

Volatility Prediction Using Kernel Regression: Supplementary Material about Dow Jones 30 Stocks

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Abstract

We provide supplementary material for the article “Volatility Prediction Using Kernel Regression”. We evaluate kernel regression volatility predictor using Dow Jones 30 Stocks.

Section 1 gives the list of tickers for Dow Jones 30 stocks. Section 2 evaluates the kernel volatility predictor with the prediction horizon of $\eta = 1$ days. Section 3 evaluates the kernel volatility predictor with the prediction horizon of $\eta = 10$ days.

1 Dow Jones 30 Stocks

The stocks of Dow Jones 30 and their tickers are in the following list.

1. "DWDP", DowDuPont Inc.
2. "CAT", Caterpillar Inc.
3. "UTX", United Technologies Corporation
4. "TRV", The Travelers Companies, Inc.
5. "XOM", Exxon Mobil Corporation
6. "CSCO", Cisco Systems, Inc.
7. "WMT", Wal-Mart Stores, Inc.
8. "NKE", NIKE, Inc.

9. "GE", General Electric Company
10. "INTC", Intel Corporation
11. "KO", The Coca-Cola Company
12. "MRK", Merck & Co., Inc.
13. "GS", The Goldman Sachs Group, Inc.
14. "JNJ", Johnson & Johnson
15. "AAPL", Apple Inc.
16. "AXP", American Express Company
17. "MMM", 3M Company
18. "PFE", Pfizer Inc.
19. "VZ", Verizon Communications Inc.
20. "IBM", International Business Machines Corporation
21. "CVX", Chevron Corporation
22. "PG", The Procter & Gamble Company
23. "MCD", McDonald's Corporation
24. "JPM", JPMorgan Chase & Co.
25. "UNH", UnitedHealth Group Incorporated
26. "BA", The Boeing Company
27. "HD", The Home Depot, Inc.
28. "V", Visa Inc.
29. "MSFT", Microsoft Corporation
30. "DIS", The Walt Disney Company

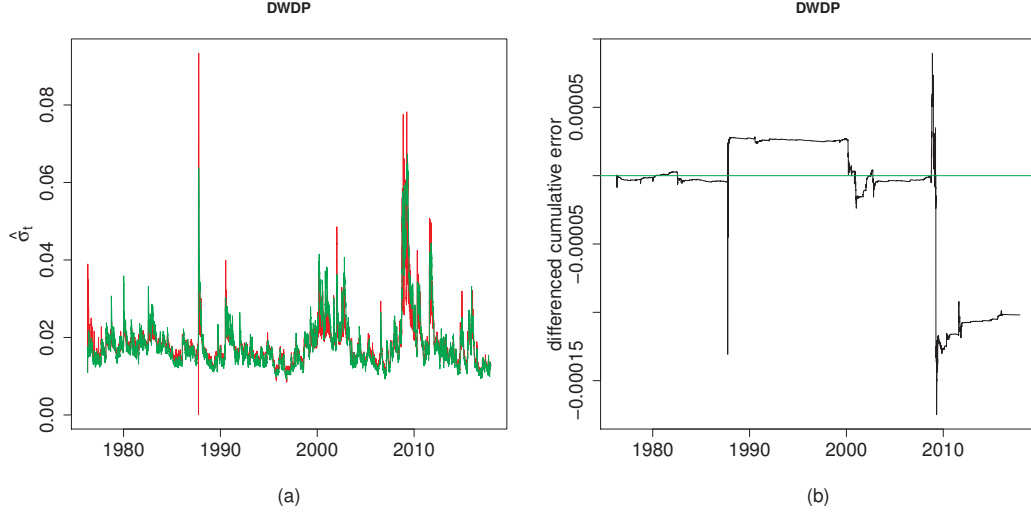


Figure 1: *DowDuPont*.

2 Volatility Predictions and Prediction Errors

Figures 1–30 show volatility predictions and prediction errors. Each company has a different sampling period, but the last observation is in all cases 4th December 2017.

The volatility prediction means the prediction of the squared return with horizon of $\eta = 1$ day, but the time series show the square roots of the predictions.

Panel (a) shows GARCH(1,1) volatility predictions (green) and kernel regression volatility predictions (red).

Panel (b) shows the time series of differences of the cumulative sums of squared prediction errors. We show

$$D_t = \text{CSPE}_t(\text{garch}) - \text{CSPE}_t(\text{kernel}).$$

This means that the kernel predictor is better in those time periods where D_t is increasing. Note that the highest jumps in D_t occur at the times of volatility spikes: autumn 1987, spring 2000, and autumn 1998.

2.1 Companies 1-10

Figure 1

Figure 2

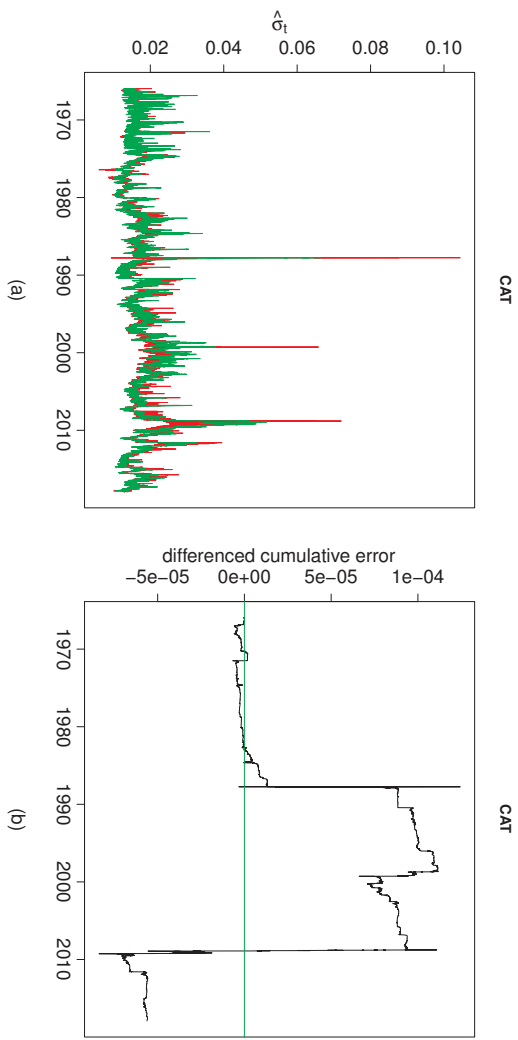


Figure 2: *Caterpillar*.

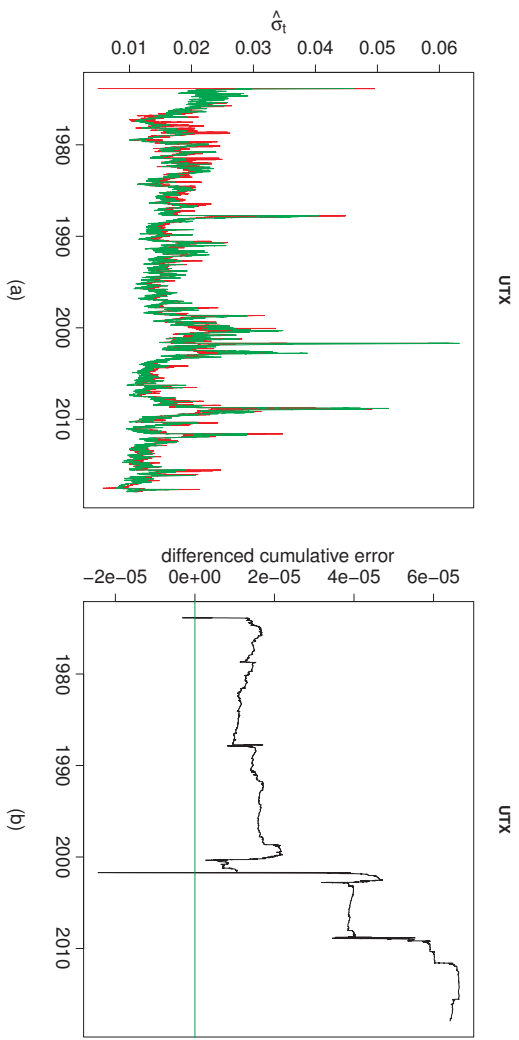


Figure 3: *United Technologies*.

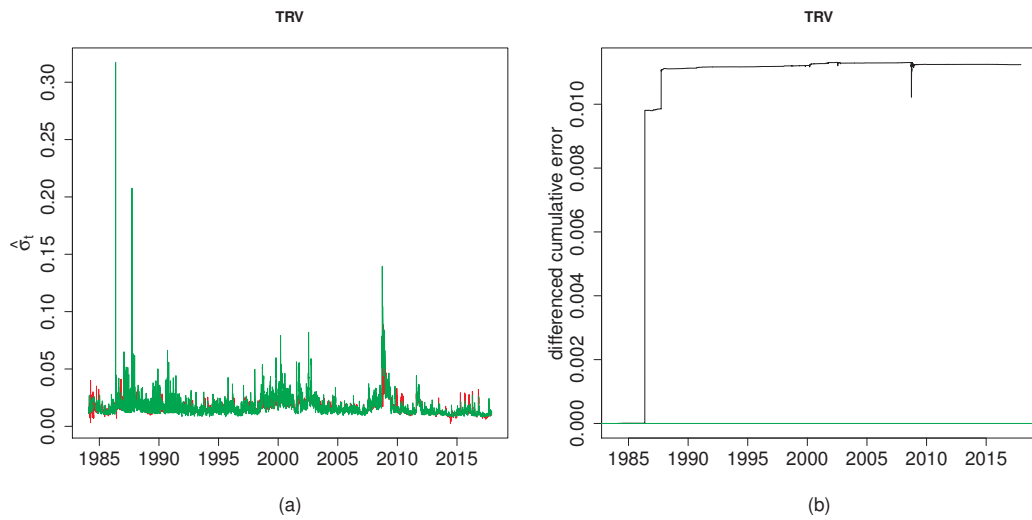


Figure 4: *The Travelers Companies.*

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2.2 Companies 11-20

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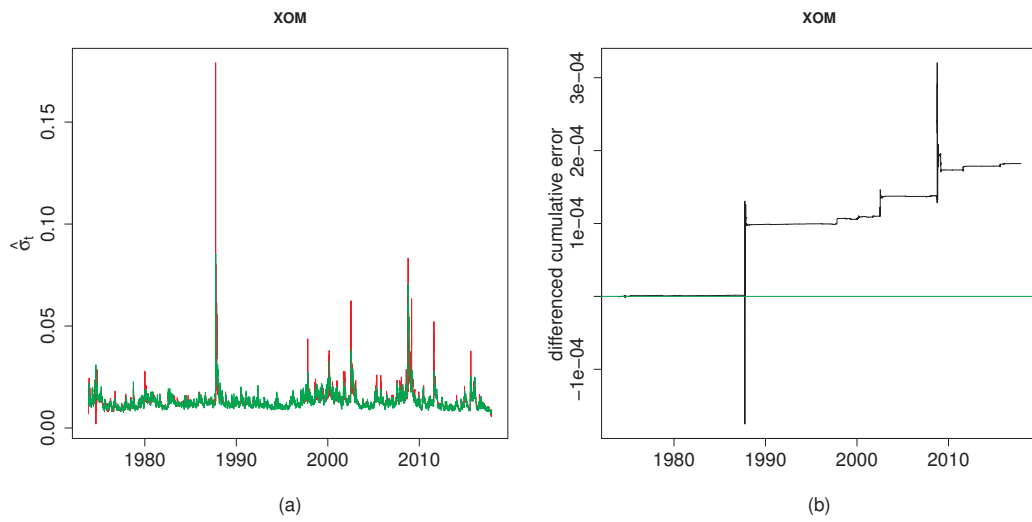


Figure 5: *Exxon Mobil*.

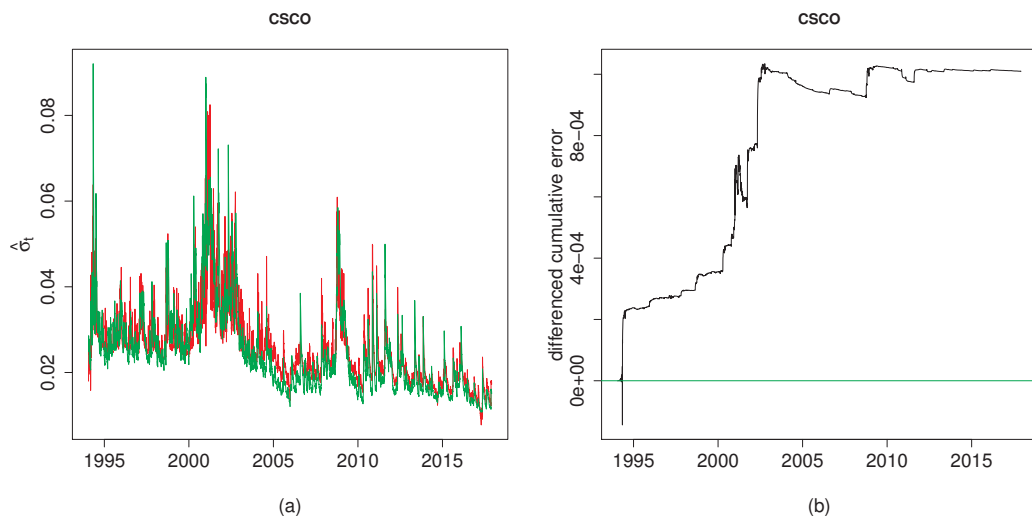


Figure 6: *Cisco*.

