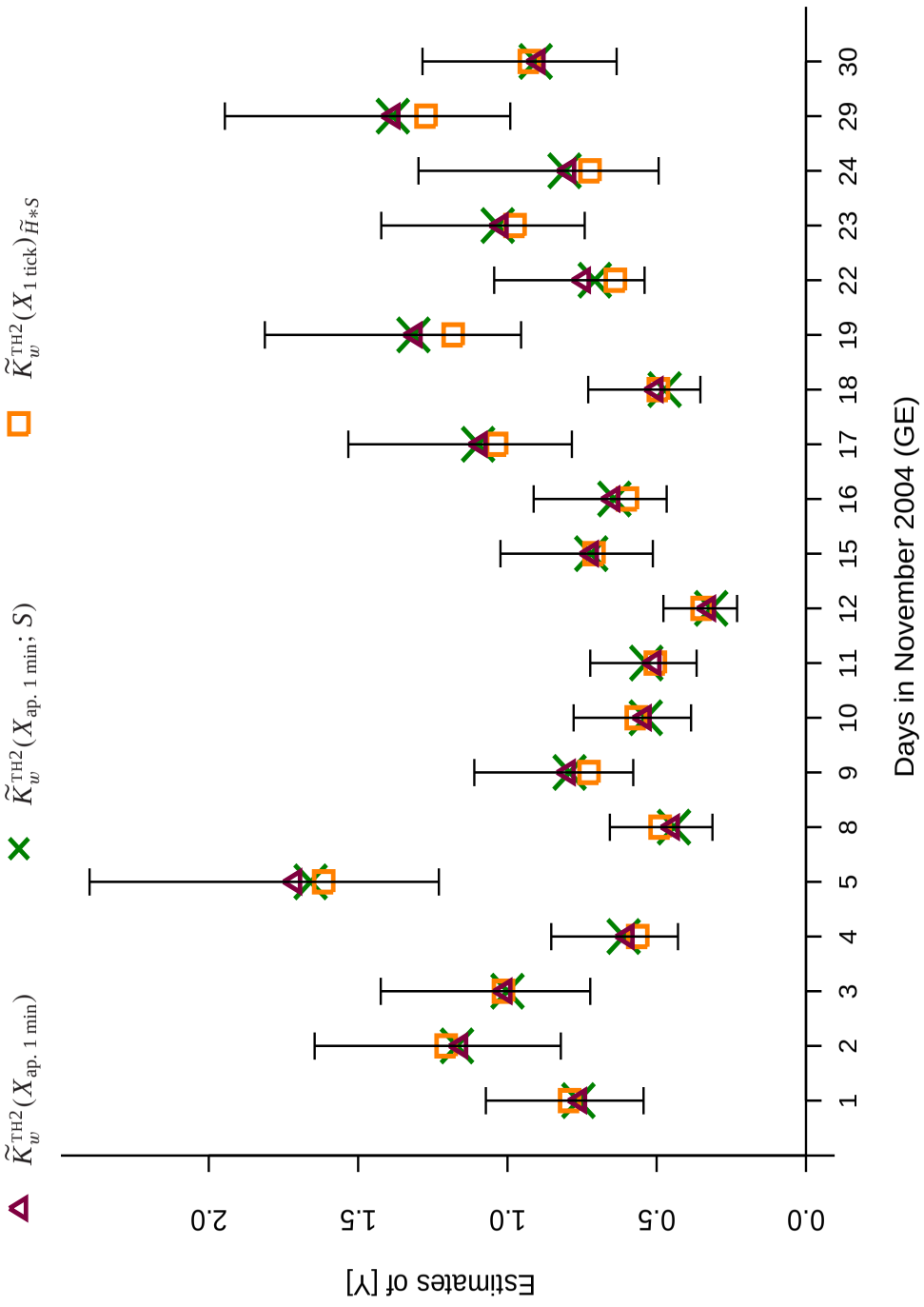

Figure 9: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 9: Summary statistics for subsampled $[Y]$ estimators, GE year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	0.962	0.568 (1.195)	5.723	1.000	0.34	0.32	0.28	0.08
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	0.954	0.561 (1.202)	5.723	0.995	0.37	0.32	0.28	0.09
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	0.947	0.522 (1.130)	78.27	0.990	0.37	0.31	0.30	0.08
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.885	0.516 (1.036)		0.933	0.27	0.27	0.27	0.08
$[X_{\text{5 minutes}}; 300]$	0.943	0.503 (1.088)		0.984	0.37	0.32	0.30	0.08
$[X_{\text{1 minutes}}; 60]$	0.942	0.376 (0.921)		0.899	0.46	0.43	0.38	0.12
AMZ (2005)								
$TSRV(K, J)$	0.946	0.560 (1.194)		0.944	0.33	0.35	0.28	0.11

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

10. Tables and Figures for GM

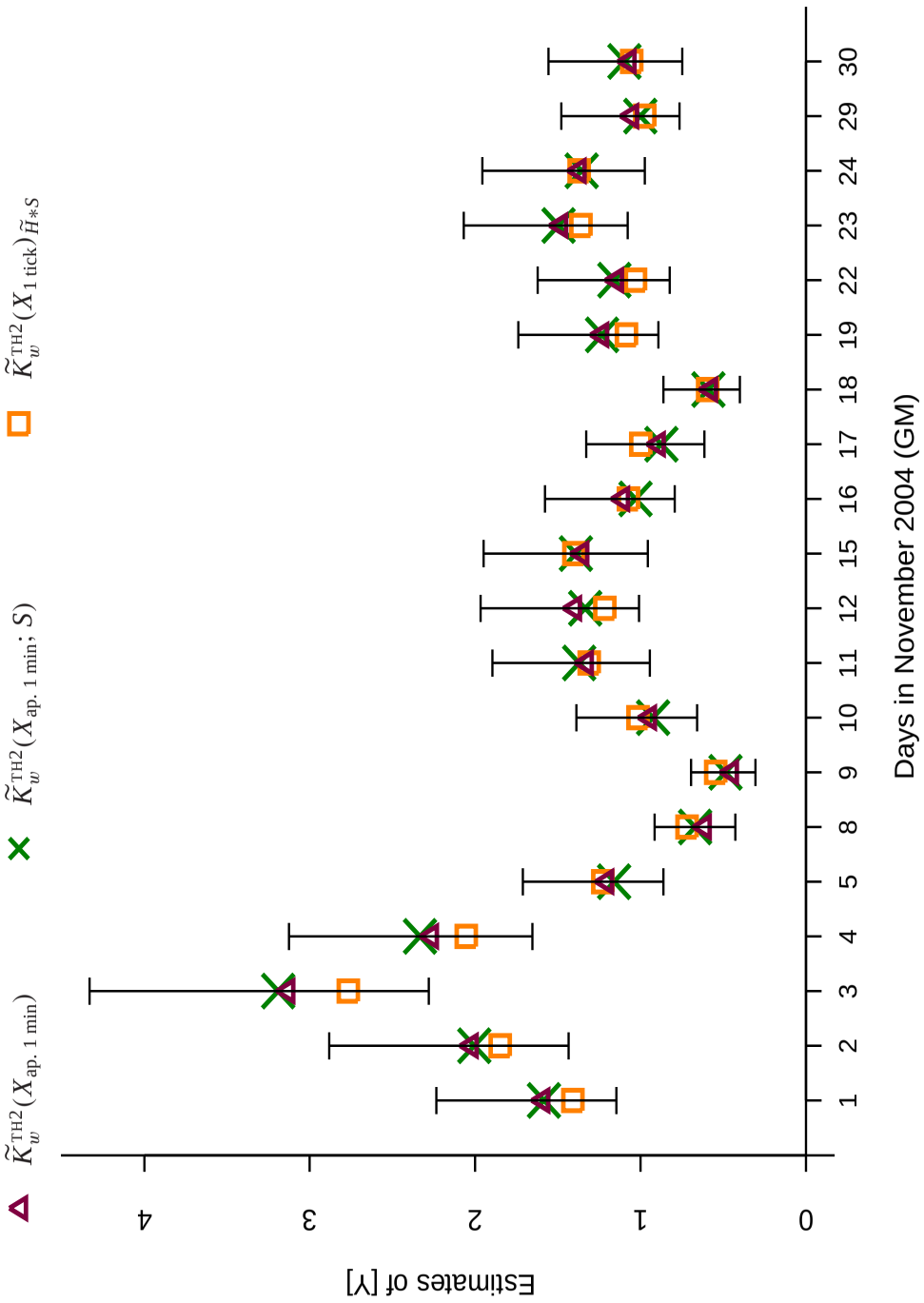

Figure 10: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 10: Summary statistics for subsampled $[Y]$ estimators, GM year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.390	0.791 (1.199)	5.116	1.000	0.29	0.12	-0.01	0.14
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.373	0.760 (1.192)	5.116	0.987	0.30	0.14	0.00	0.12
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{1\text{ tick}})$	1.335	0.685 (1.096)	44.69	0.986	0.30	0.14	0.02	0.16
Simple RV subsampled								
$[X_{20\text{ minutes}}; 1200]$	1.417	0.986 (1.474)		0.926	0.30	0.13	-0.03	0.08
$[X_{5\text{ minutes}}; 300]$	1.352	0.702 (1.157)		0.977	0.33	0.16	0.02	0.12
$[X_{1\text{ minutes}}; 60]$	1.247	0.495 (0.883)		0.860	0.32	0.21	0.12	0.14
AMZ (2005)								
$TSRV(K, J)$	1.438	0.949 (1.432)		0.924	0.31	0.12	-0.04	0.04

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\text{ minutes}}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

11. Tables and Figures for HD

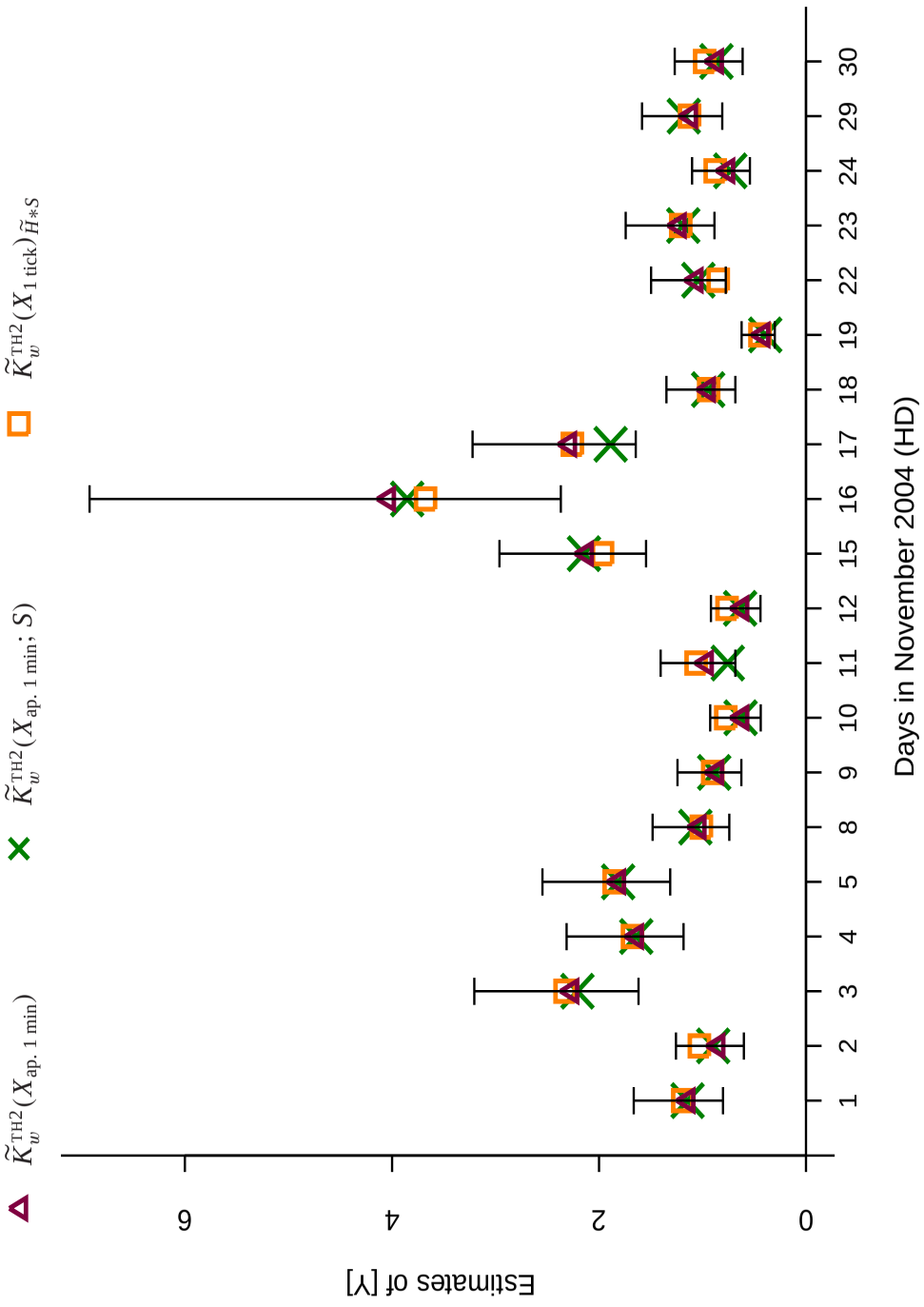

Figure 11: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 11: Summary statistics for subsampled $[Y]$ estimators, HD year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.466	0.822 (1.668)	5.241	1.000	0.39	0.26	0.18	0.10
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.453	0.811 (1.640)	5.241	0.997	0.38	0.26	0.18	0.10
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.433	0.745 (1.551)	56.73	0.979	0.42	0.30	0.21	0.10
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.403	0.826 (1.449)		0.887	0.24	0.14	0.14	0.10
$[X_{\text{5 minutes}}; 300]$	1.419	0.722 (1.525)		0.976	0.45	0.31	0.21	0.12
$[X_{\text{1 minutes}}; 60]$	1.384	0.628 (1.442)		0.793	0.55	0.43	0.26	0.14
AMZ (2005)								
$TSRV(K, J)$	1.506	0.906 (1.729)		0.935	0.32	0.22	0.13	0.10