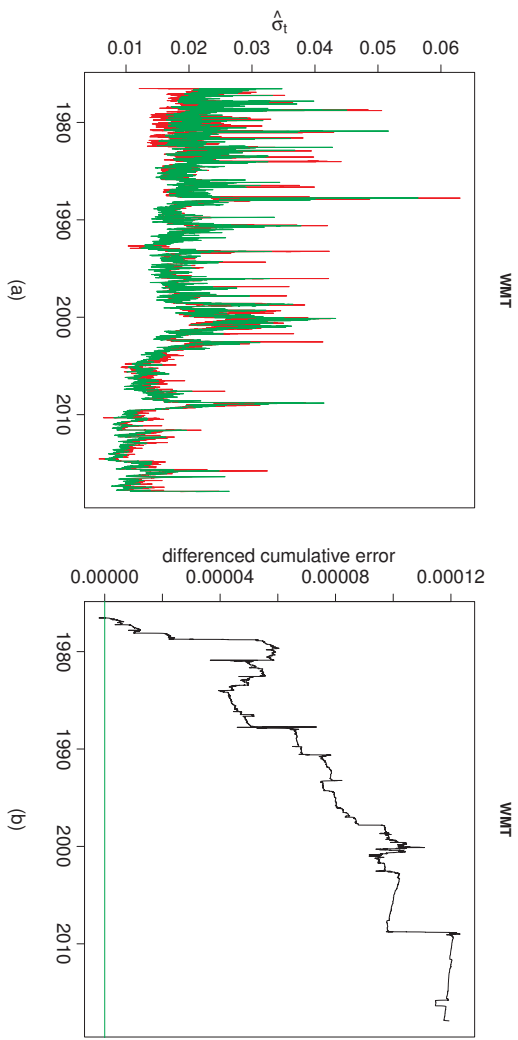


Figure 7: *Wal-Mart.*

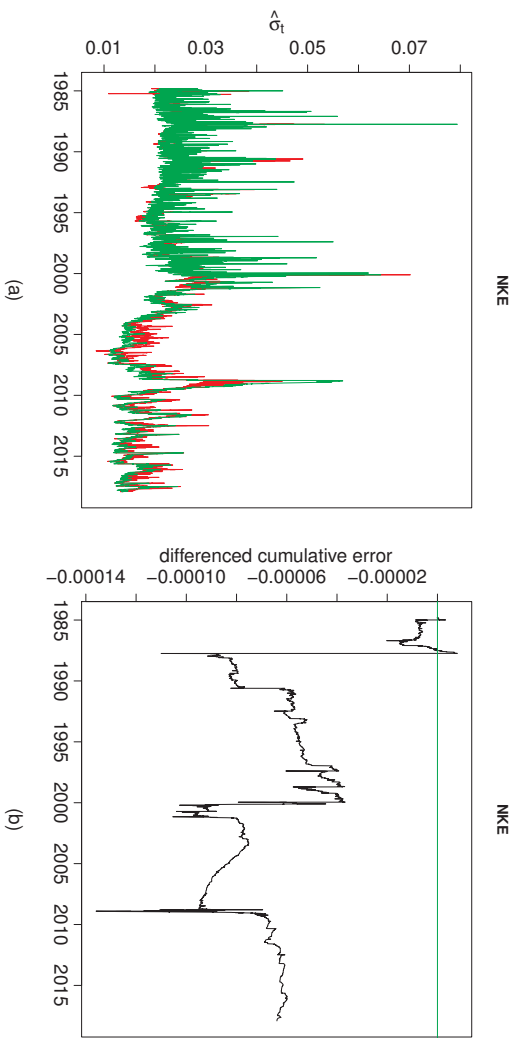


Figure 8: *Nike.*

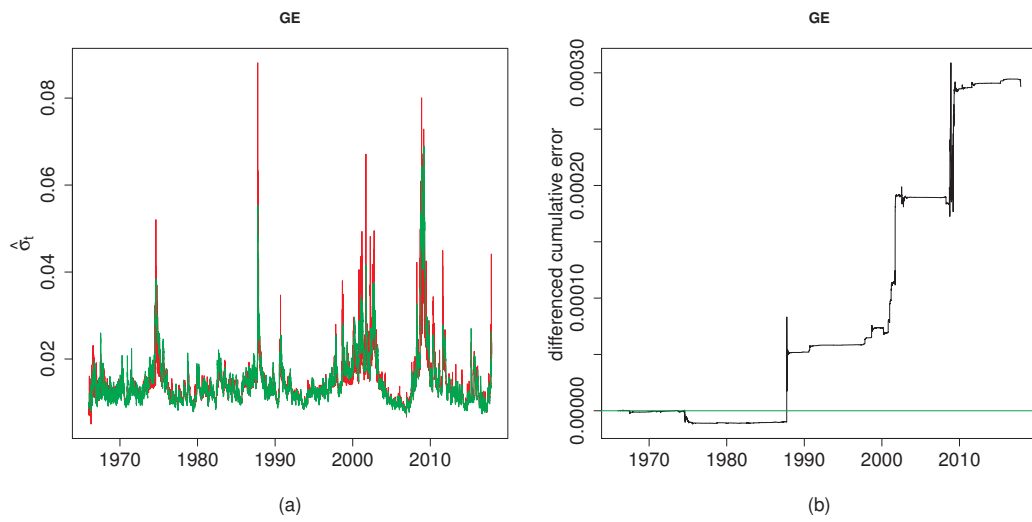


Figure 9: *General Electric*.

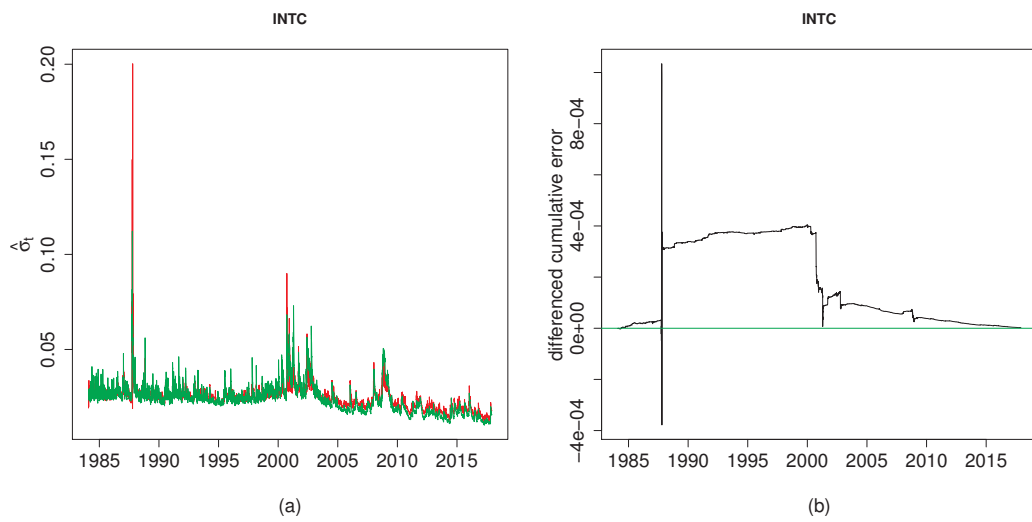


Figure 10: *Intel*.

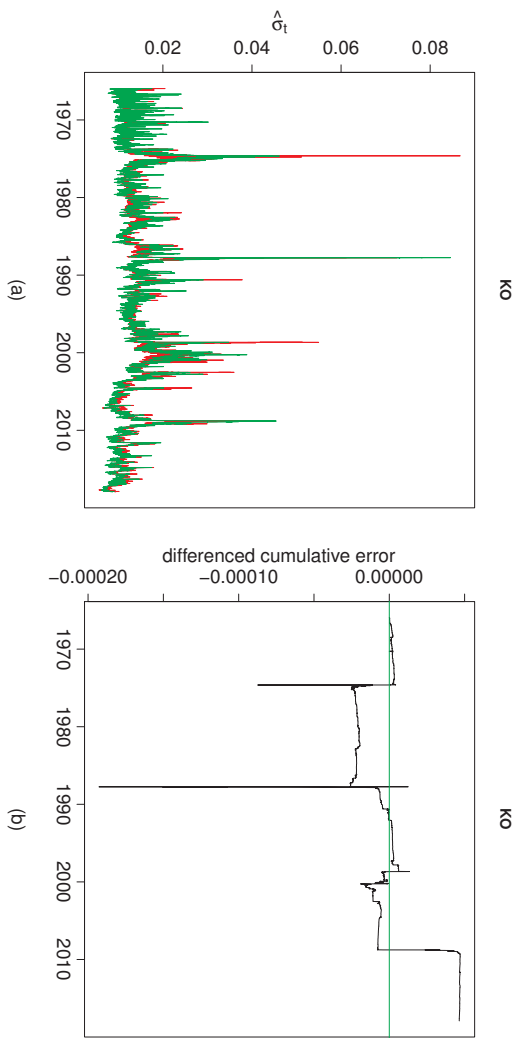


Figure 11: *Coca-Cola*.

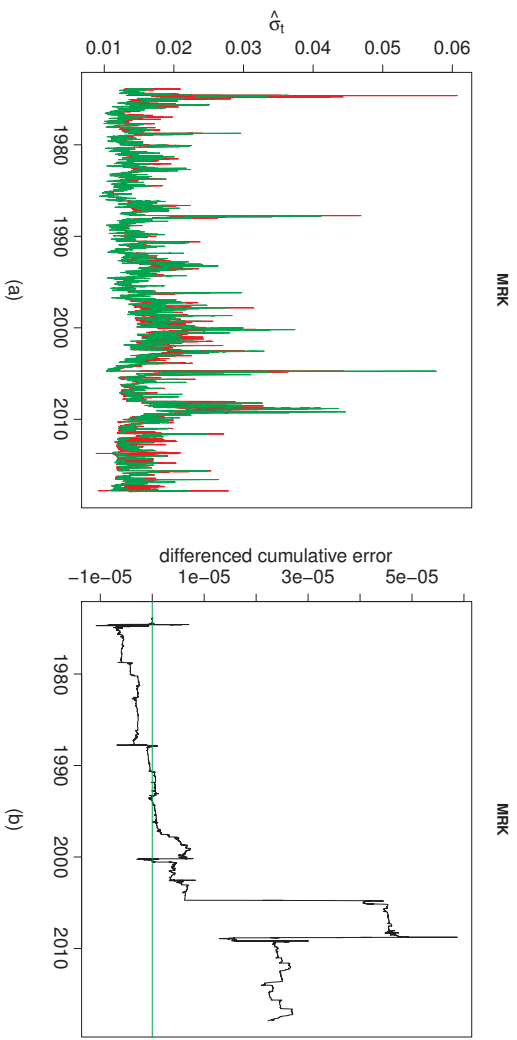


Figure 12: *Merck*.

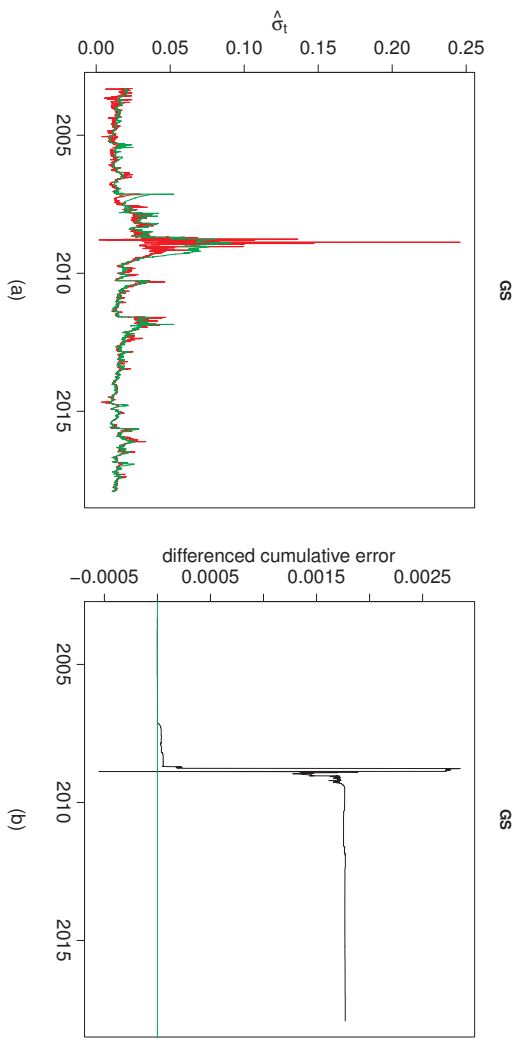


Figure 13: *Goldman Sachs*.

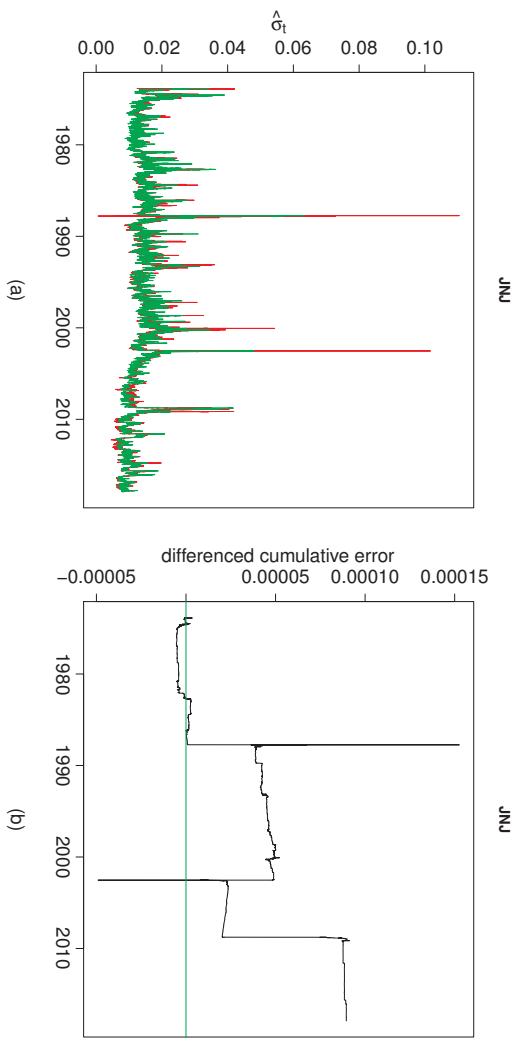


Figure 14: *Johnson & Johnson*.

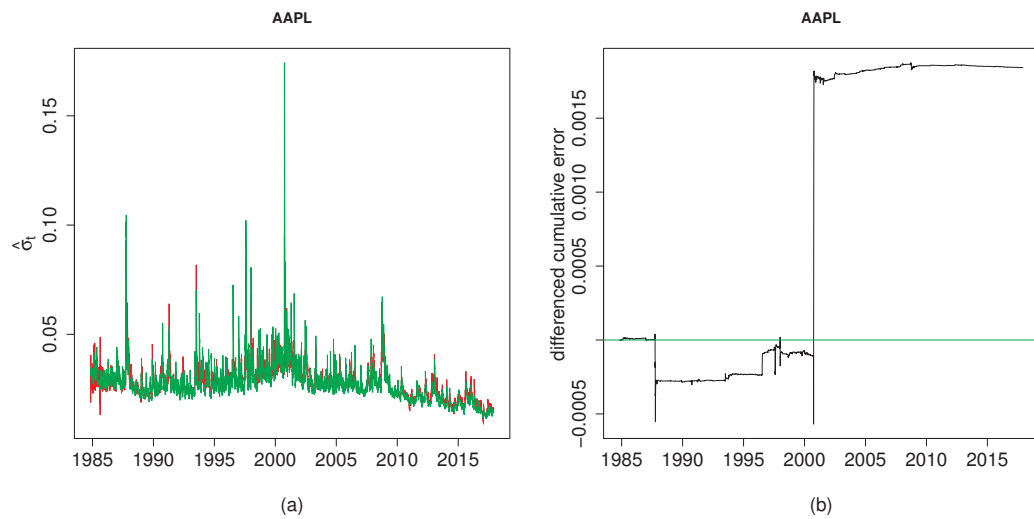


Figure 15: *Apple*.

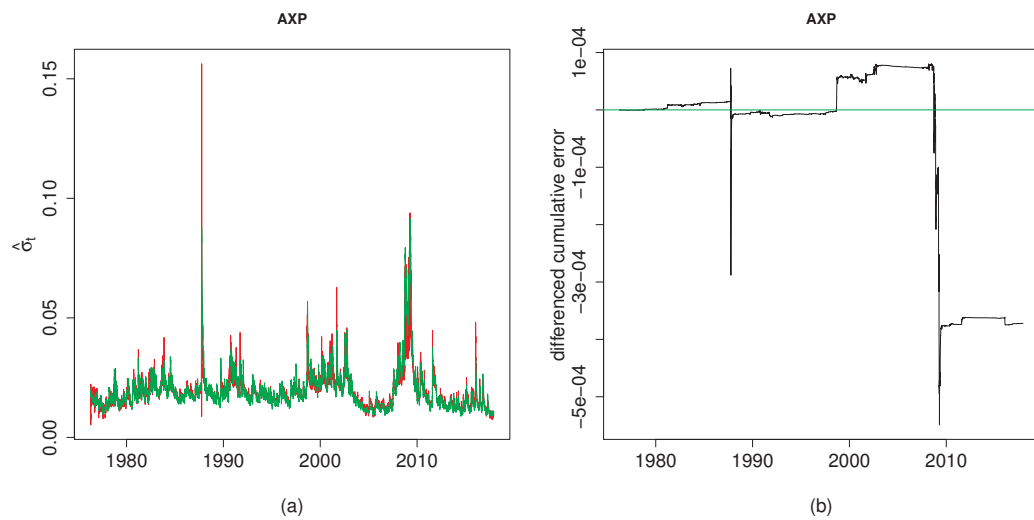


Figure 16: *American Express*.

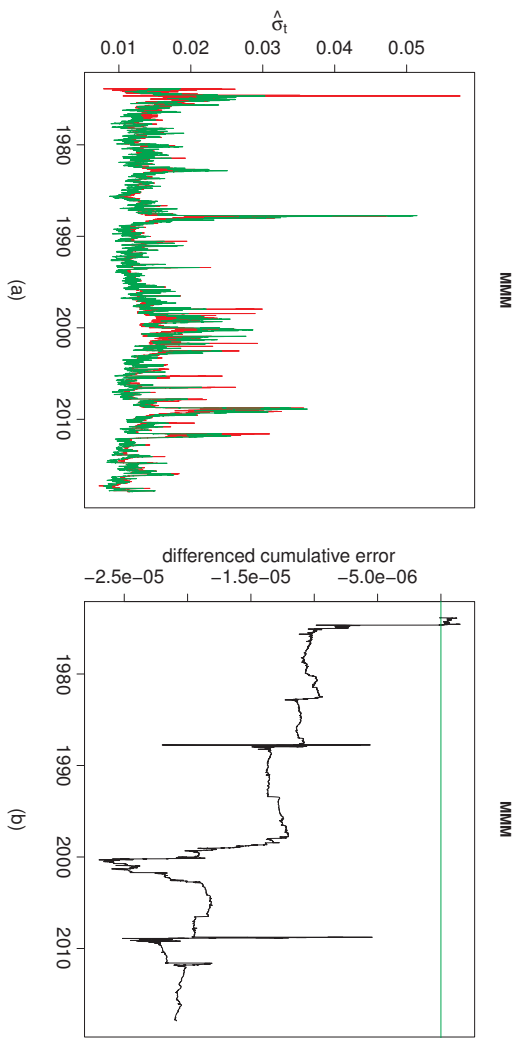


Figure 17: 3M.

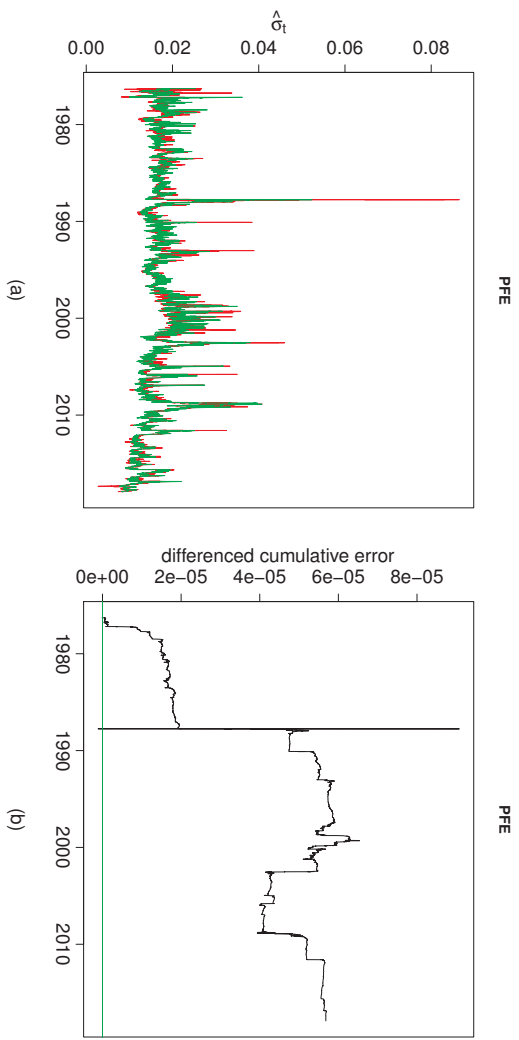


Figure 18: Pfizer.

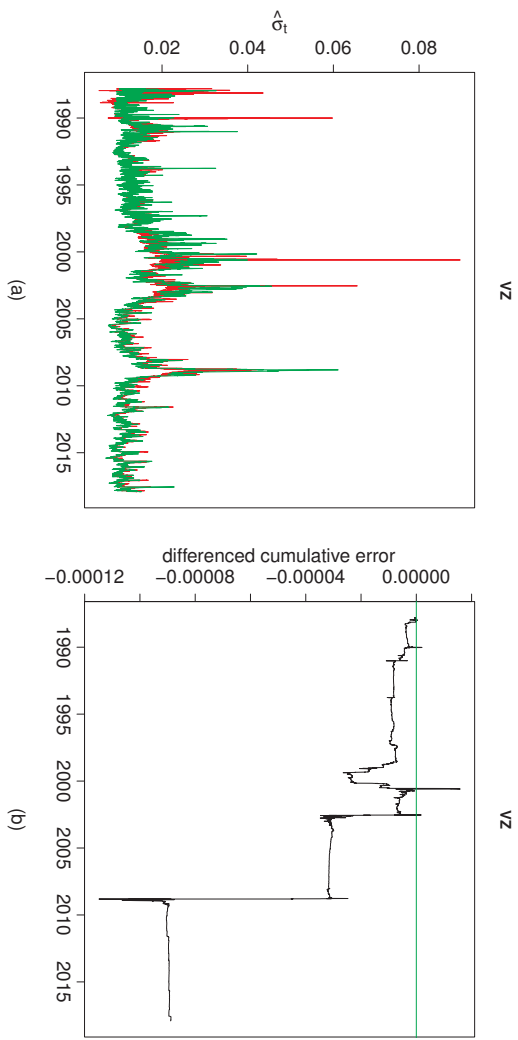


Figure 19: *Verizon*.

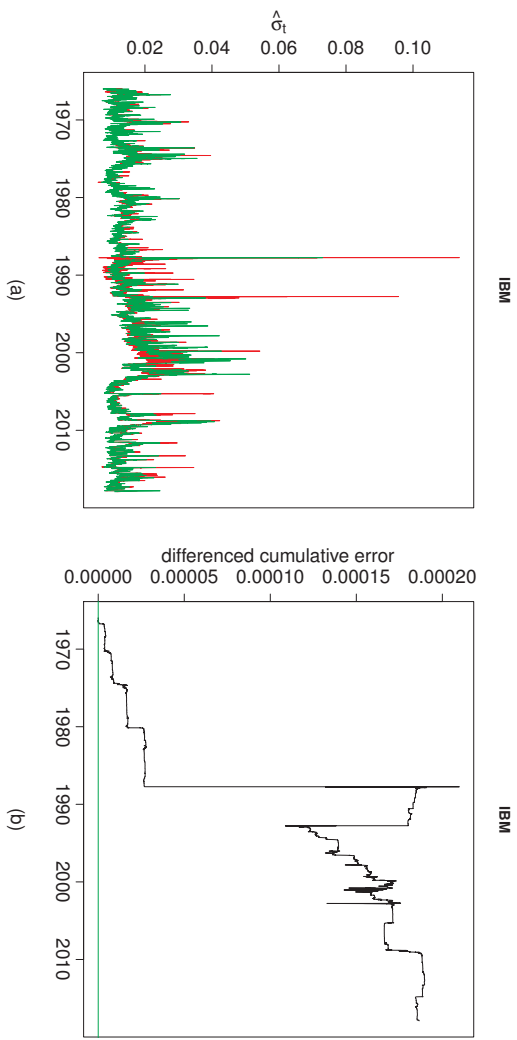


Figure 20: *IBM*.

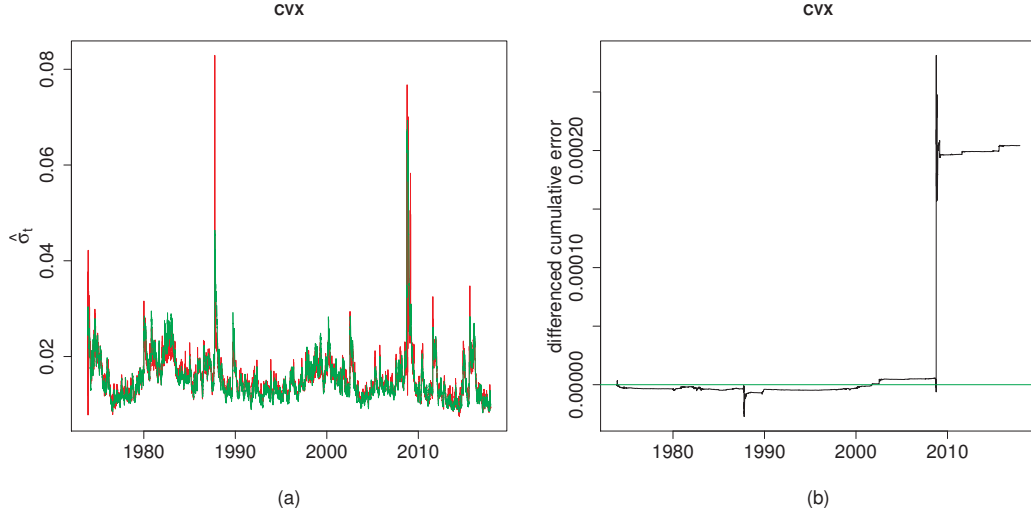


Figure 21: *Chevron*.

2.3 Companies 21-30

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Figure 30

3 Volatility Predictions and Prediction Errors with $\eta = 10$

Figures 31–60 show volatility predictions and prediction errors. Each company has a different sampling period, but the last observation is in all cases 4th December 2017.

The volatility prediction means the prediction of the squared return with the horizon of $\eta = 10$ days, but the time series show the square roots of the predictions.