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

12. Tables and Figures for HON

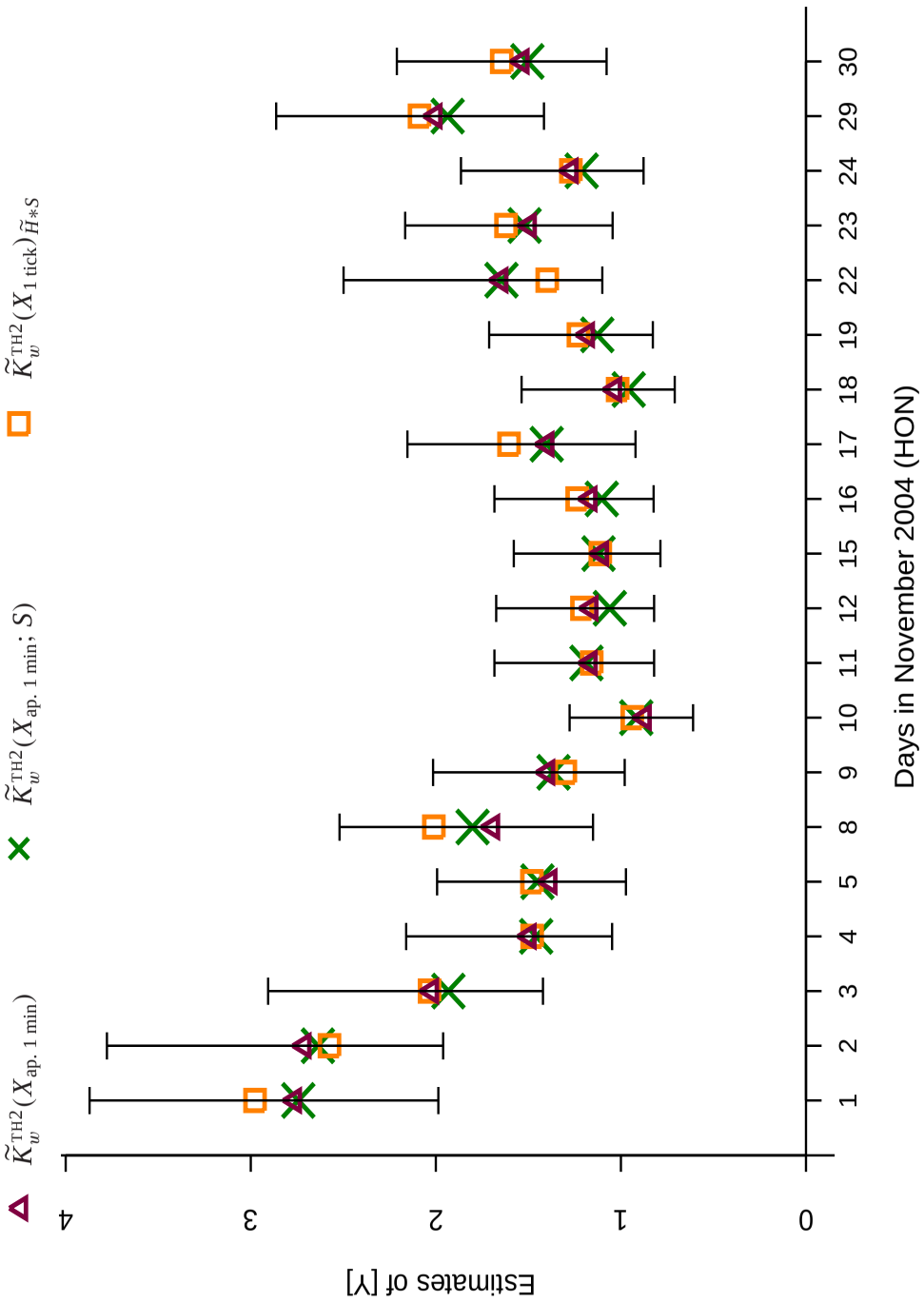

Figure 12: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 12: Summary statistics for subsampled $[Y]$ estimators, HON year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.940	1.524 (2.603)	5.554	1.000	0.32	0.11	0.11	0.04
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.926	1.521 (2.602)	5.554	0.998	0.33	0.12	0.10	0.03
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.963	1.505 (2.572)	46.35	0.987	0.30	0.14	0.09	0.04
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.798	1.521 (2.356)		0.954	0.24	0.05	0.10	0.02
$[X_{\text{5 minutes}}; 300]$	1.940	1.525 (2.689)		0.914	0.26	0.13	0.10	0.06
$[X_{\text{1 minutes}}; 60]$	2.070	1.349 (2.261)		0.817	0.19	0.16	0.06	0.06
AMZ (2005)								
$TSRV(K, J)$	1.890	1.566 (2.590)		0.978	0.31	0.10	0.11	0.01

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

13. Tables and Figures for HPQ

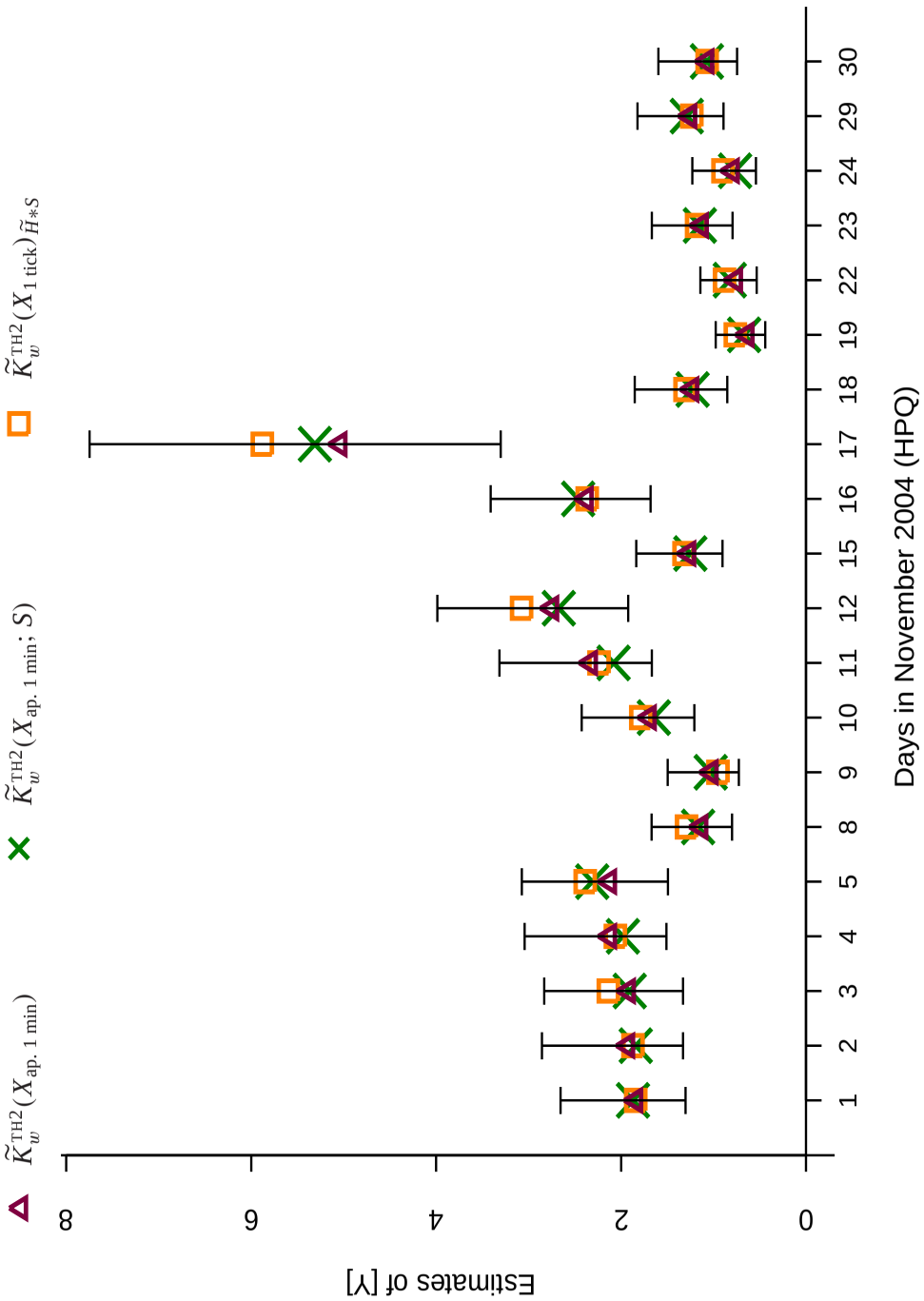

Figure 13: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 13: Summary statistics for subsampled $[Y]$ estimators, HPQ year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.945	1.326 (2.730)	6.261	1.000	0.34	0.23	0.22	0.18
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.915	1.292 (2.694)	6.261	0.993	0.34	0.25	0.23	0.19
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.993	1.277 (2.661)	68.68	0.981	0.36	0.23	0.21	0.18
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.827	1.430 (2.562)		0.933	0.28	0.15	0.17	0.13
$[X_{\text{5 minutes}}; 300]$	1.990	1.192 (2.477)		0.978	0.38	0.25	0.20	0.17
$[X_{\text{1 minutes}}; 60]$	2.300	1.037 (2.173)		0.837	0.38	0.28	0.18	0.13
AMZ (2005)								
$TSRV(K, J)$	1.818	1.494 (2.949)		0.931	0.32	0.22	0.18	0.22

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

14. Tables and Figures for IBM

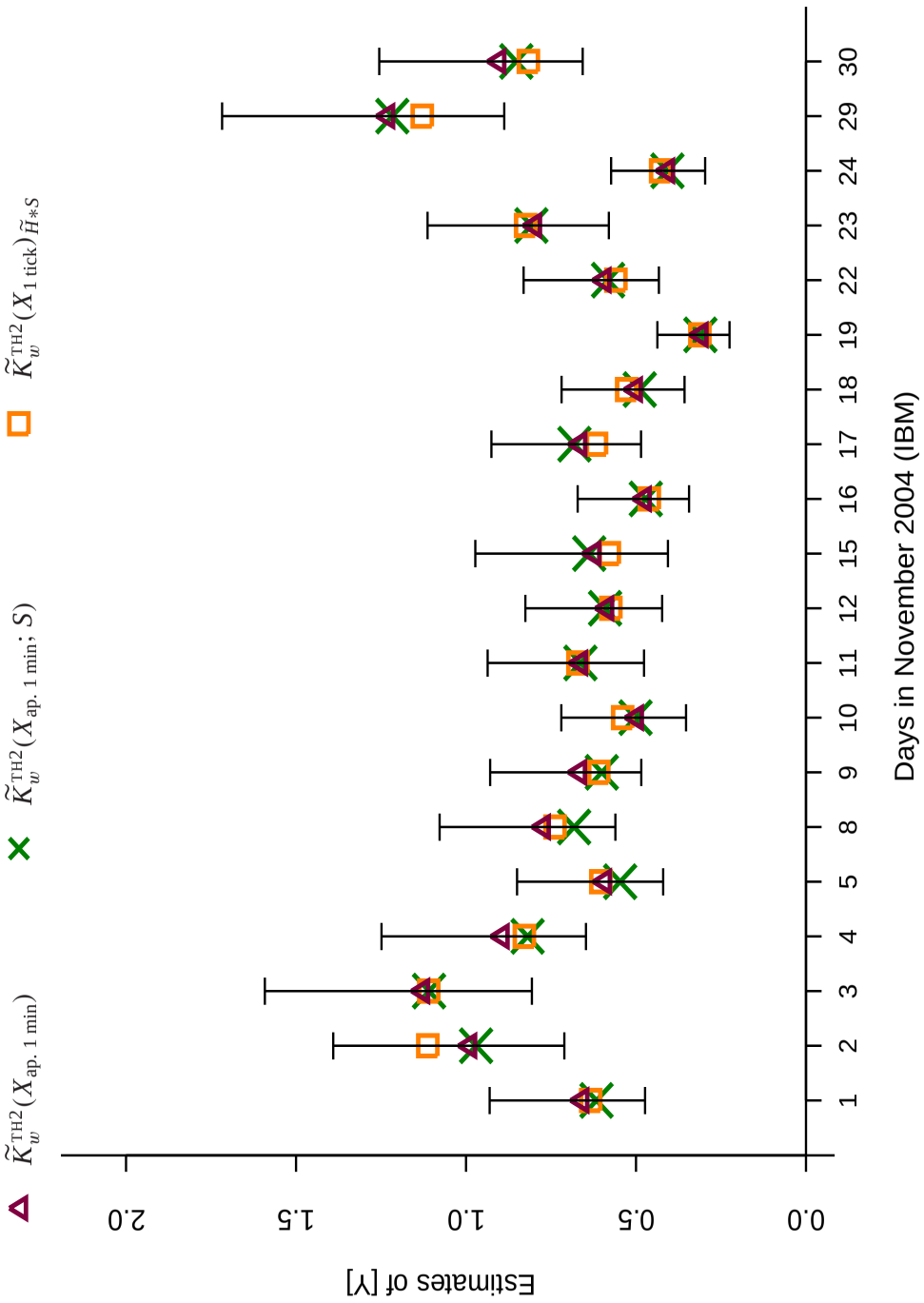

Figure 14: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 14: Summary statistics for subsampled $[Y]$ estimators, IBM year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	0.800	0.445 (0.991)	5.566	1.000	0.35	0.32	0.29	0.11
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	0.791	0.445 (1.008)	5.566	0.996	0.35	0.33	0.31	0.11
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	0.834	0.435 (1.041)	73.13	0.984	0.41	0.40	0.36	0.14
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.734	0.423 (0.834)		0.916	0.22	0.25	0.21	0.10
$[X_{\text{5 minutes}}; 300]$	0.830	0.424 (1.024)		0.983	0.43	0.40	0.36	0.13
$[X_{\text{1 minutes}}; 60]$	0.951	0.413 (1.126)		0.831	0.58	0.55	0.46	0.20
AMZ (2005)								
$TSRV(K, J)$	0.777	0.443 (0.967)		0.951	0.32	0.29	0.30	0.11

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

15. Tables and Figures for INTC

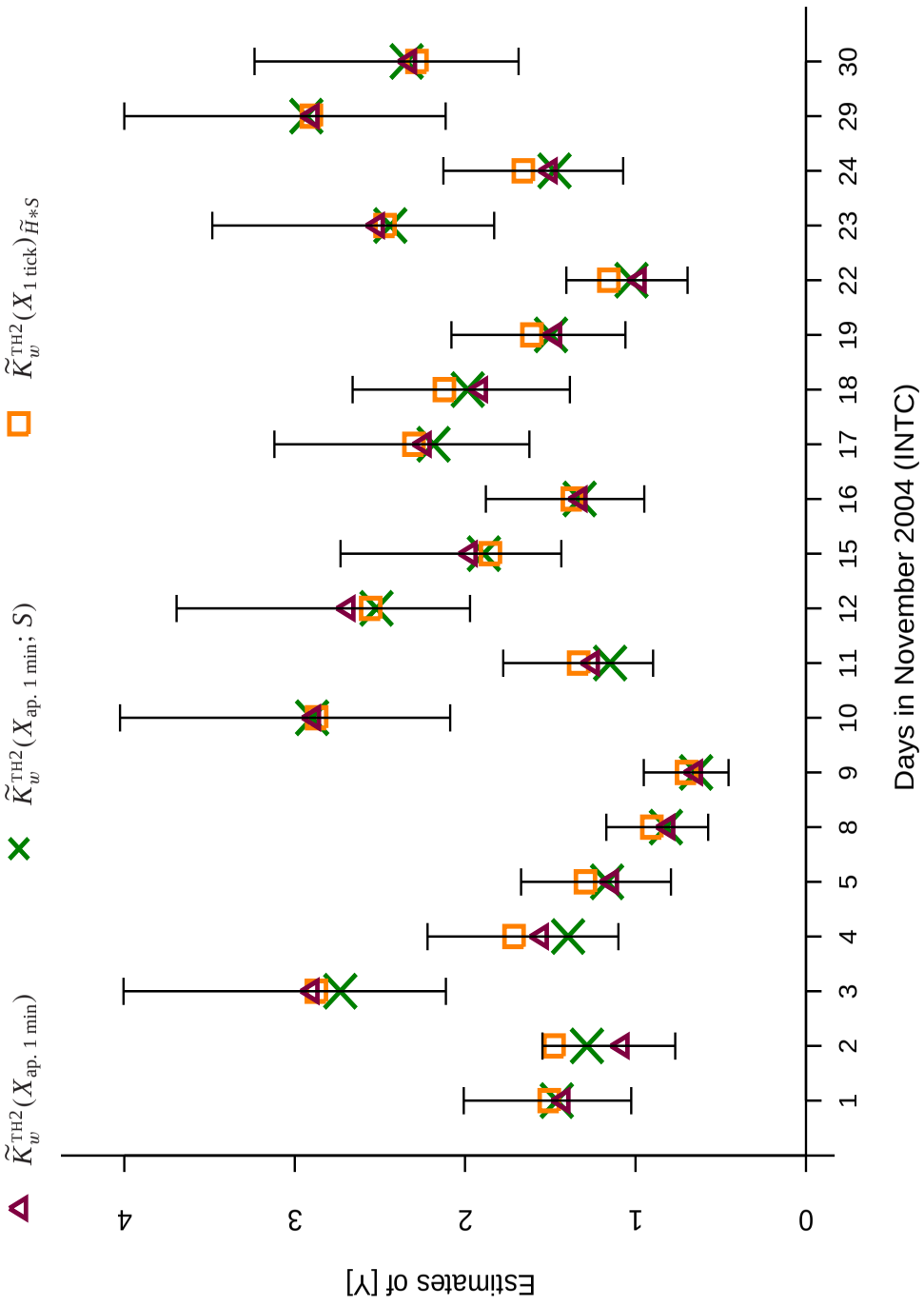

Figure 15: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \tilde{H} \cdot S$.

Table 15: Summary statistics for subsampled $[Y]$ estimators, INTC year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	2.272	0.976 (1.868)	5.462	1.000	0.33	0.21	0.22	0.01
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	2.244	0.952 (1.859)	5.462	0.994	0.34	0.22	0.22	0.02
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	2.310	0.936 (1.924)	134.86	0.983	0.39	0.27	0.26	0.05
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	2.026	0.963 (1.665)		0.880	0.25	0.16	0.20	-0.01
$[X_{\text{5 minutes}}; 300]$	2.279	0.937 (1.836)		0.987	0.36	0.22	0.23	0.02
$[X_{\text{1 minutes}}; 60]$	2.510	0.908 (2.084)		0.917	0.48	0.36	0.34	0.10
AMZ (2005)								
$TSRV(K, J)$	2.217	0.998 (1.811)		0.933	0.33	0.18	0.20	-0.01

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

16. Tables and Figures for IP

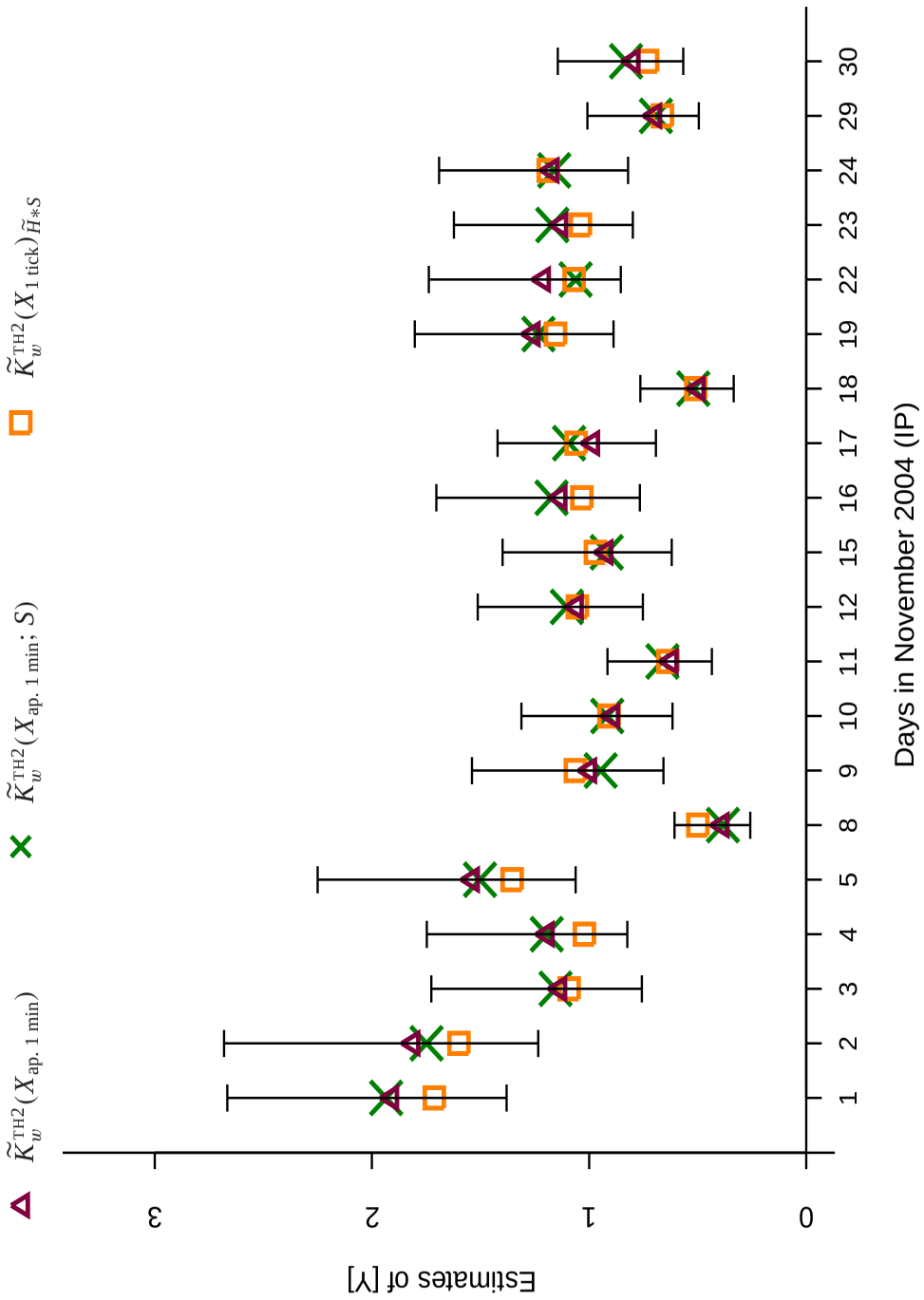

Figure 16: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 16: Summary statistics for subsampled $[Y]$ estimators, IP year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.252	0.681 (1.522)	5.253	1.000	0.44	0.33	0.23	0.10
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.239	0.661 (1.505)	5.253	0.993	0.47	0.34	0.22	0.10
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.216	0.621 (1.515)	38.70	0.976	0.49	0.41	0.31	0.15
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.230	0.774 (1.511)		0.878	0.32	0.22	0.08	0.07
$[X_{\text{5 minutes}}; 300]$	1.232	0.617 (1.500)		0.976	0.51	0.41	0.29	0.15
$[X_{\text{1 minutes}}; 60]$	1.225	0.582 (1.664)		0.811	0.61	0.56	0.49	0.30
AMZ (2005)								
$TSRV(K, J)$	1.246	0.757 (1.623)		0.921	0.38	0.28	0.12	0.10