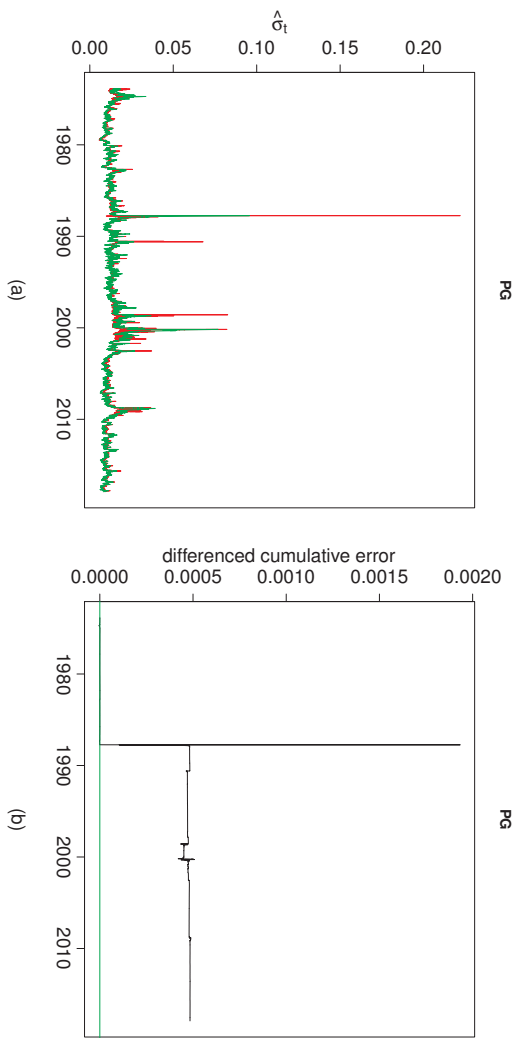


Figure 22: *Procter & Gamble.*

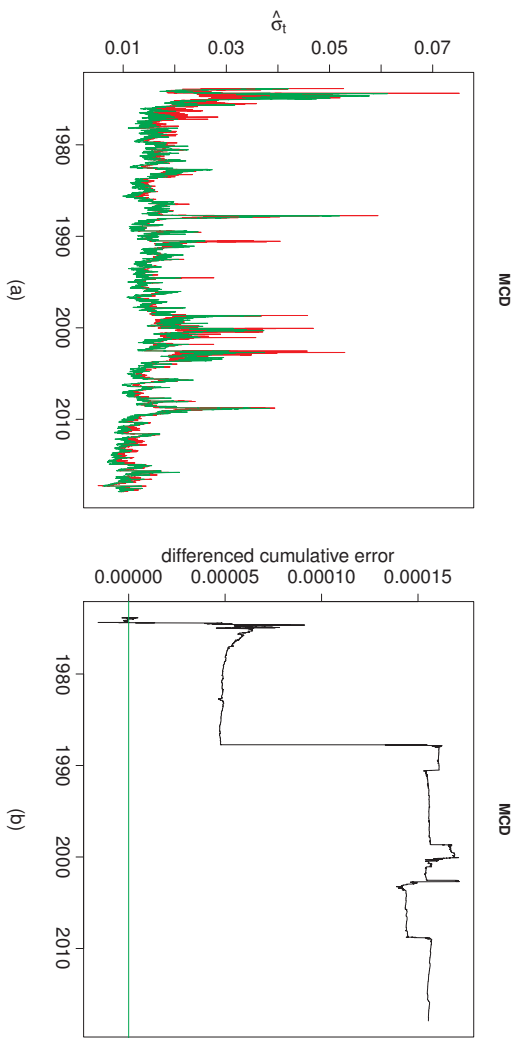


Figure 23: *McDonald's.*

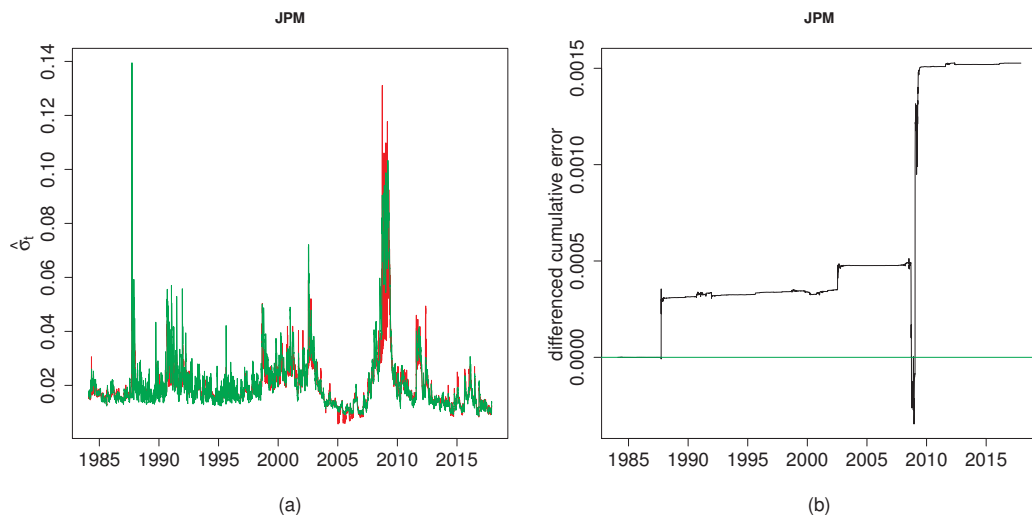


Figure 24: *JPMorgan Chase*.

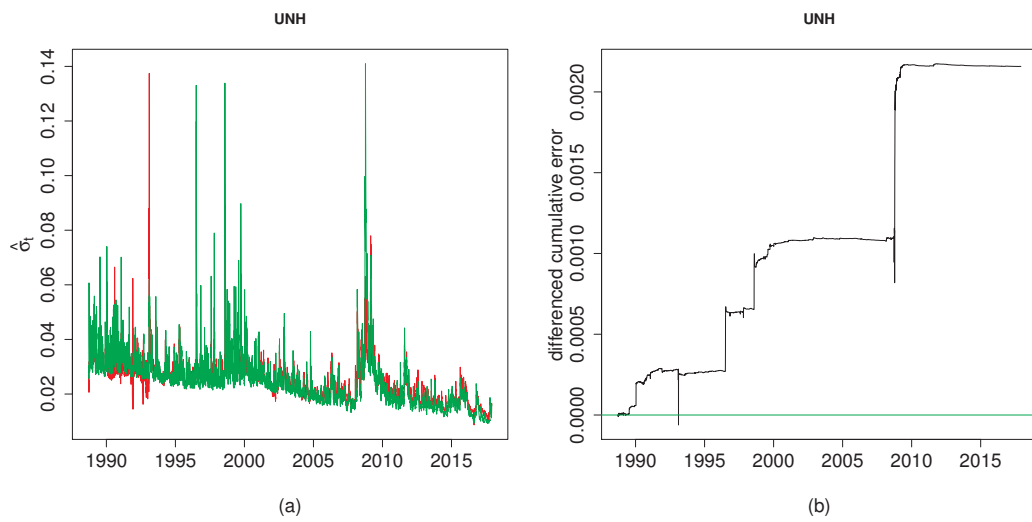


Figure 25: *UnitedHealth Group*.

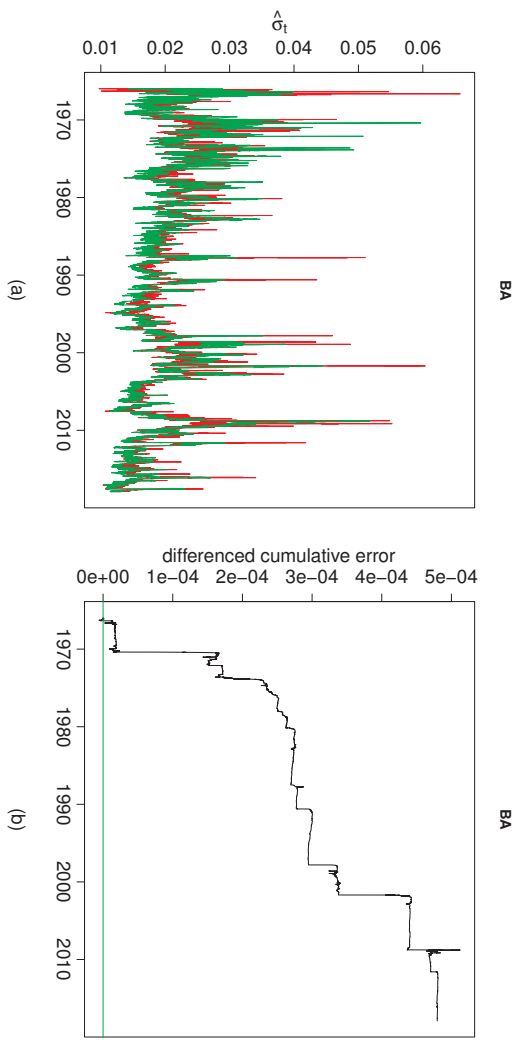


Figure 26: *Boeing.*

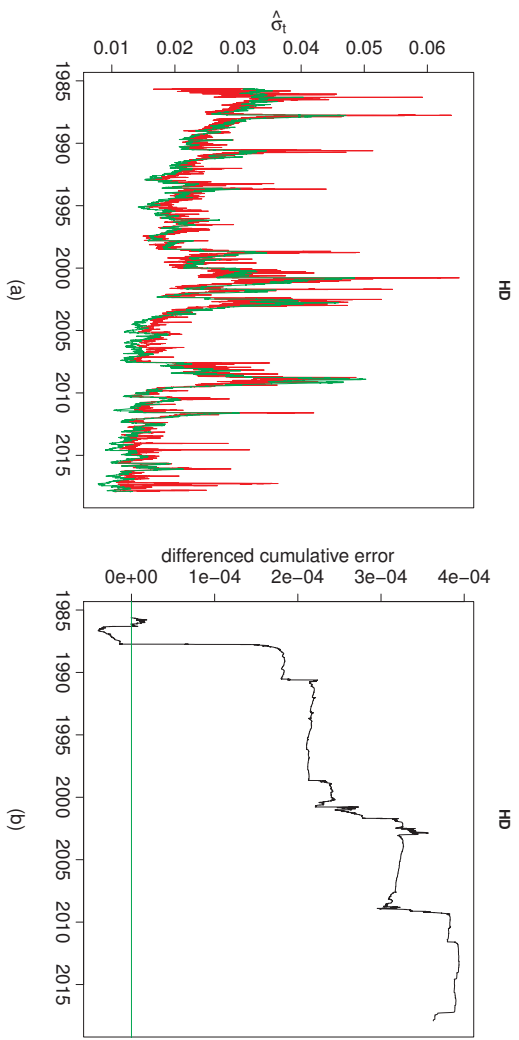


Figure 27: *Home Depot.*

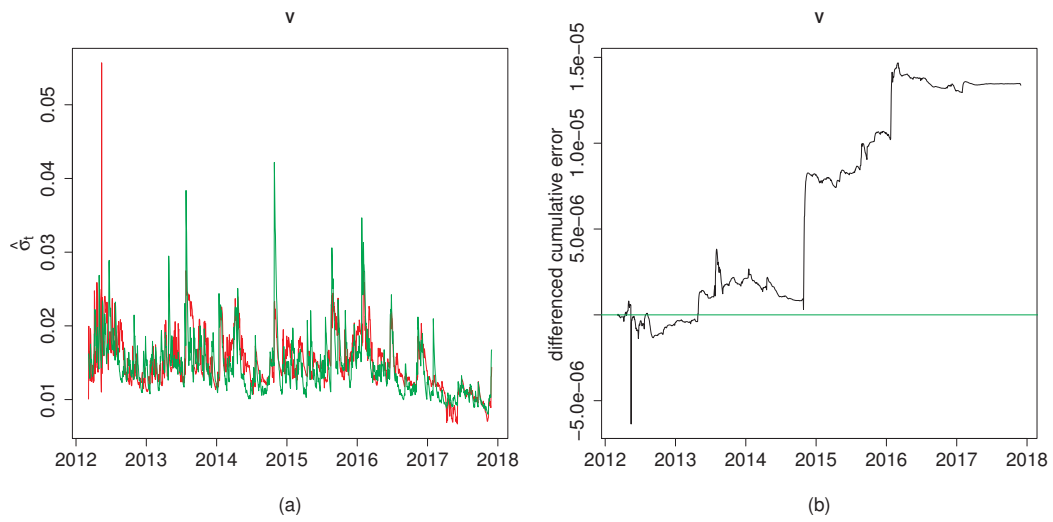


Figure 28: *Visa*.

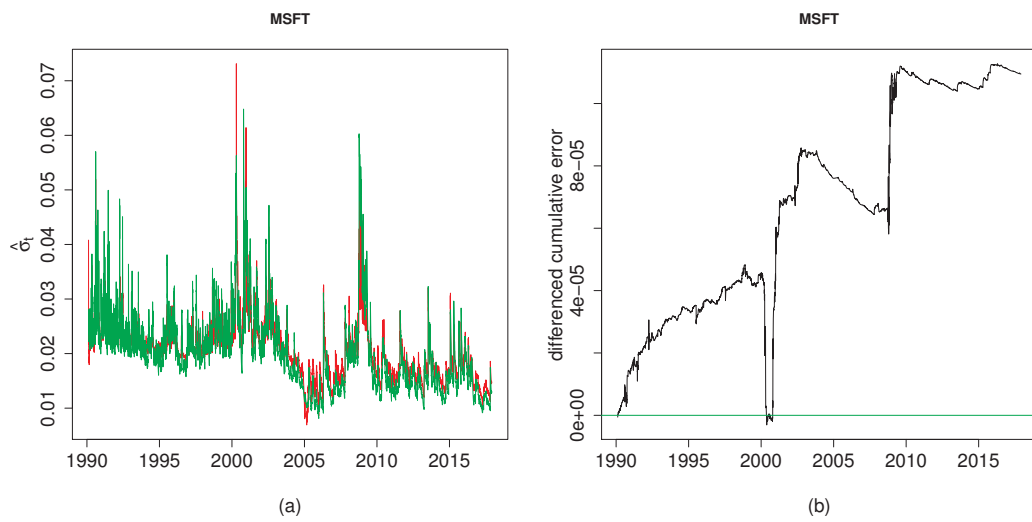


Figure 29: *Microsoft*.