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

17. Tables and Figures for JNJ

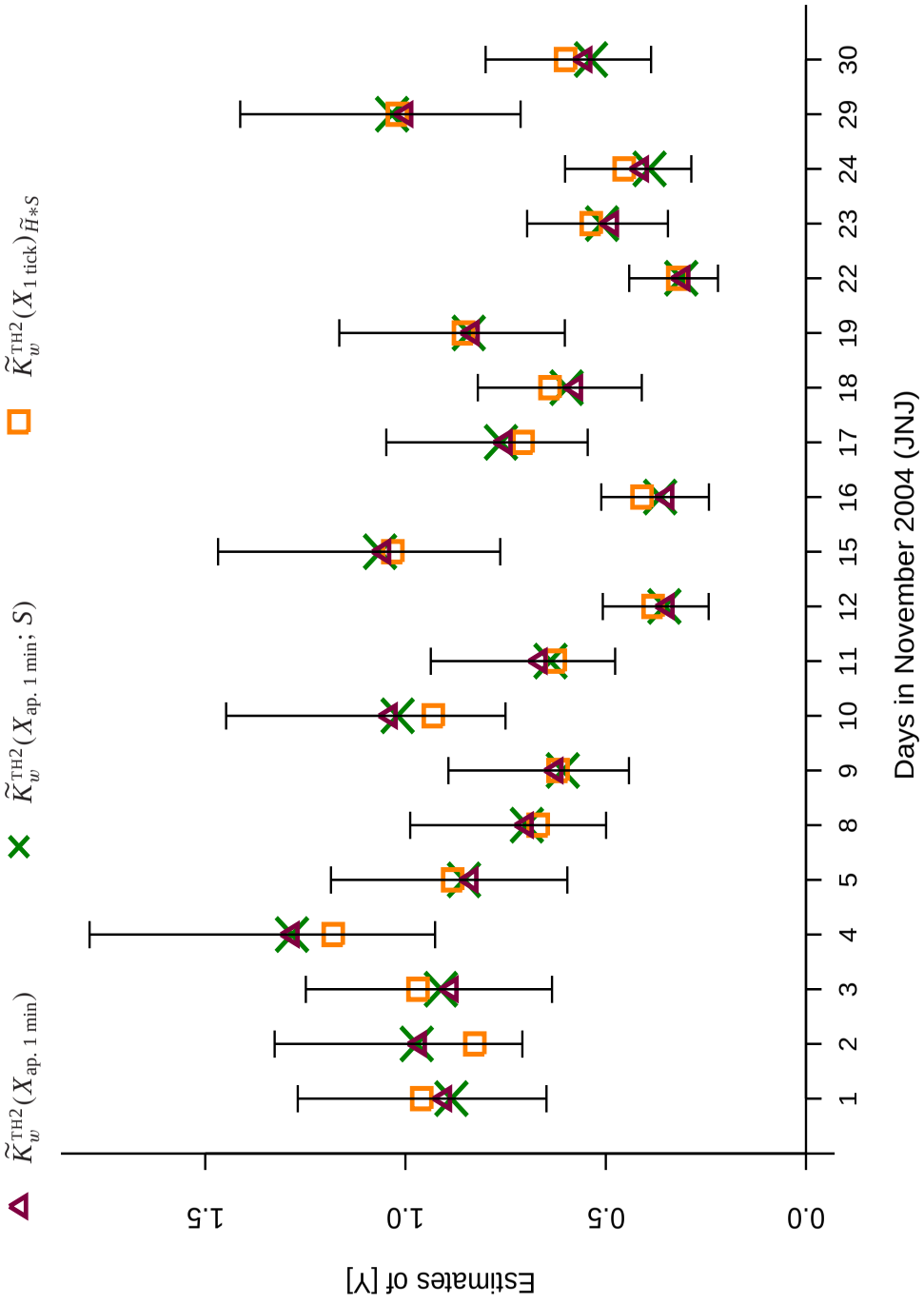

Figure 17: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 17: Summary statistics for subsampled $[Y]$ estimators, JNJ year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	0.795	0.694 (1.037)	5.470	1.000	0.16	0.08	0.02	0.02
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	0.786	0.700 (1.052)	5.470	0.998	0.16	0.08	0.02	0.02
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	0.793	0.610 (0.961)	62.01	0.993	0.19	0.08	0.04	0.04
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.790	0.746 (1.080)		0.966	0.22	0.06	0.02	-0.00
$[X_{\text{5 minutes}}; 300]$	0.776	0.562 (0.903)		0.991	0.20	0.10	0.04	0.04
$[X_{\text{1 minutes}}; 60]$	0.797	0.398 (0.763)		0.888	0.31	0.16	0.12	0.08
AMZ (2005)								
$TSRV(K, J)$	0.812	0.827 (1.206)		0.975	0.15	0.08	0.03	0.00

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

18. Tables and Figures for JPM

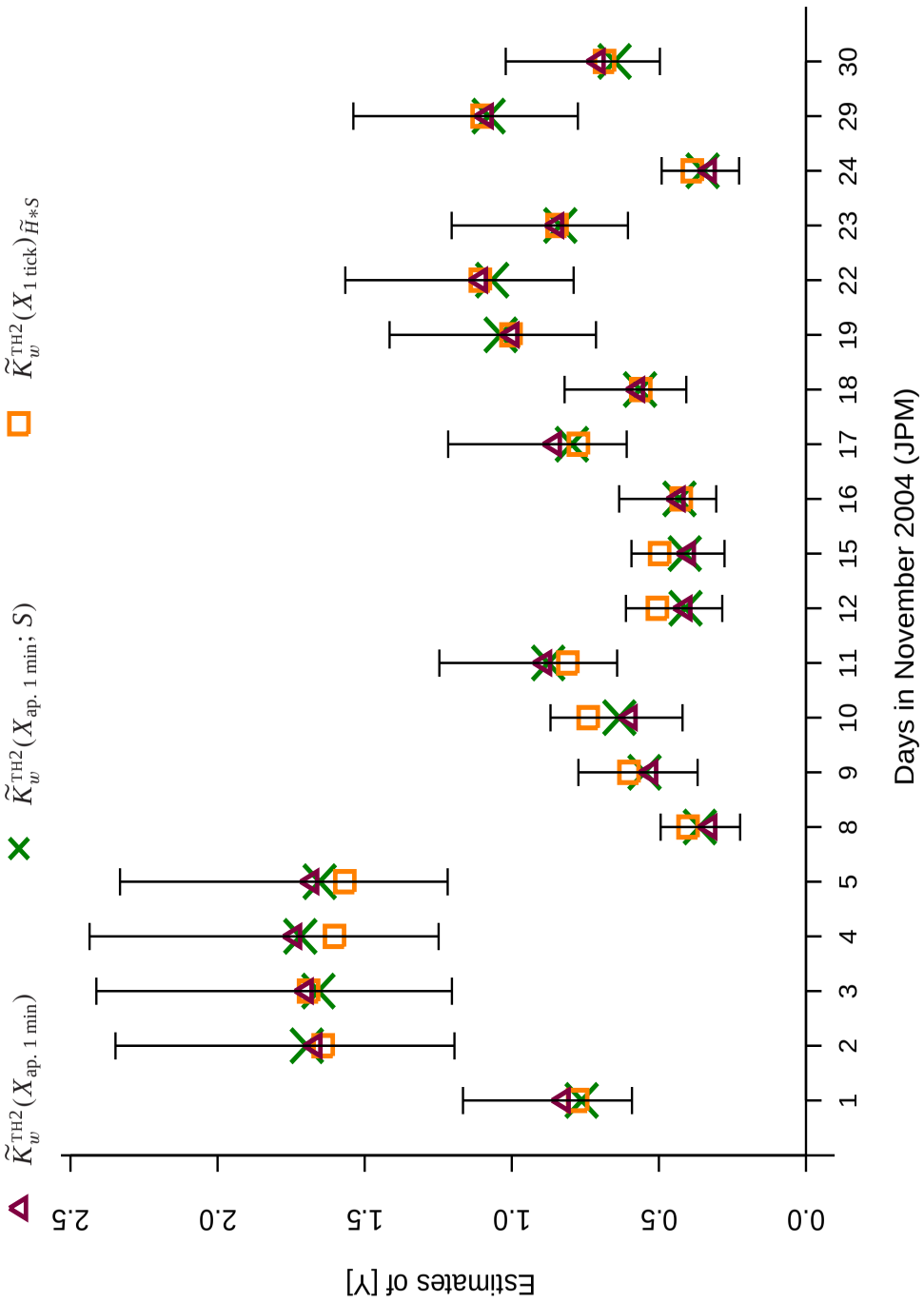

Figure 18: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 18: Summary statistics for subsampled $[Y]$ estimators, JPM year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.112	0.789 (1.641)	5.470	1.000	0.43	0.25	0.25	0.13
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.098	0.781 (1.634)	5.470	0.997	0.44	0.26	0.25	0.13
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.101	0.728 (1.569)	63.34	0.989	0.46	0.29	0.28	0.15
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.104	0.934 (1.717)		0.956	0.37	0.15	0.17	0.11
$[X_{\text{5 minutes}}; 300]$	1.096	0.750 (1.548)		0.986	0.46	0.27	0.23	0.14
$[X_{\text{1 minutes}}; 60]$	1.108	0.554 (1.347)		0.904	0.56	0.43	0.38	0.18
AMZ (2005)								
$TSRV(K, J)$	1.151	0.924 (1.818)		0.960	0.36	0.21	0.22	0.15

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

19. Tables and Figures for KO

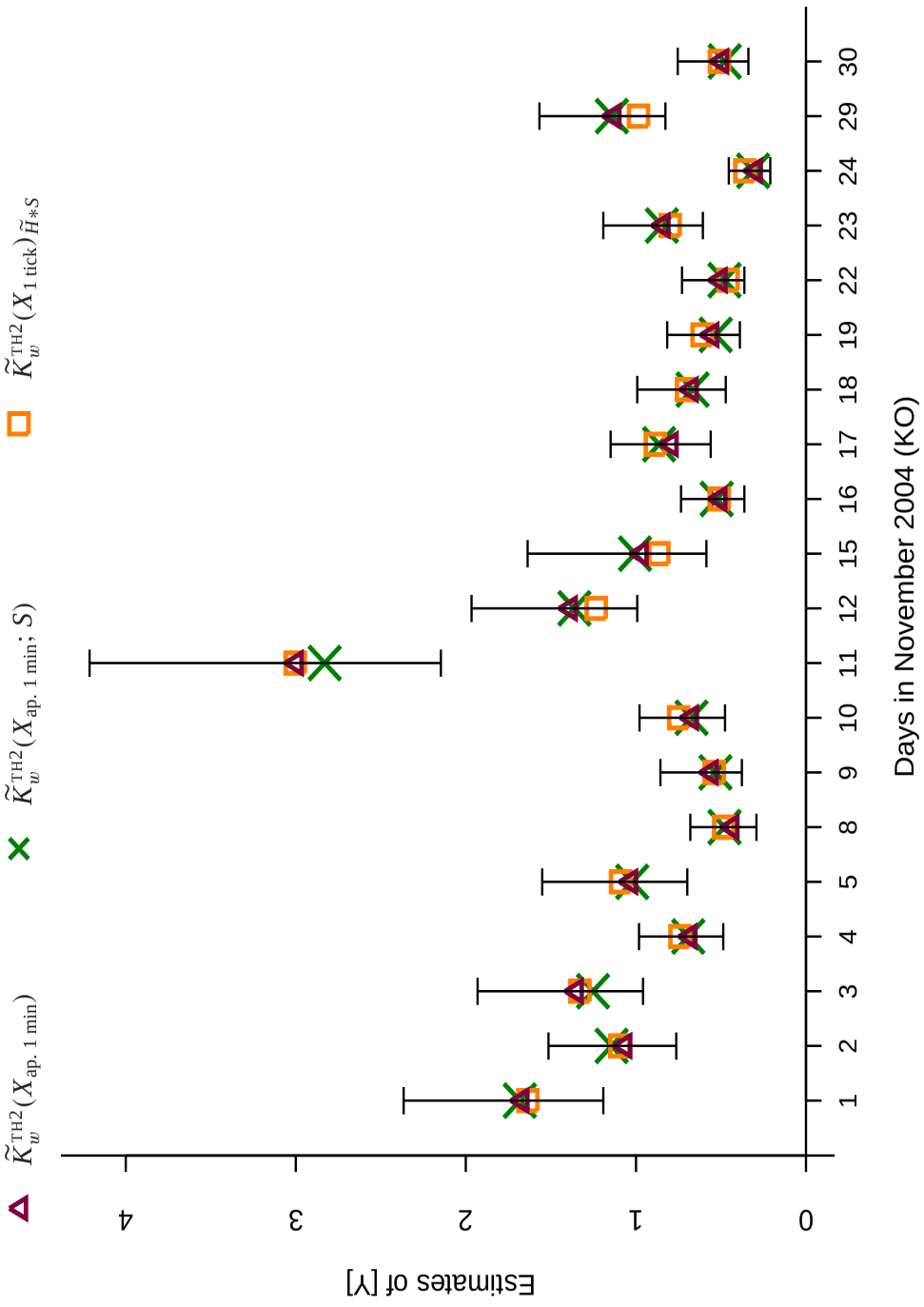

Figure 19: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 19: Summary statistics for subsampled $[Y]$ estimators, KO year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	0.918	0.536 (0.995)	5.743	1.000	0.36	0.26	0.16	0.04
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	0.907	0.531 (0.988)	5.743	0.996	0.38	0.26	0.14	0.04
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	0.932	0.523 (1.005)	57.53	0.981	0.37	0.27	0.18	0.04
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.840	0.488 (0.821)		0.893	0.31	0.23	0.12	0.04
$[X_{\text{5 minutes}}; 300]$	0.917	0.497 (0.962)		0.976	0.42	0.27	0.16	0.05
$[X_{\text{1 minutes}}; 60]$	0.998	0.431 (0.912)		0.861	0.46	0.34	0.22	0.05
AMZ (2005)								
$TSRV(K, J)$	0.876	0.494 (0.878)		0.915	0.37	0.29	0.11	0.02