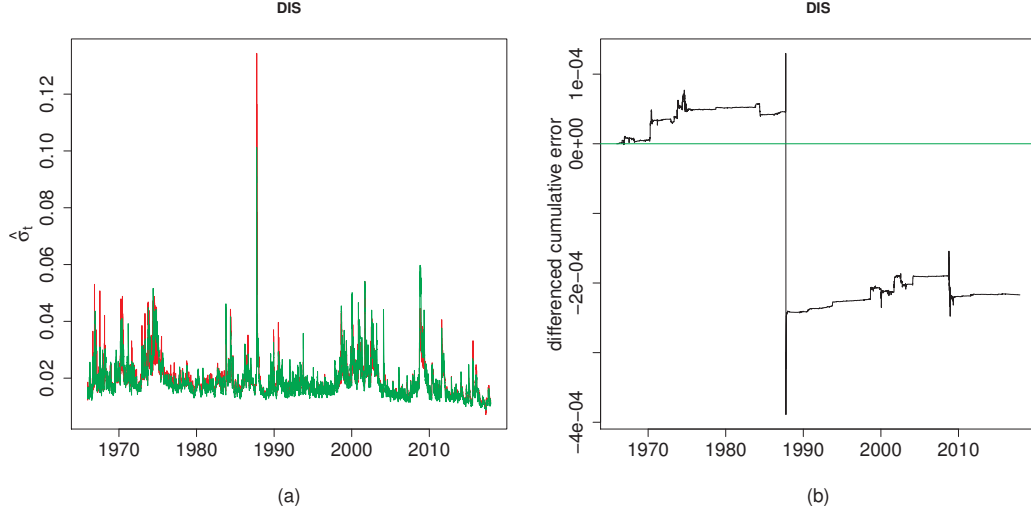


Figure 30: *Walt Disney*.

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This means that the kernel predictor is better in those time periods where D_t is increasing. Note that the highest jumps in D_t occur at the times of volatility spikes: autumn 1987, spring 2000, and autumn 1998.

3.1 Companies 1-10

Figure 31

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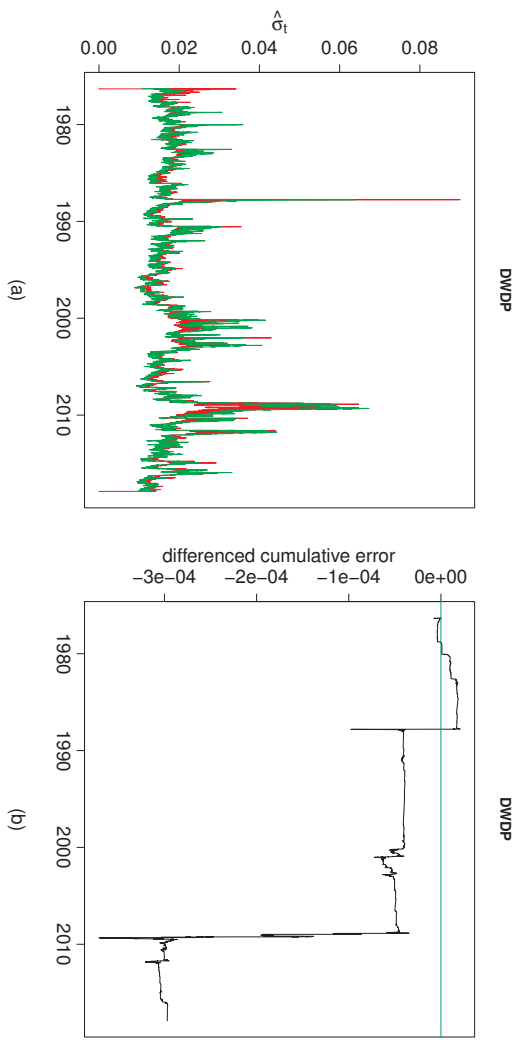


Figure 31: *DowDuPont*.

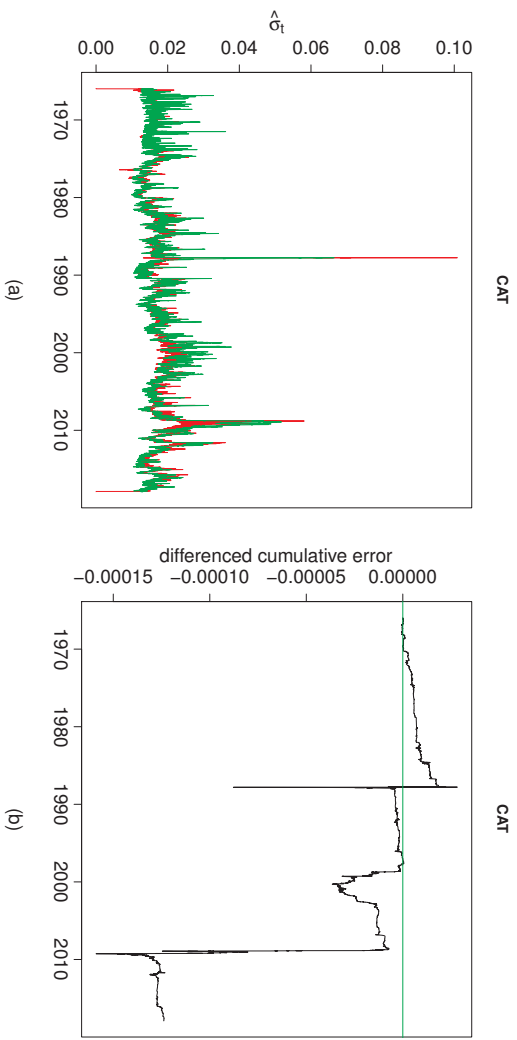


Figure 32: *Caterpillar*.

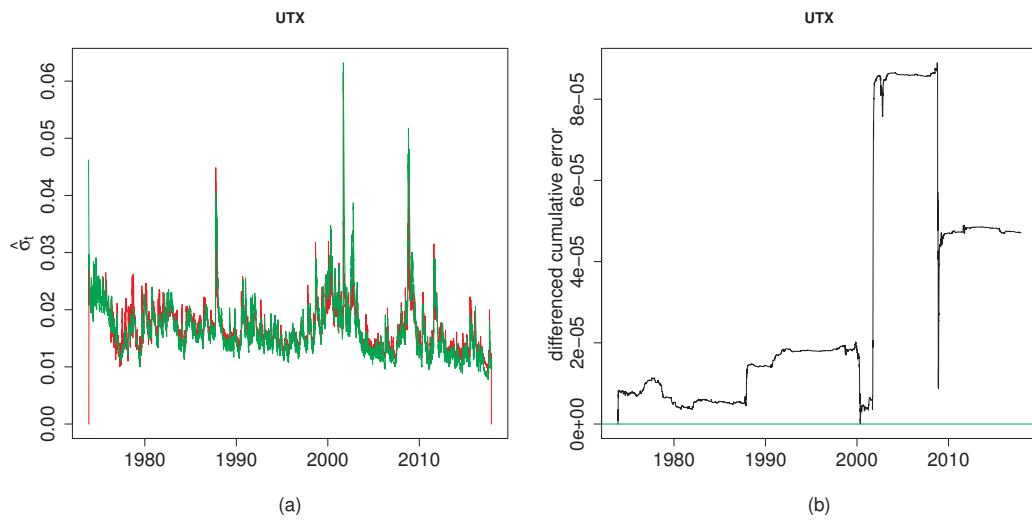


Figure 33: *United Technologies.*

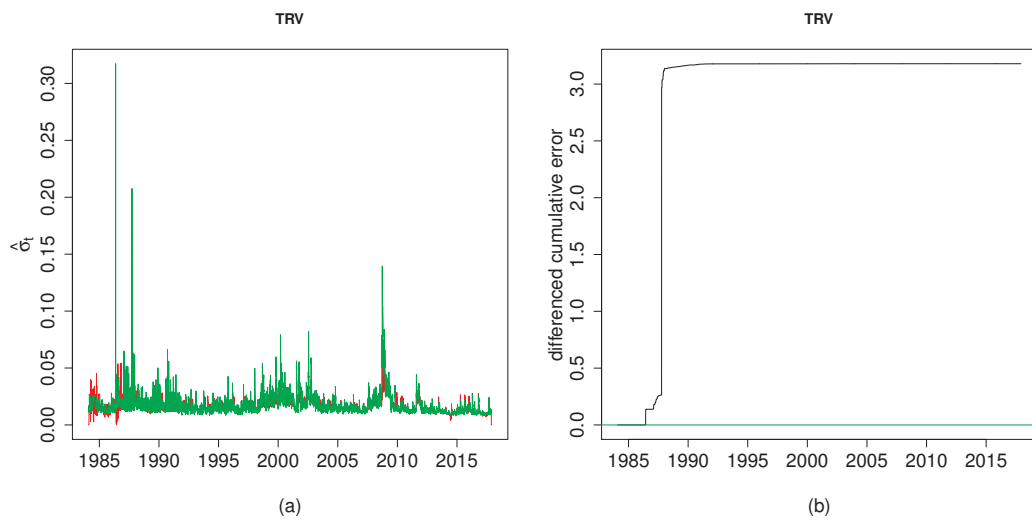


Figure 34: *The Travelers Companies.*

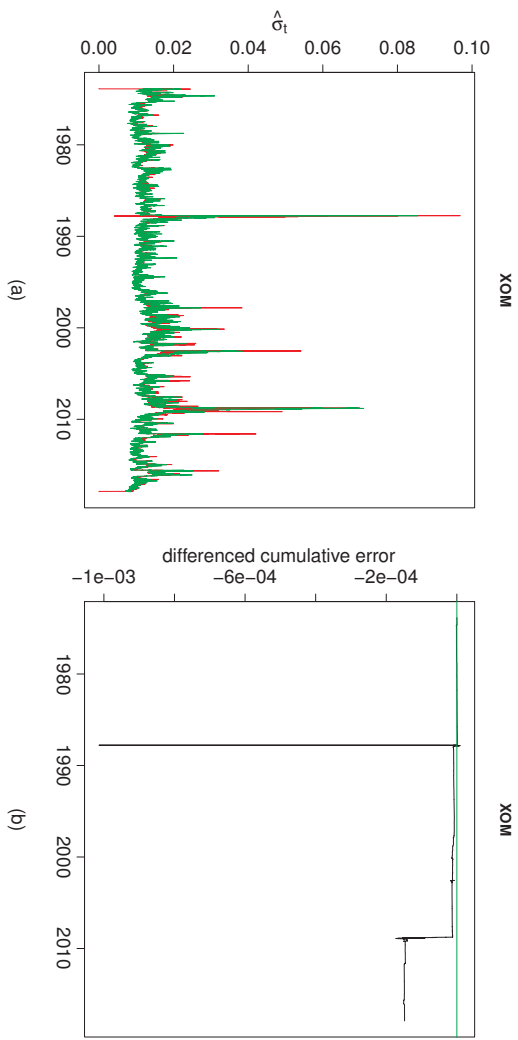


Figure 35: *Exxon Mobil*.

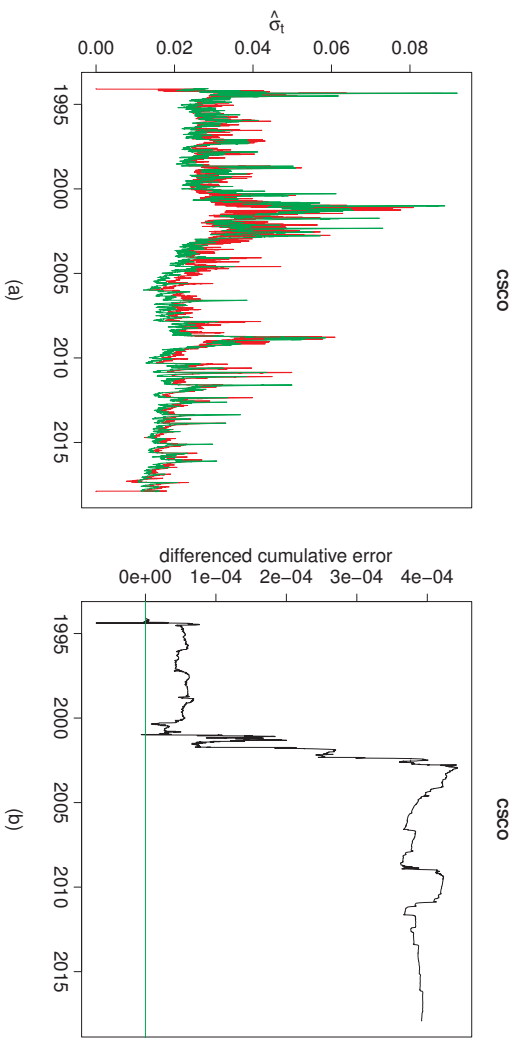


Figure 36: *Cisco*.

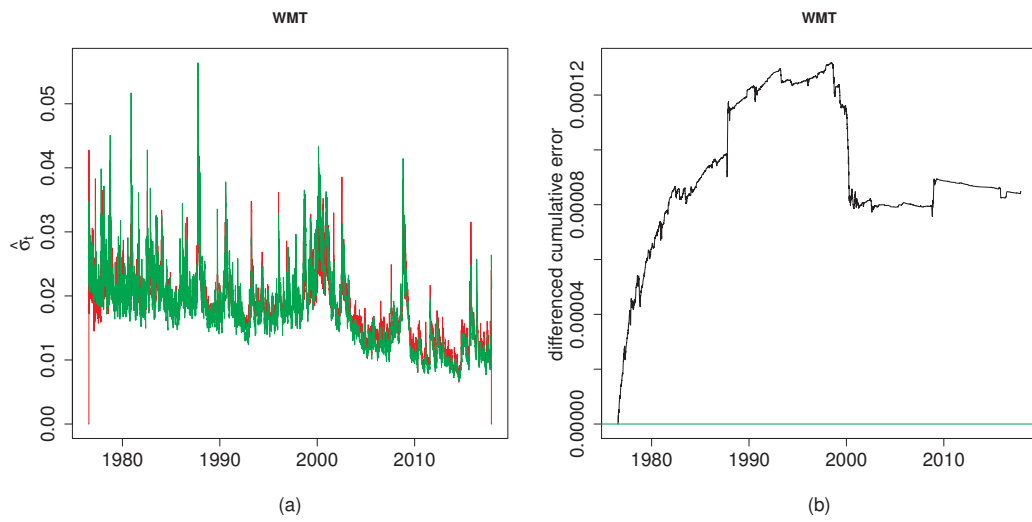


Figure 37: *Wal-Mart*.