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

20. Tables and Figures for MCD

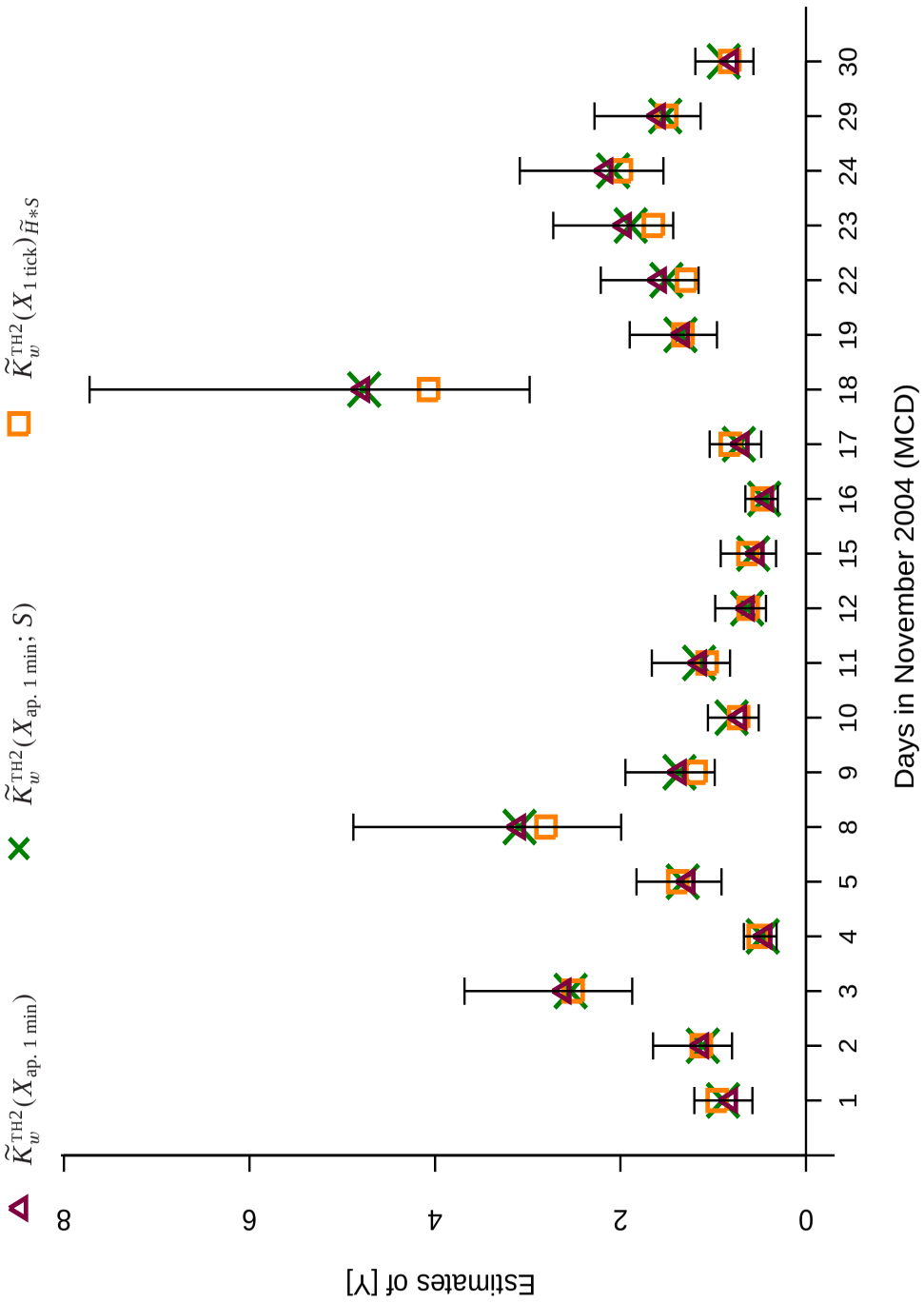

Figure 20: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 20: Summary statistics for subsampled $[Y]$ estimators, MCD year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.429	0.872 (1.792)	5.711	1.000	0.32	0.28	0.12	0.15
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.411	0.860 (1.777)	5.711	0.996	0.33	0.27	0.13	0.14
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.398	0.797 (1.723)	49.26	0.985	0.34	0.29	0.16	0.18
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.412	0.916 (1.574)		0.907	0.25	0.19	0.04	0.06
$[X_{\text{5 minutes}}; 300]$	1.438	0.792 (1.664)		0.963	0.34	0.27	0.13	0.14
$[X_{\text{1 minutes}}; 60]$	1.507	0.666 (1.611)		0.837	0.39	0.35	0.26	0.23
AMZ (2005)								
$TSRV(K, J)$	1.421	0.928 (1.765)		0.941	0.34	0.23	0.04	0.10

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

21. Tables and Figures for MMM

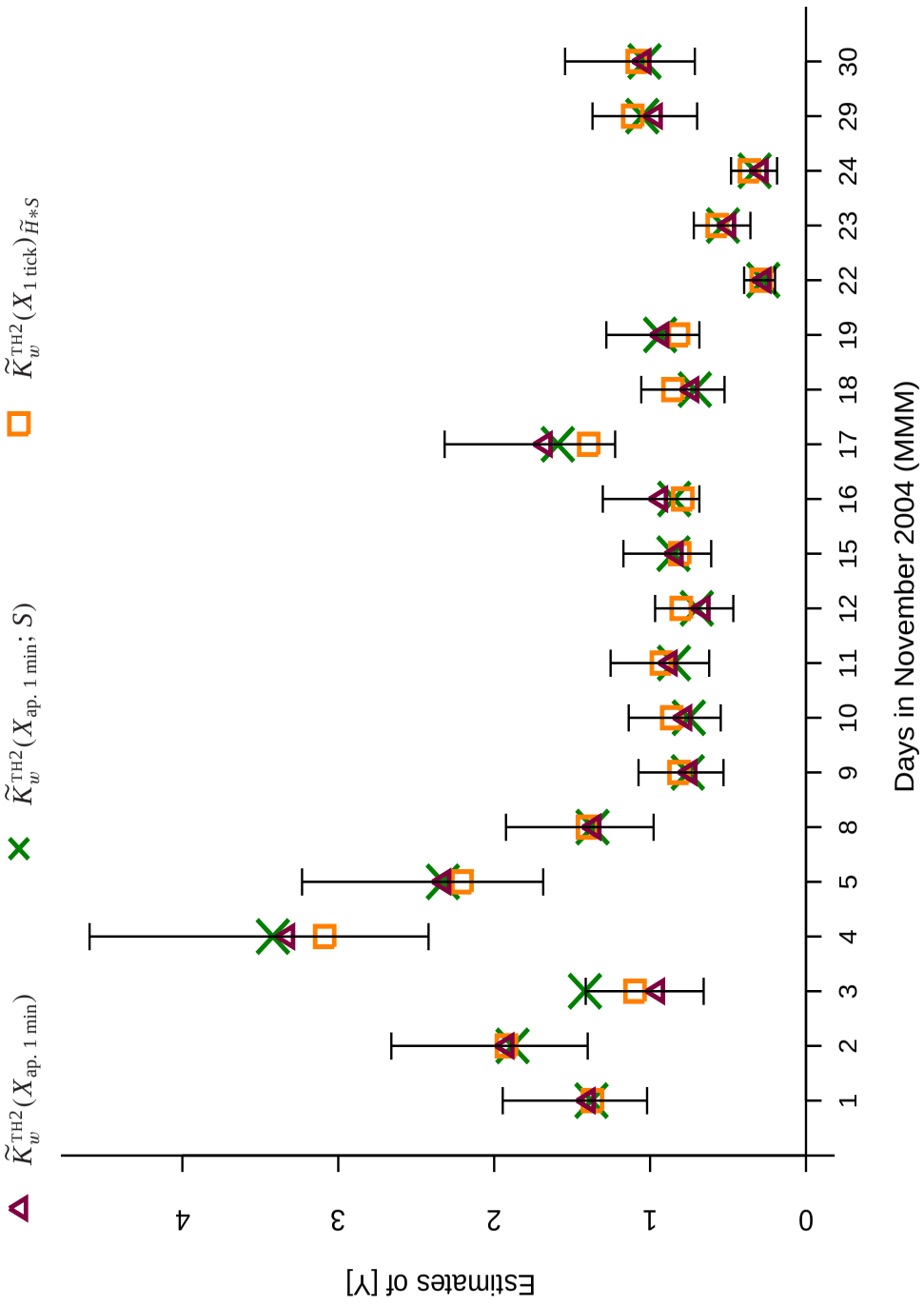

Figure 21: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 21: Summary statistics for subsampled $[Y]$ estimators, MMM year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.064	0.678 (1.295)	5.257	1.000	0.31	0.25	0.11	0.03
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.059	0.685 (1.316)	5.257	0.996	0.32	0.25	0.11	0.03
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.074	0.650 (1.289)	53.24	0.986	0.32	0.29	0.13	0.03
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.993	0.743 (1.274)		0.933	0.20	0.19	0.08	0.00
$[X_{\text{5 minutes}}; 300]$	1.047	0.627 (1.246)		0.987	0.33	0.28	0.15	0.03
$[X_{\text{1 minutes}}; 60]$	1.035	0.519 (1.153)		0.847	0.41	0.40	0.21	0.09
AMZ (2005)								
$TSRV(K, J)$	1.054	0.741 (1.393)		0.953	0.29	0.24	0.13	0.03

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

22. Tables and Figures for MO

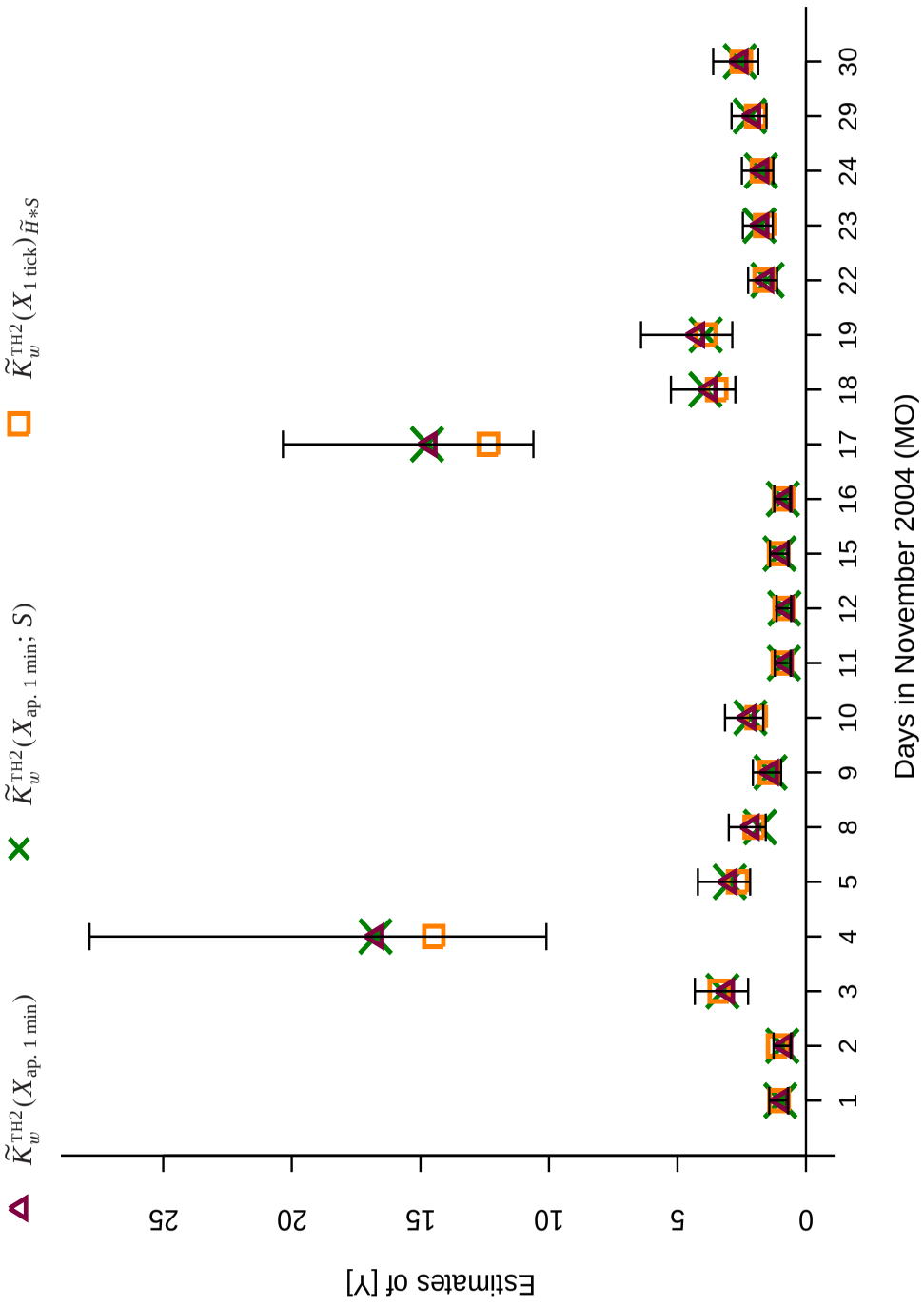

Figure 22: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 22: Summary statistics for subsampled $[Y]$ estimators, MO year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.491	2.935 (4.191)	5.550	1.000	0.10	0.07	0.02	0.06
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.486	2.989 (4.233)	5.550	1.000	0.10	0.07	0.02	0.06
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.455	2.681 (3.930)	55.86	0.997	0.11	0.08	0.03	0.07
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.446	3.253 (4.404)		0.984	0.07	0.05	0.01	0.05
$[X_{\text{5 minutes}}; 300]$	1.367	2.145 (3.237)		0.984	0.15	0.09	0.03	0.07
$[X_{\text{1 minutes}}; 60]$	1.296	1.924 (2.976)		0.968	0.14	0.09	0.06	0.08
AMZ (2005)								
$TSRV(K, J)$	1.575	3.761 (4.990)		0.994	0.06	0.04	0.01	0.04