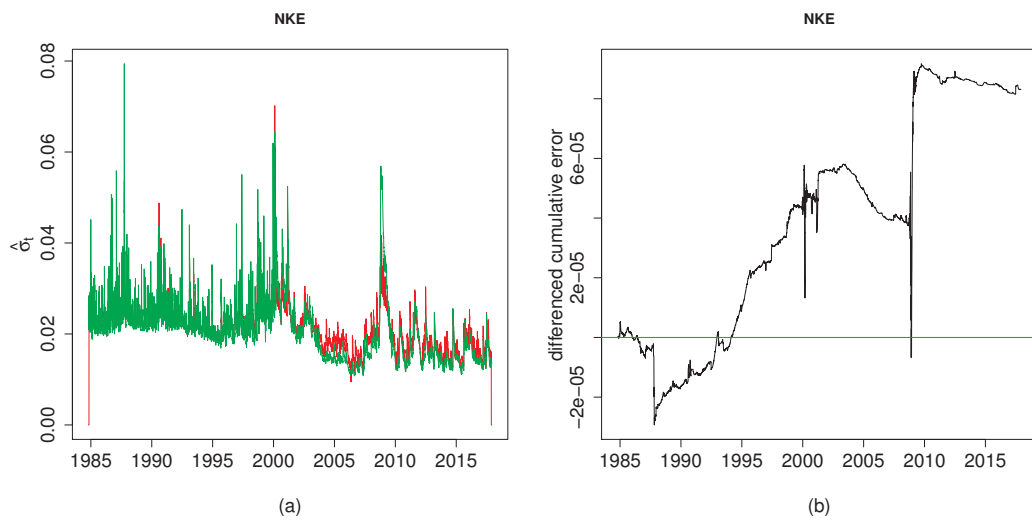


Figure 38: *Nike*.

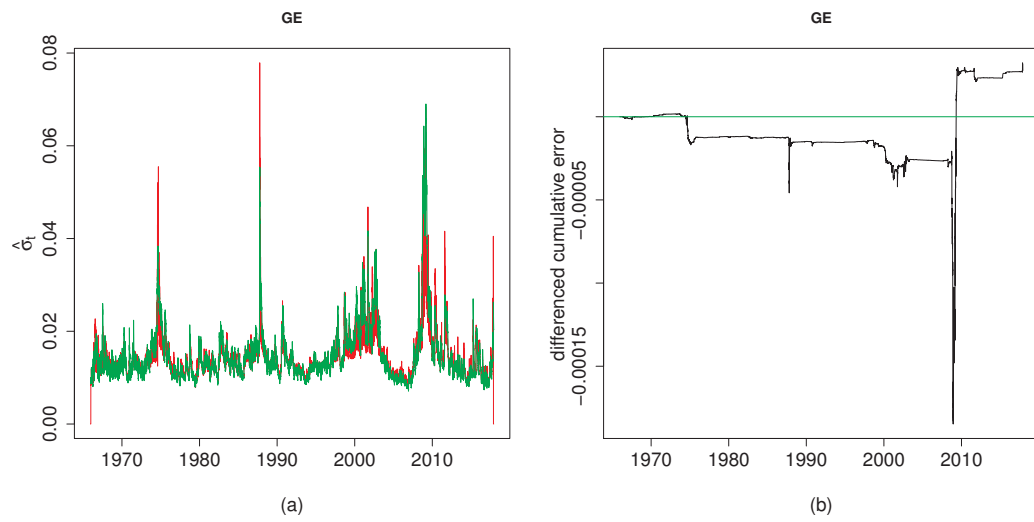


Figure 39: *General Electric*.

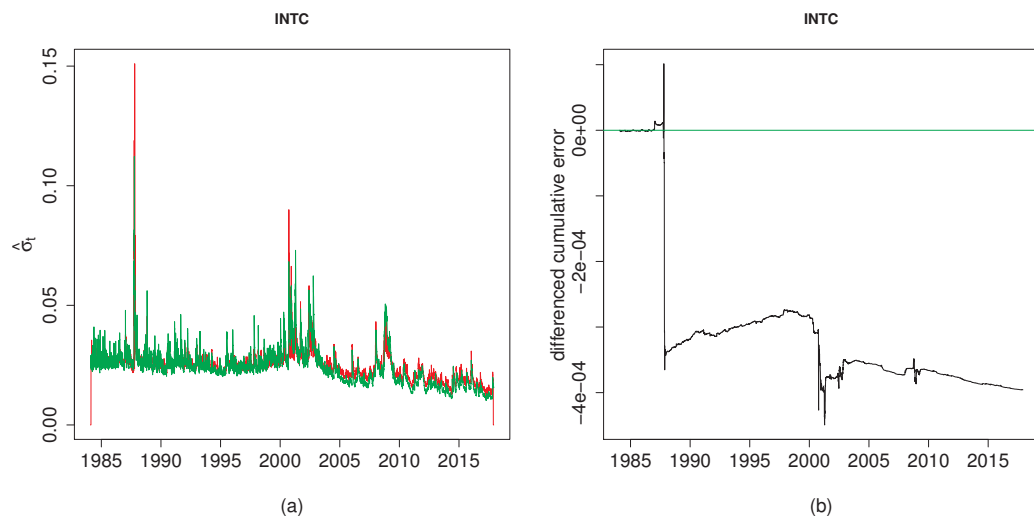


Figure 40: *Intel*.

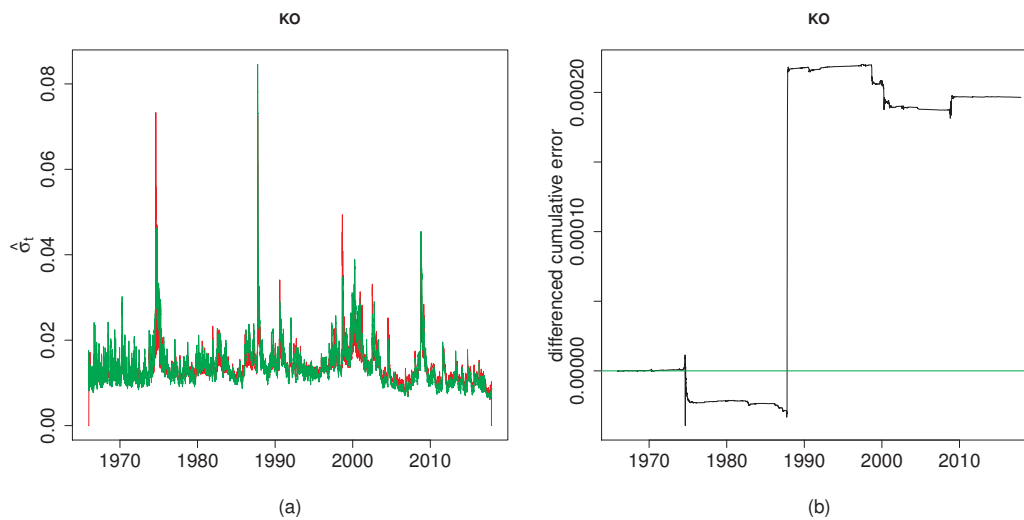


Figure 41: *Coca-Cola*.

3.2 Companies 11-20

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3.3 Companies 21-30

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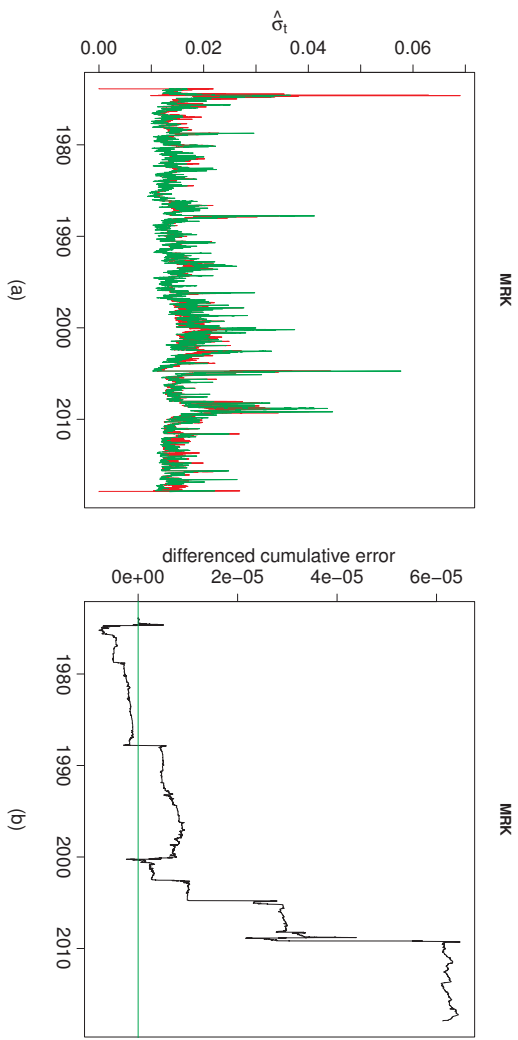


Figure 42: *Merck*.

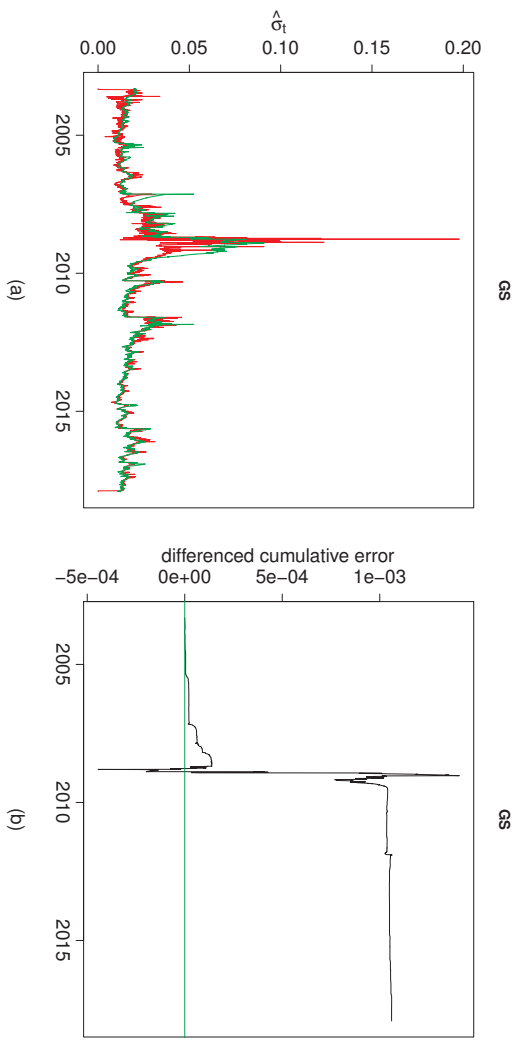


Figure 43: *Goldman Sachs*.