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

23. Tables and Figures for MRK

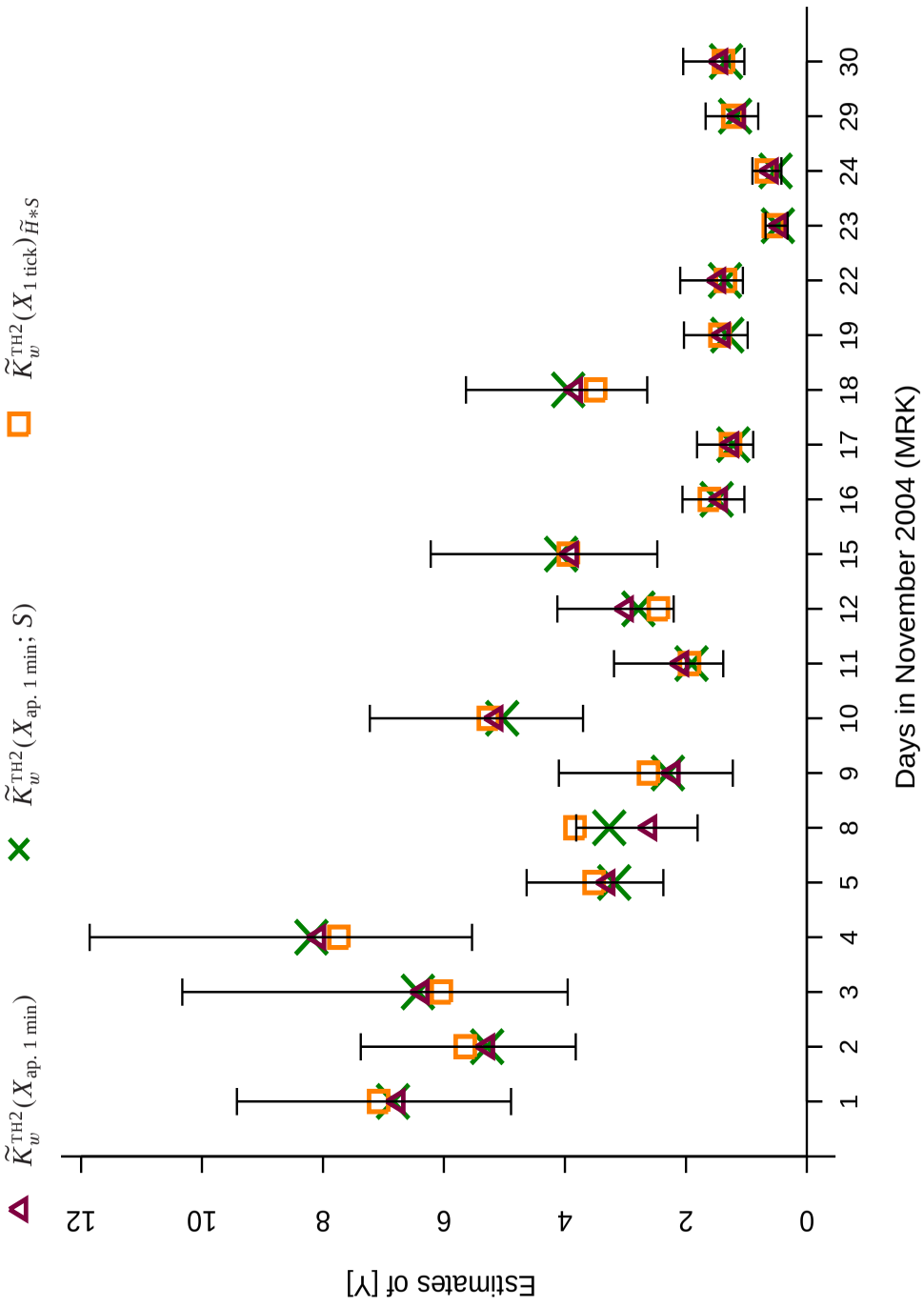

Figure 23: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 23: Summary statistics for subsampled $[Y]$ estimators, MRK year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.353	1.314 (2.862)	5.353	1.000	0.46	0.30	0.24	0.15
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.333	1.286 (2.882)	5.353	0.992	0.47	0.33	0.28	0.16
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.346	1.354 (2.892)	58.35	0.992	0.44	0.30	0.24	0.12
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.300	1.308 (2.889)		0.961	0.42	0.35	0.22	0.16
$[X_{\text{5 minutes}}; 300]$	1.330	1.307 (2.957)		0.984	0.47	0.37	0.28	0.16
$[X_{\text{1 minutes}}; 60]$	1.271	1.162 (2.629)		0.946	0.47	0.38	0.29	0.11
AMZ (2005)								
$TSRV(K, J)$	1.311	1.280 (2.952)		0.951	0.46	0.35	0.26	0.22

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

24. Tables and Figures for MSFT

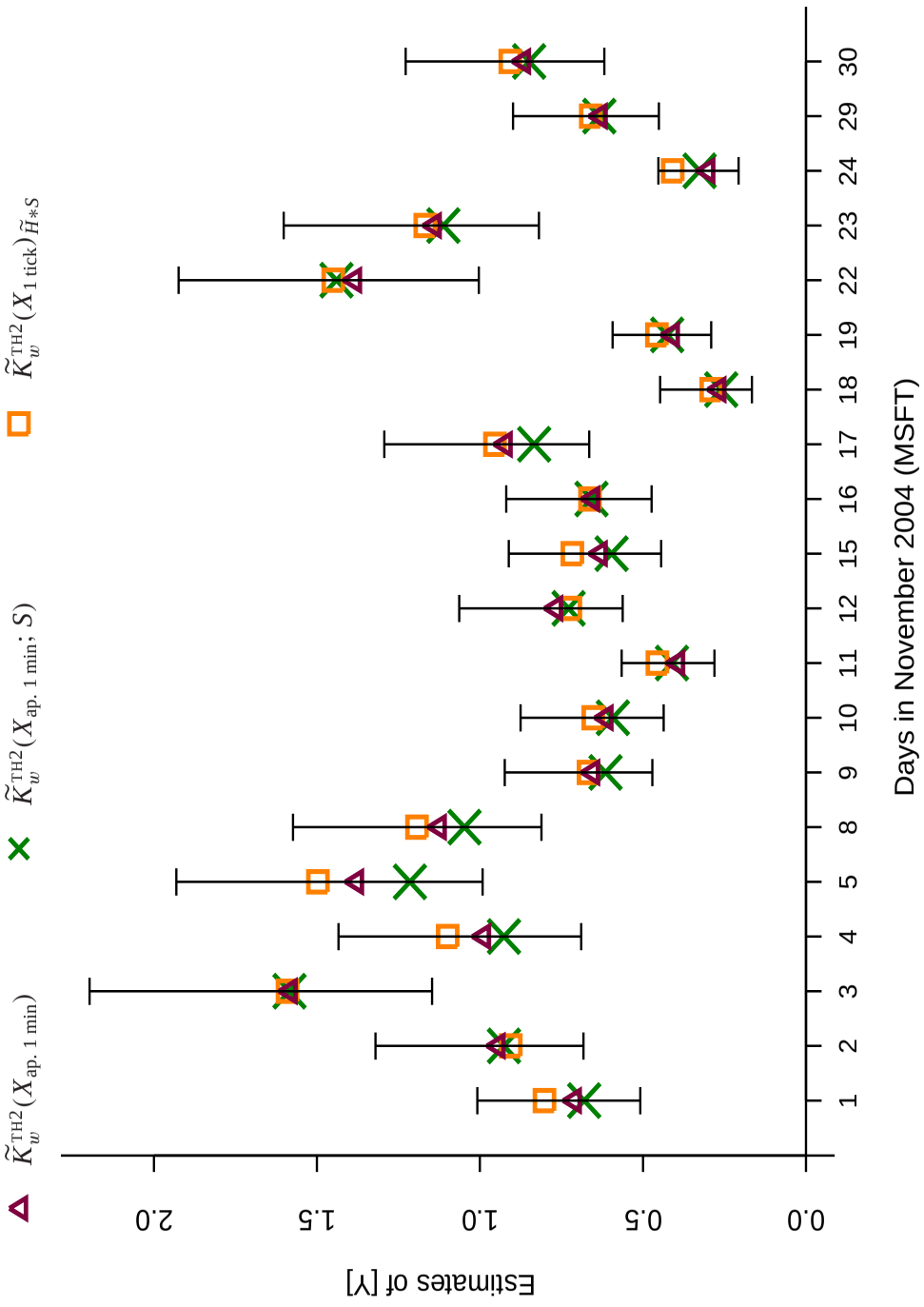

Figure 24: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 24: Summary statistics for subsampled $[Y]$ estimators, MSFT year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.082	0.662 (1.517)	6.064	1.000	0.43	0.35	0.25	0.14
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.060	0.653 (1.504)	6.064	0.997	0.43	0.36	0.26	0.14
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.108	0.631 (1.485)	142.39	0.993	0.45	0.39	0.27	0.15
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.940	0.645 (1.411)		0.935	0.43	0.29	0.27	0.15
$[X_{\text{5 minutes}}; 300]$	1.118	0.638 (1.529)		0.993	0.48	0.38	0.29	0.17
$[X_{\text{1 minutes}}; 60]$	1.302	0.575 (1.470)		0.958	0.52	0.48	0.34	0.20
AMZ (2005)								
$TSRV(K, J)$	1.026	0.704 (1.605)		0.971	0.43	0.34	0.27	0.12

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

25. Tables and Figures for PG

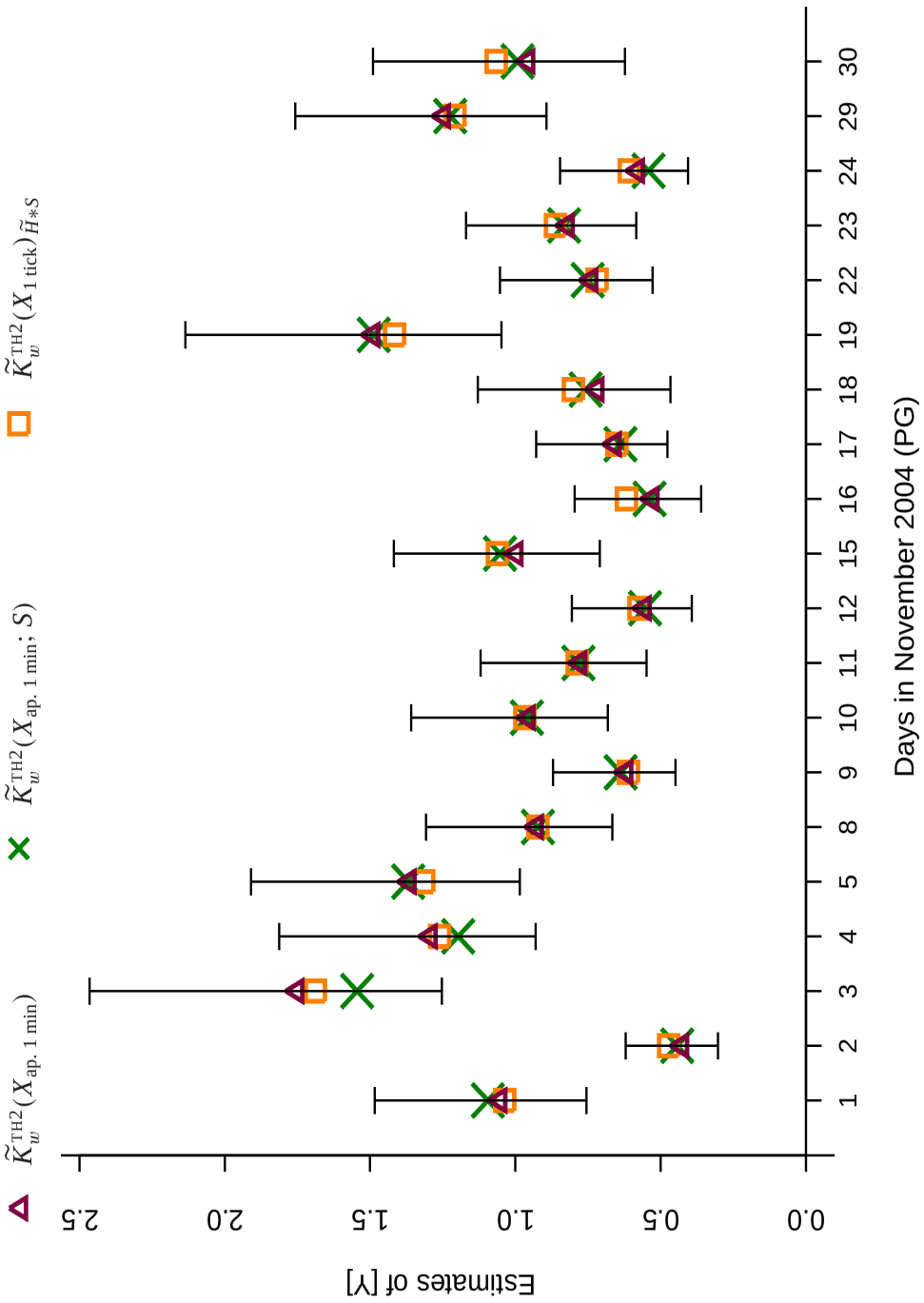

Figure 25: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \tilde{H} \cdot S$.

Table 25: Summary statistics for subsampled $[Y]$ estimators, PG year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	0.836	0.468 (0.983)	5.450	1.000	0.45	0.34	0.25	-0.04
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	0.826	0.458 (0.975)	5.450	0.995	0.46	0.36	0.25	-0.03
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	0.845	0.439 (0.951)	59.42	0.988	0.48	0.39	0.26	-0.02
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.766	0.470 (0.890)		0.918	0.39	0.27	0.18	-0.01
$[X_{\text{5 minutes}}; 300]$	0.825	0.434 (0.924)		0.986	0.46	0.36	0.24	-0.02
$[X_{\text{1 minutes}}; 60]$	0.858	0.375 (0.876)		0.856	0.55	0.49	0.26	0.06
AMZ (2005)								
$TSRV(K, J)$	0.819	0.480 (0.960)		0.940	0.44	0.31	0.18	-0.03

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

26. Tables and Figures for SBC

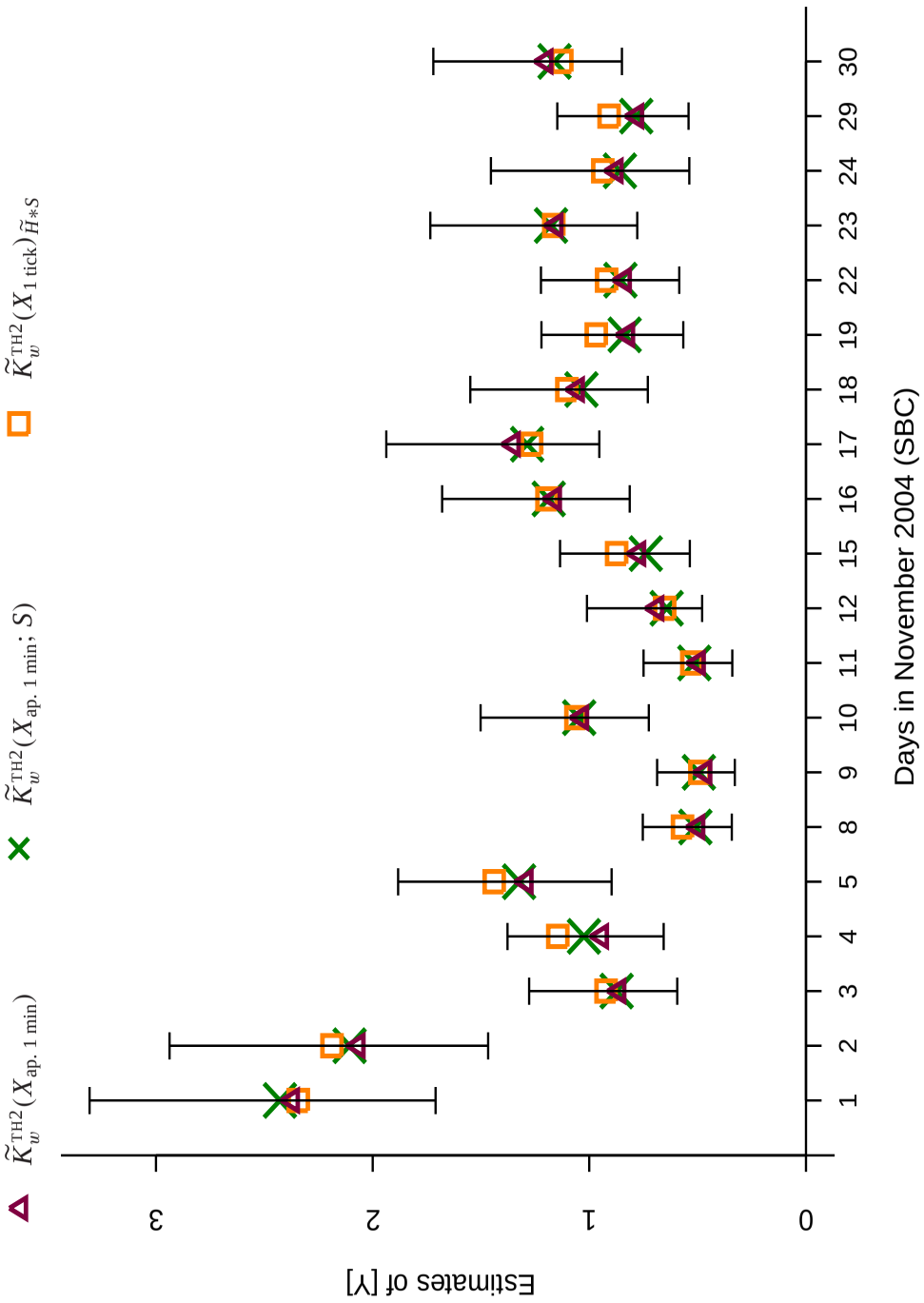

Figure 26: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 26: Summary statistics for subsampled $[Y]$ estimators, SBC year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.363	0.953 (1.943)	6.100	1.000	0.35	0.17	0.16	0.30
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.347	0.933 (1.888)	6.100	0.997	0.34	0.17	0.16	0.27
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.360	0.835 (1.713)	61.59	0.987	0.35	0.19	0.16	0.28
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.284	1.019 (1.727)		0.943	0.24	0.05	0.11	0.22
$[X_{\text{5 minutes}}; 300]$	1.362	0.800 (1.628)		0.986	0.35	0.17	0.15	0.29
$[X_{\text{1 minutes}}; 60]$	1.492	0.595 (1.268)		0.798	0.38	0.24	0.17	0.27
AMZ (2005)								
$TSRV(K, J)$	1.279	1.018 (1.807)		0.932	0.27	0.10	0.13	0.14

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

27. Tables and Figures for T

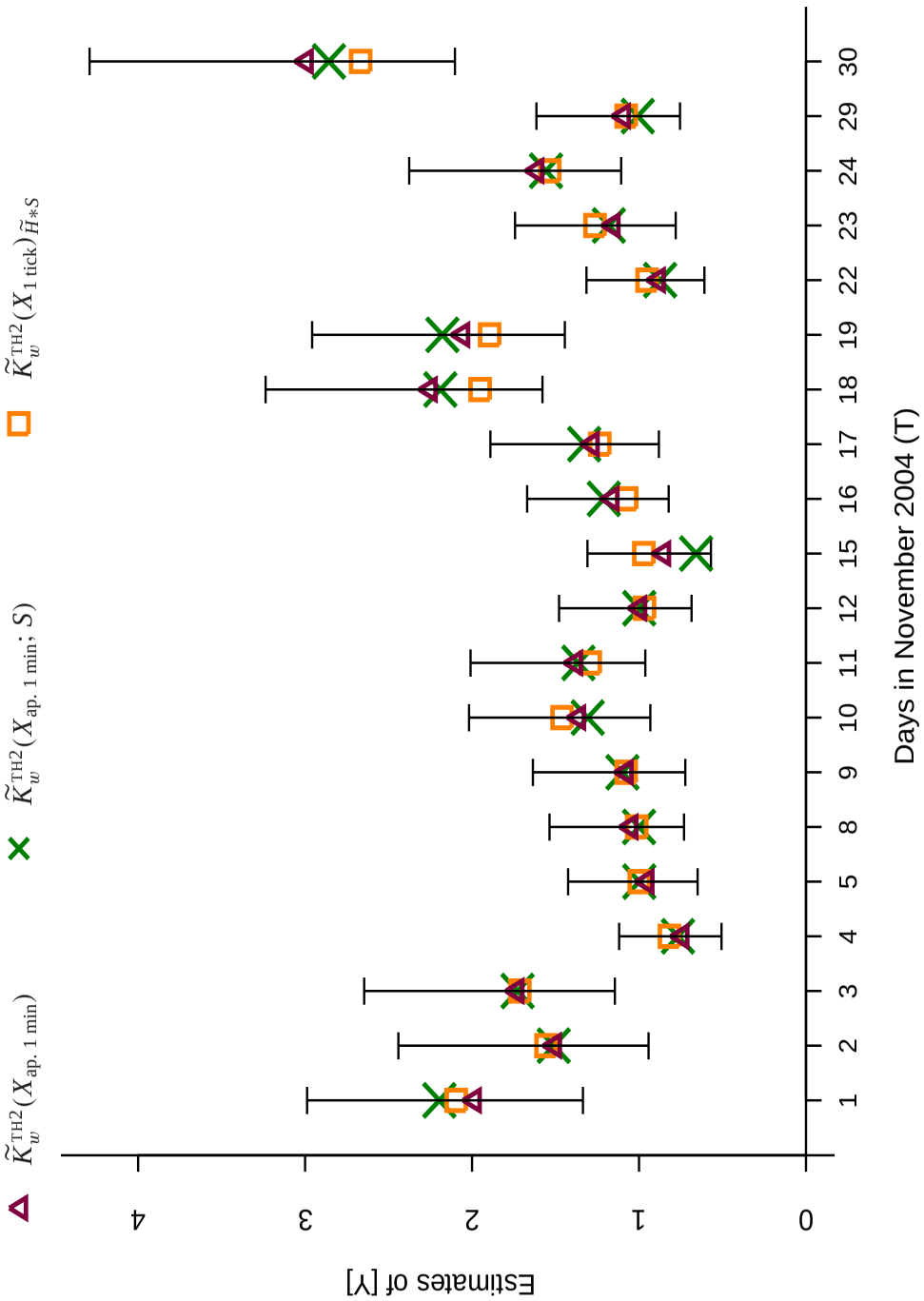

Figure 27: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 27: Summary statistics for subsampled $[Y]$ estimators, T year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.826	1.386 (2.815)	6.072	1.000	0.29	0.36	0.17	0.10
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.803	1.385 (2.833)	6.072	0.996	0.29	0.37	0.18	0.11
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.745	1.217 (2.519)	46.21	0.993	0.29	0.38	0.19	0.12
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.954	1.878 (3.447)		0.938	0.18	0.33	0.11	0.07
$[X_{\text{5 minutes}}; 300]$	1.876	1.323 (2.733)		0.990	0.27	0.37	0.19	0.11
$[X_{\text{1 minutes}}; 60]$	2.053	0.950 (2.291)		0.911	0.38	0.46	0.32	0.19
AMZ (2005)								
$TSRV(K, J)$	1.816	1.759 (3.386)		0.962	0.19	0.37	0.14	0.09

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

28. Tables and Figures for UTX

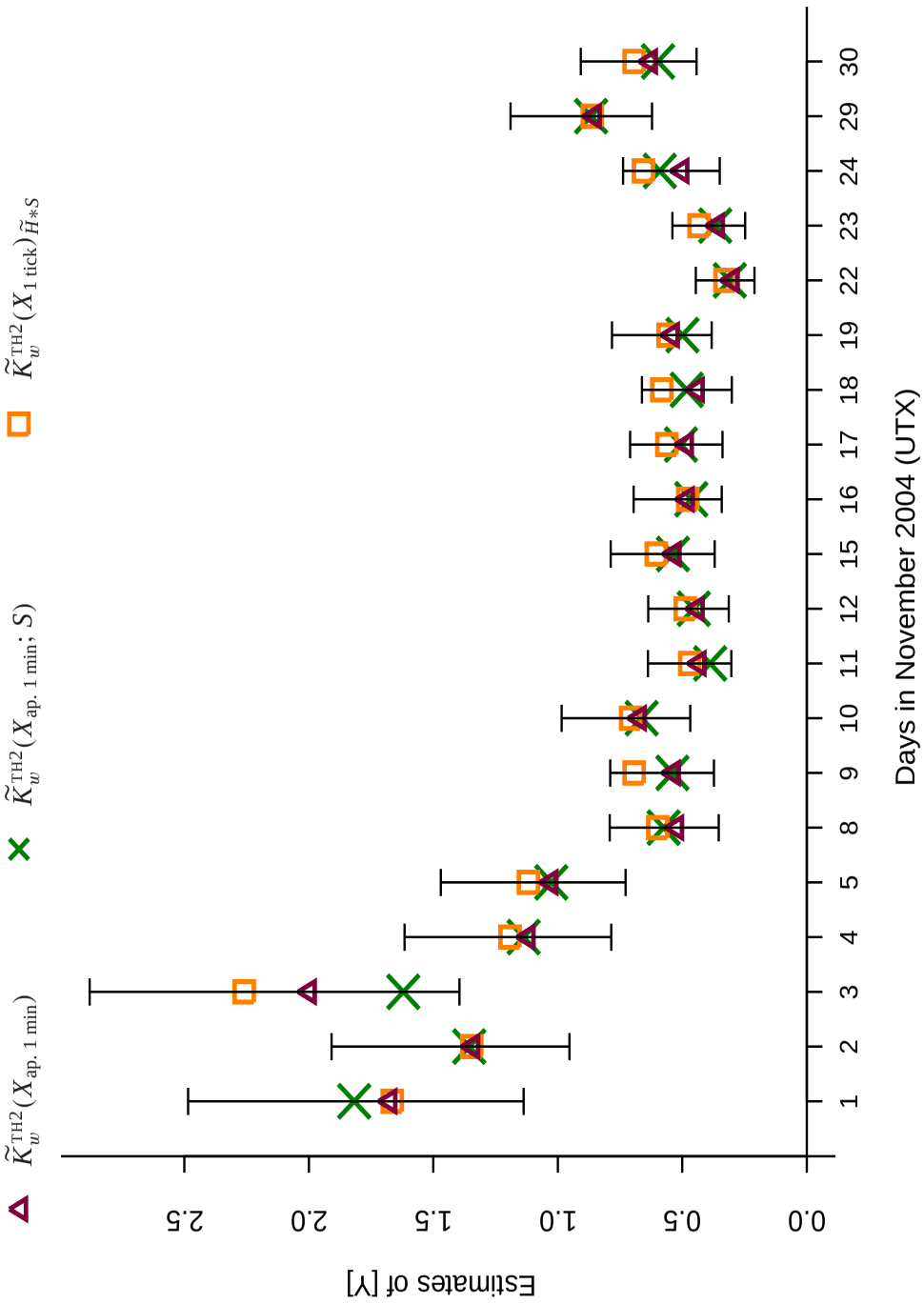

Figure 28: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \tilde{H} \cdot S$.