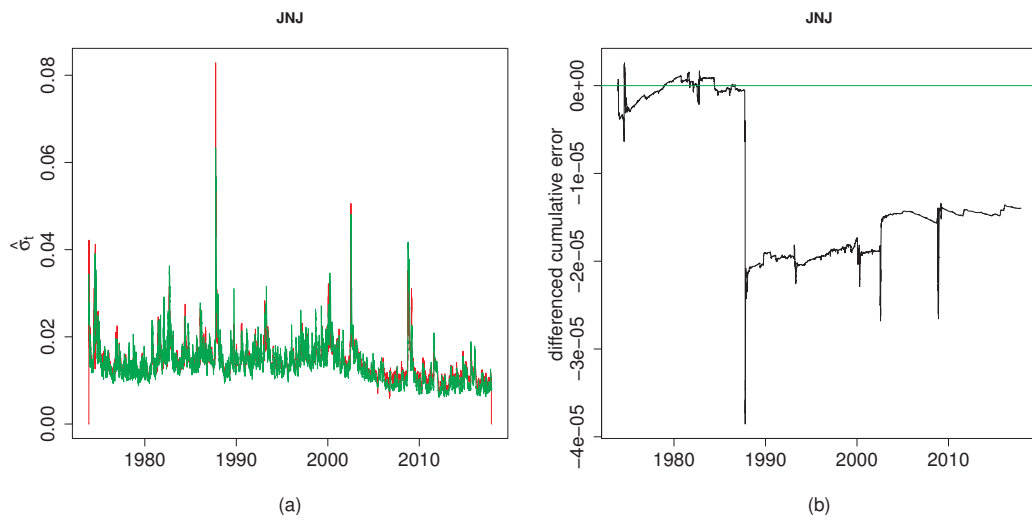


Figure 44: *Johnson & Johnson.*

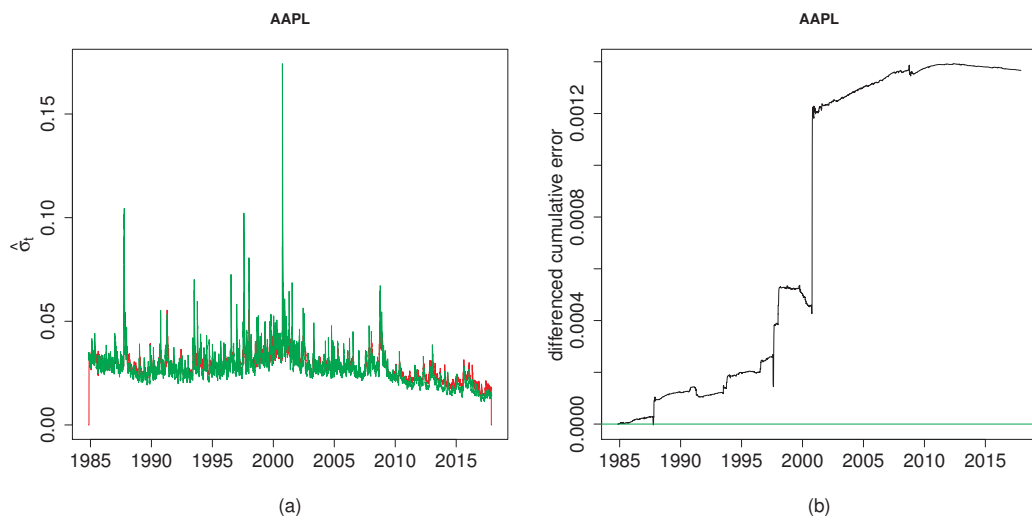


Figure 45: *Apple.*

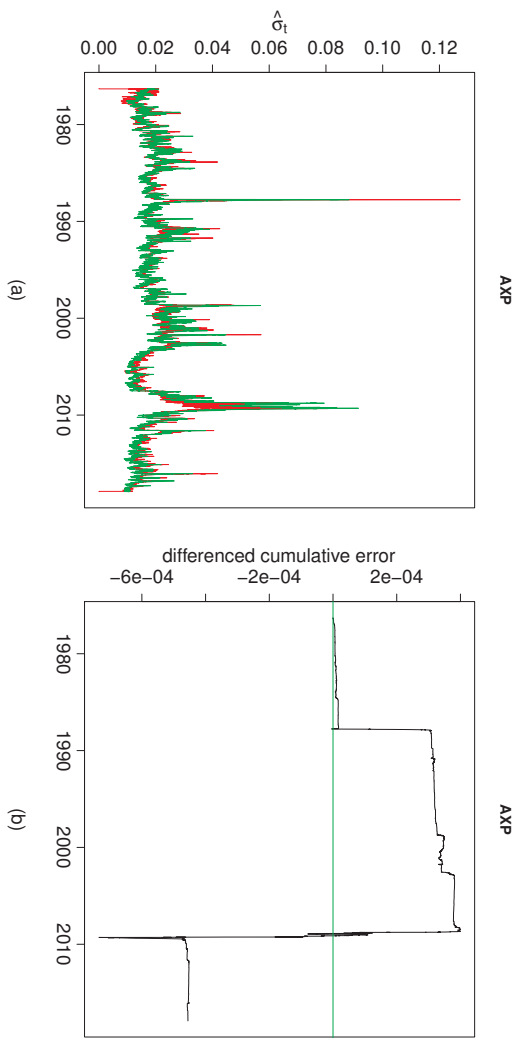


Figure 46: *American Express*.

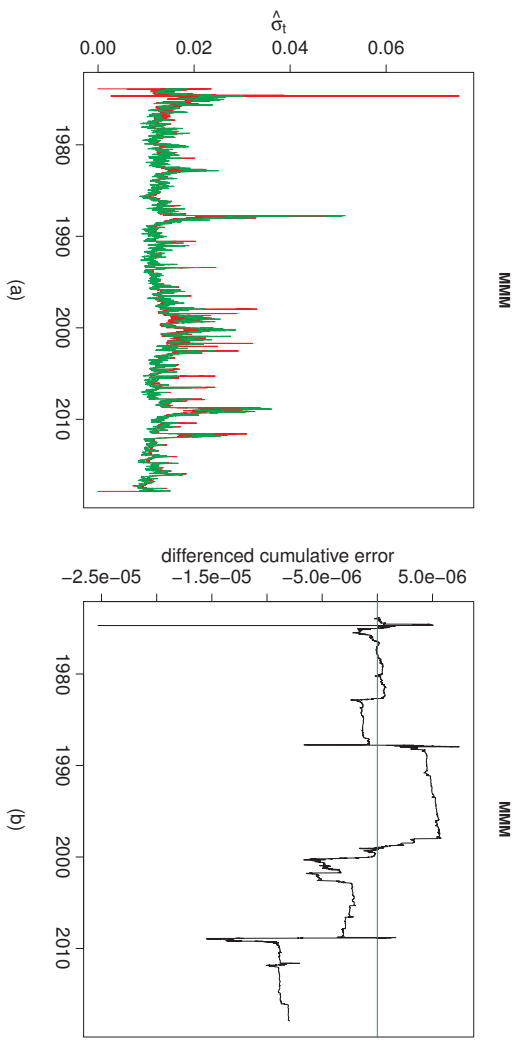


Figure 47: *3M*.

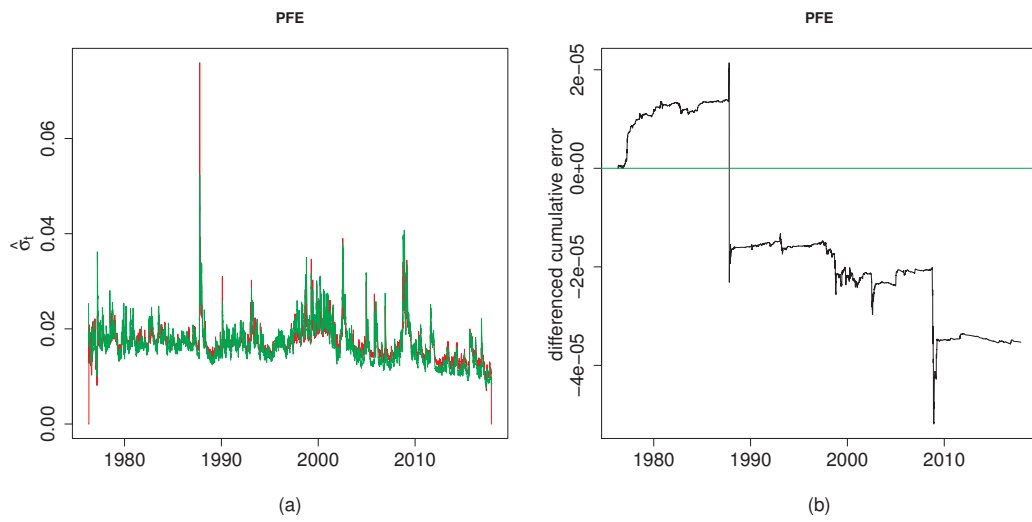


Figure 48: *Pfizer*.

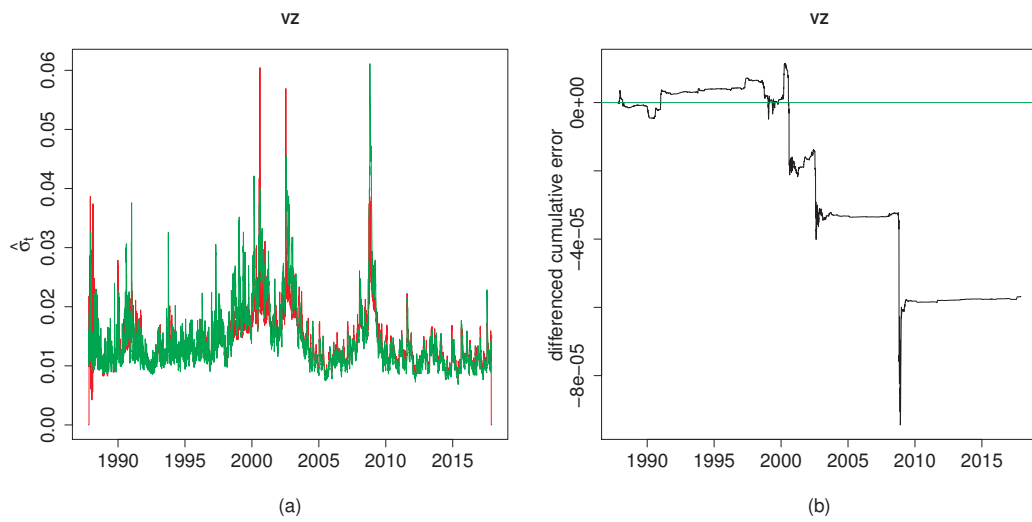


Figure 49: *Verizon*.

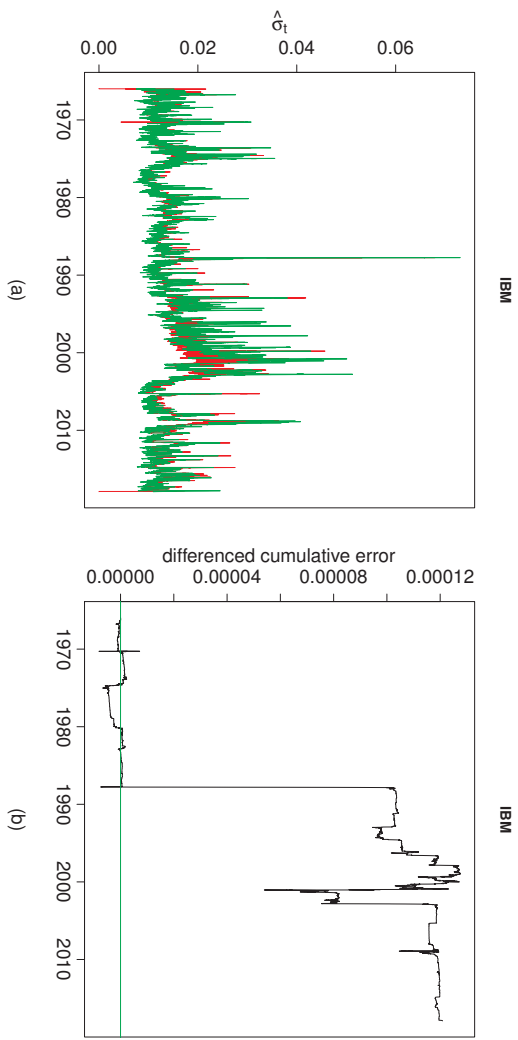


Figure 50: *IBM*.

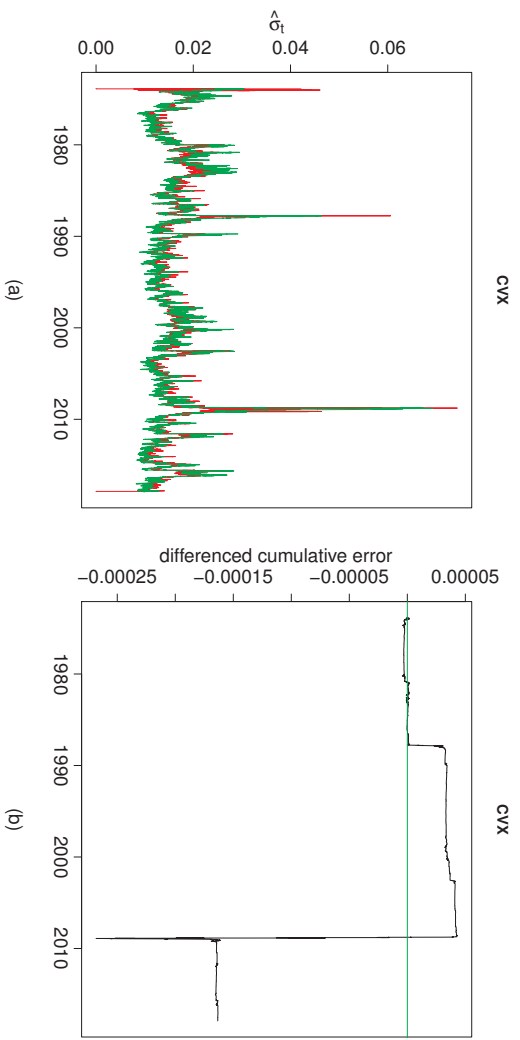


Figure 51: *Chevron*.