Table 28: Summary statistics for subsampled $[Y]$ estimators, UTX year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.105	0.727 (1.524)	5.446	1.000	0.45	0.32	0.13	0.13
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.095	0.718 (1.507)	5.446	0.995	0.45	0.32	0.13	0.12
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.125	0.661 (1.452)	51.45	0.988	0.48	0.35	0.17	0.13
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.065	0.836 (1.640)		0.929	0.41	0.24	0.14	0.11
$[X_{\text{5 minutes}}; 300]$	1.104	0.638 (1.396)		0.986	0.48	0.35	0.15	0.15
$[X_{\text{1 minutes}}; 60]$	1.187	0.533 (1.312)		0.864	0.54	0.42	0.29	0.18
AMZ (2005)								
$TSRV(K, J)$	1.115	0.849 (1.672)		0.943	0.40	0.26	0.13	0.13

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

29. Tables and Figures for WMT

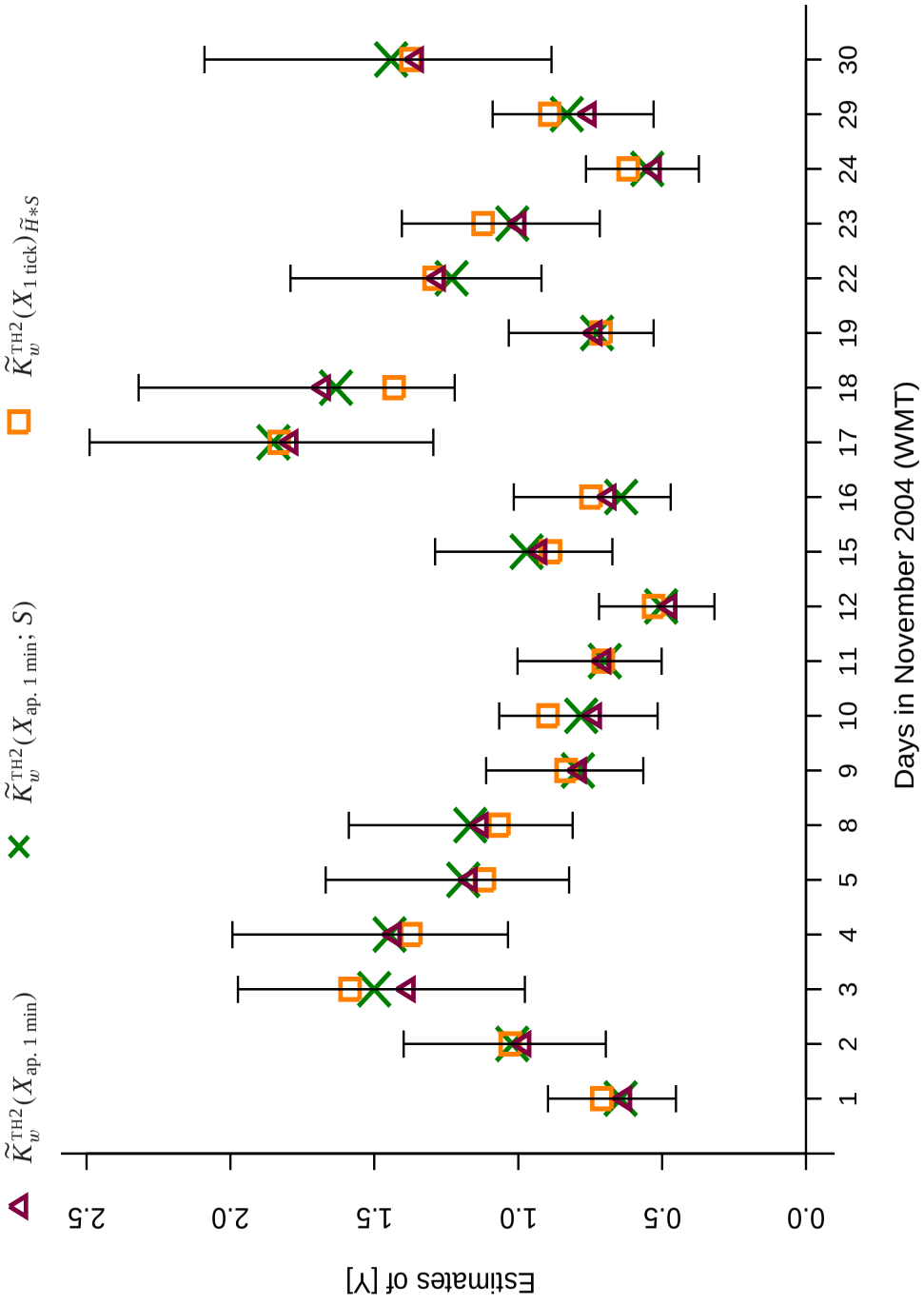

Figure 29: Four estimators for the daily increments to $[Y]$ for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 29: Summary statistics for subsampled $[Y]$ estimators, WMT year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	1.092	0.522 (1.123)	5.209	1.000	0.40	0.38	0.20	0.07
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	1.084	0.522 (1.121)	5.209	0.995	0.39	0.39	0.20	0.07
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	1.099	0.501 (1.125)	66.79	0.982	0.44	0.40	0.20	0.09
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	1.043	0.541 (1.100)		0.908	0.35	0.32	0.19	0.09
$[X_{\text{5 minutes}}; 300]$	1.058	0.469 (1.055)		0.978	0.45	0.40	0.22	0.09
$[X_{\text{1 minutes}}; 60]$	1.064	0.458 (1.121)		0.823	0.50	0.44	0.24	0.16
AMZ (2005)								
$TSRV(K, J)$	1.098	0.553 (1.158)		0.909	0.29	0.37	0.23	0.03

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

30. Tables and Figures for XOM

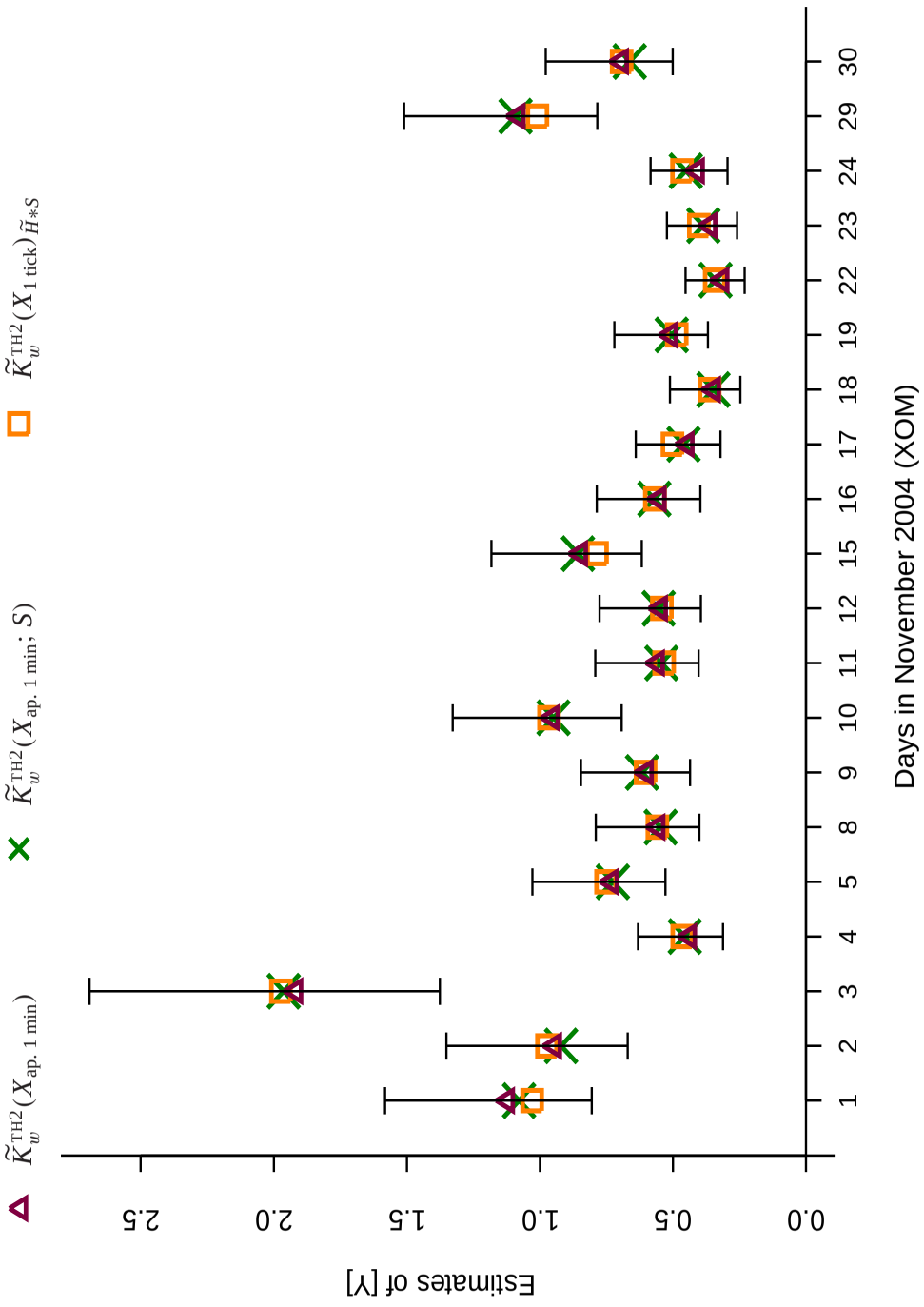

Figure 30: Four estimators for the daily increments to [Y] for General Electrics in November 2004. The intervals are the confidence intervals for our realised Modified Tukey-Hanning kernel based on returns sampled roughly every 60 seconds. The triangles denote the corresponding realised kernel. Diamonds denote the subsampled version of this realised kernel. Circles represents our inefficient realized Modified Tukey-Hanning kernel based on all trades. Squares also denote the inefficient realized Modified Tukey-Hanning, but with $H = \widetilde{H} \cdot S$.

Table 30: Summary statistics for subsampled $[Y]$ estimators, XOM year of 2004.

	Mean	Std. (HAC)	$\overline{H}$	Corr	acf(1)	acf(2)	acf(5)	acf(10)
Realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}})$	0.833	0.515 (1.201)	5.286	1.000	0.43	0.43	0.26	0.13
Subsampled realised kernel (TH_2, $H^* = c\xi n^{1/2}$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{ap. 1 min}}; S)$	0.822	0.509 (1.191)	5.286	0.997	0.43	0.44	0.27	0.12
Realised kernel ($H = S \cdot H^*$)								
$\widetilde{K}^{\text{TH2}}(X_{\text{1 tick}})$	0.820	0.485 (1.171)	68.86	0.991	0.46	0.45	0.29	0.14
Simple RV subsampled								
$[X_{\text{20 minutes}}; 1200]$	0.800	0.438 (0.939)		0.910	0.35	0.33	0.21	0.14
$[X_{\text{5 minutes}}; 300]$	0.816	0.468 (1.124)		0.993	0.46	0.45	0.28	0.15
$[X_{\text{1 minutes}}; 60]$	0.832	0.407 (1.070)		0.914	0.55	0.52	0.37	0.19
AMZ (2005)								
$TSRV(K, J)$	0.822	0.497 (1.119)		0.952	0.38	0.40	0.26	0.14

Summary statistics for seven estimators. First the realised kernel using approximate 1 minute returns with H^* and its subsampled version, followed by the realised kernel using tick-by-tick data with $H = S \cdot H^*$. Then three subsampled realised variances based on 20, 5 and 1 minute returns. For instance, $[X_{5\ minutes}; 300]$ *is the average of 300 realised variances based on 5 minutes returns, obtained by shifting the time prices are recorded by 1 second. Finally, $TSRV(K, J)$ is the two-scale estimator that is robust to deviations from i.i.d. noise. We report the average of daily estimates with standard deviations.* Corr *is the correlation between each of estimators and the first realised kernel. Finally we report four sample autocovariances.*

References

Aït-Sahalia, Y., Mykland, P. A. & Zhang, L. (2006), Ultra high frequency volatility estimation with dependent microstructure noise. Unpublished paper: Department of Economics, Princeton University.

Barndorff-Nielsen, O. E. & Shephard, N. (2002), 'Econometric analysis of realised volatility and its use in estimating stochastic volatility models', *Journal of the Royal Statistical Society, Series B* **64**, 253–280.

Zhang, L., Mykland, P. A. & Aït-Sahalia, Y. (2005), 'A tale of two time scales: determining integrated volatility with noisy high-frequency data', *Journal of the American Statistical Association* **100**, 1394–1411.