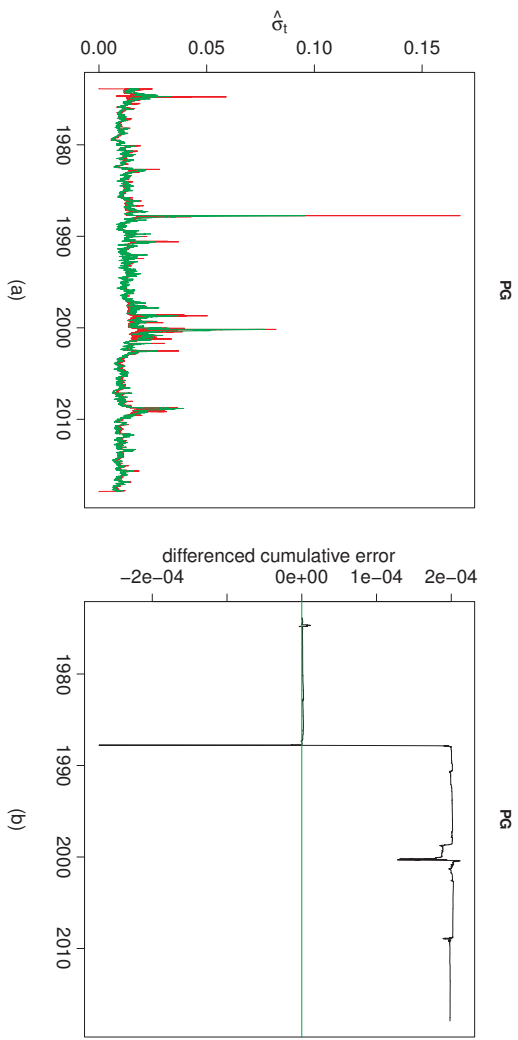


Figure 52: *Procter & Gamble.*

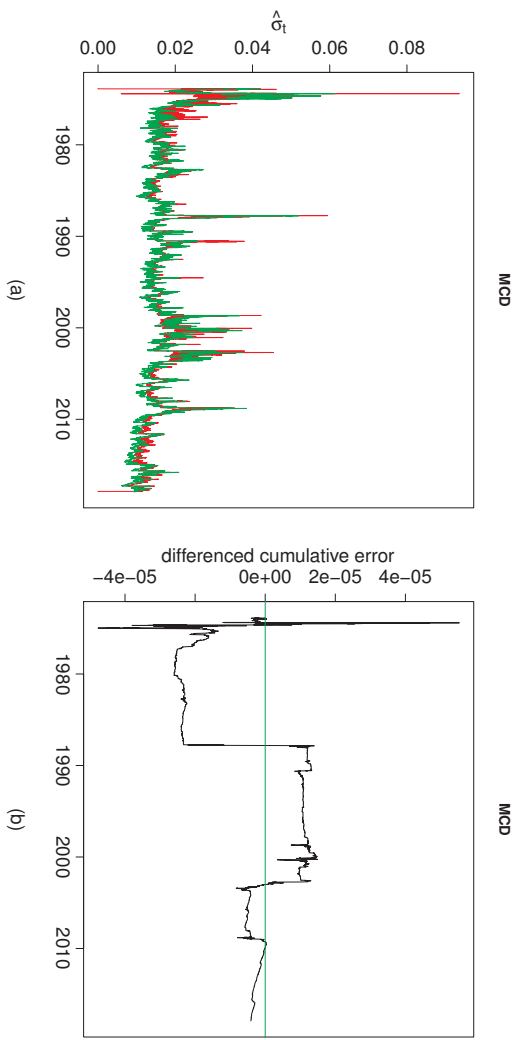


Figure 53: *McDonald's.*

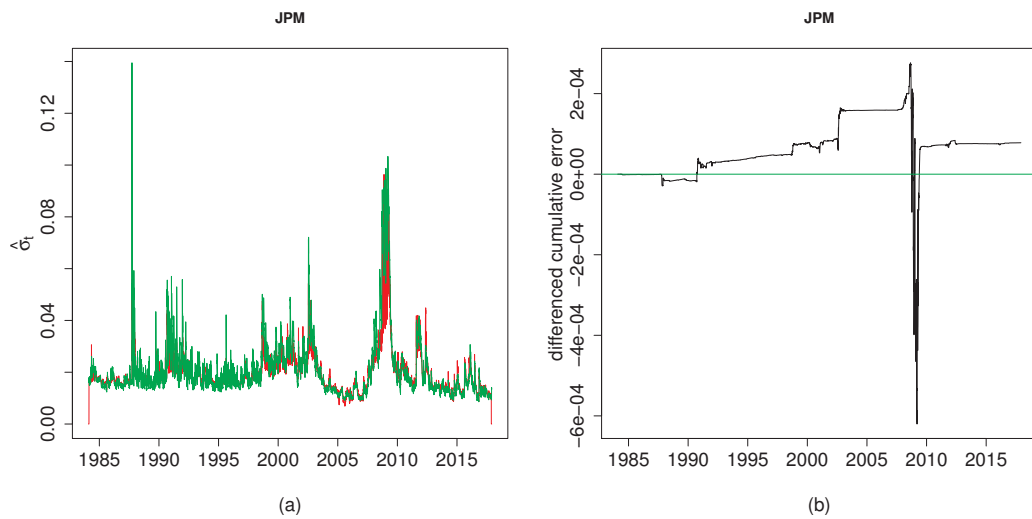


Figure 54: *JPMorgan Chase*.

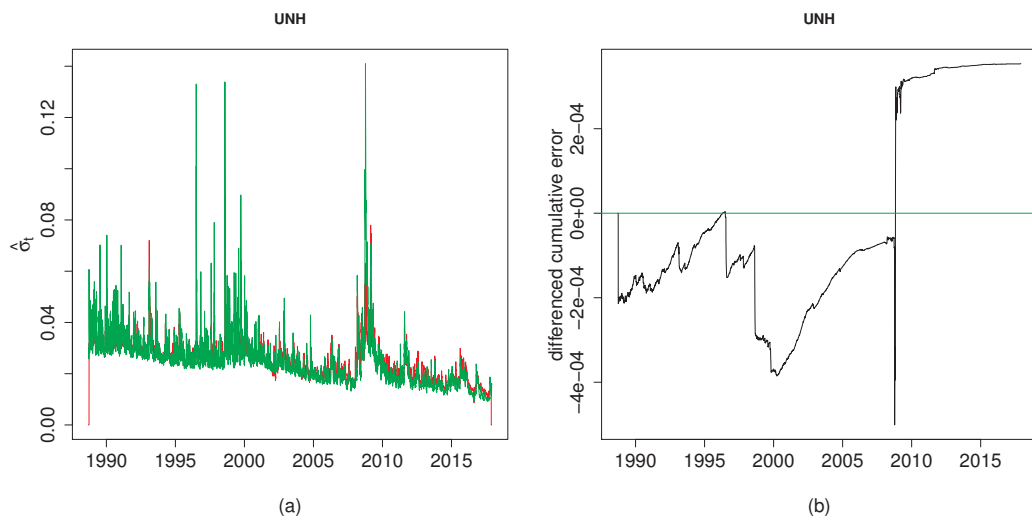


Figure 55: *UnitedHealth Group*.

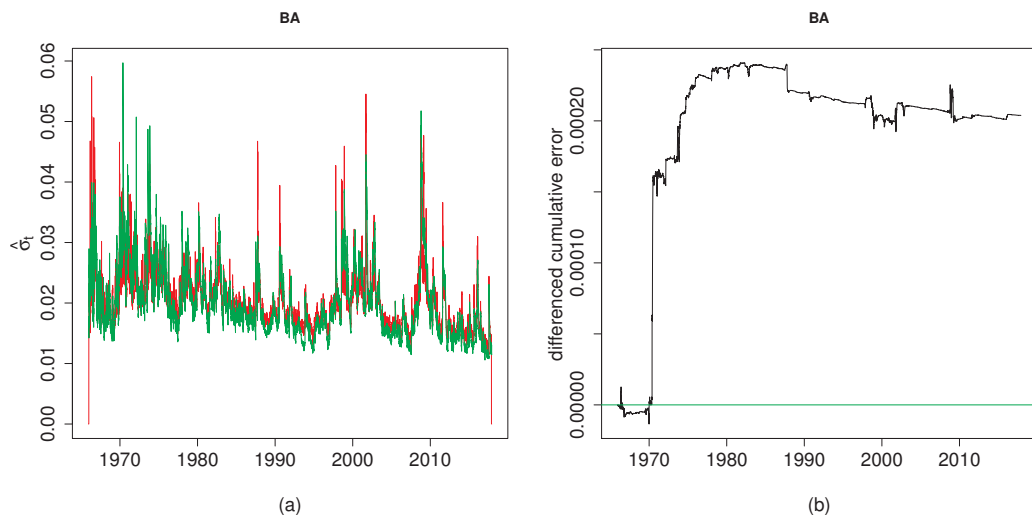


Figure 56: *Boeing*.

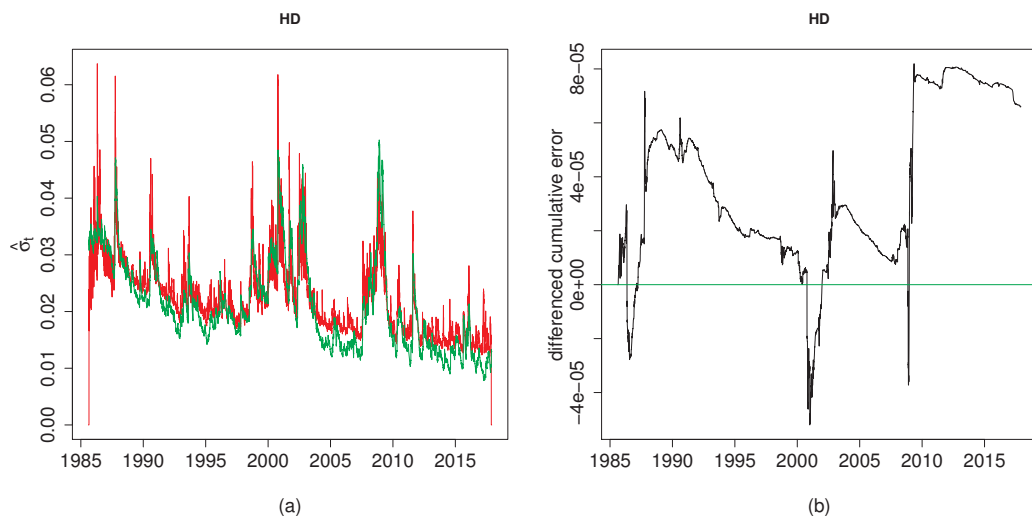


Figure 57: *Home Depot*.

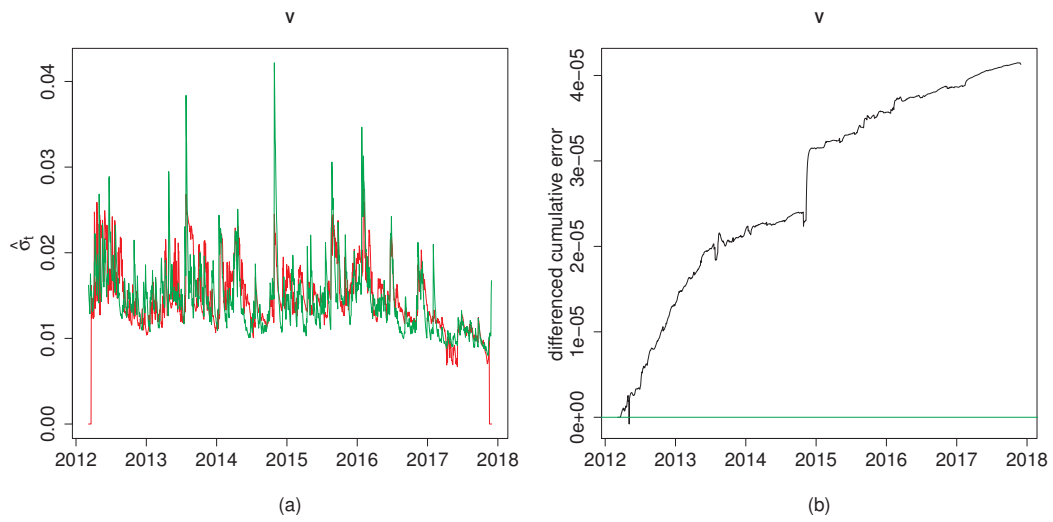


Figure 58: *Visa*.

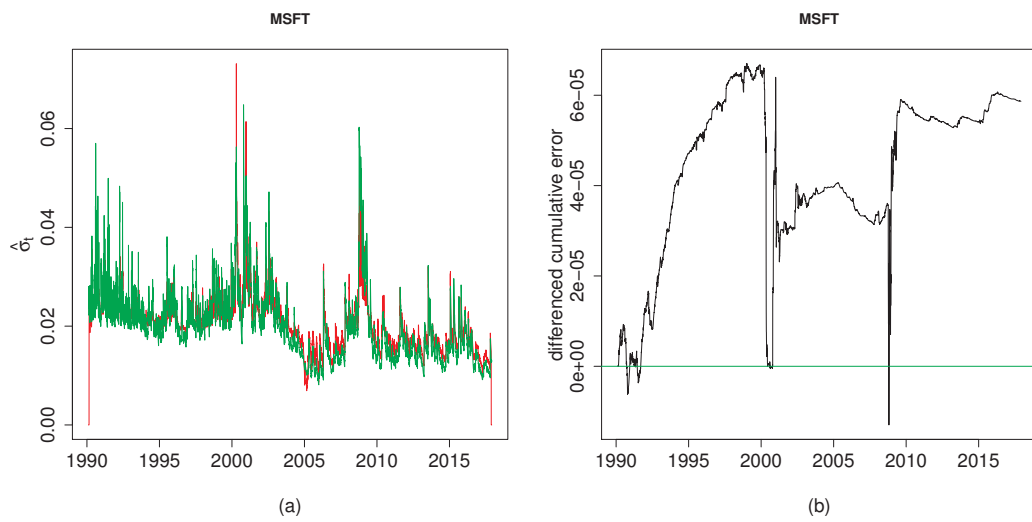


Figure 59: *Microsoft*.

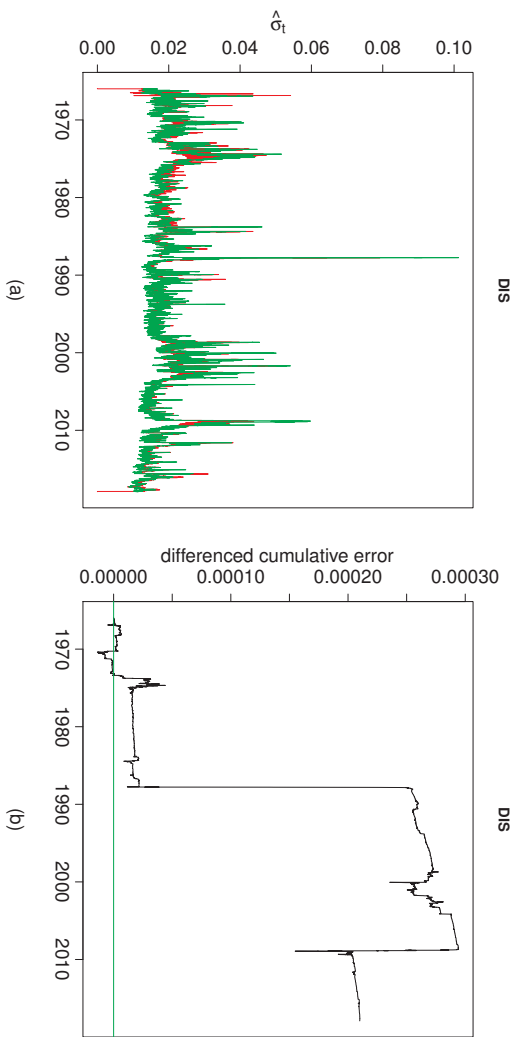


Figure 60: *Walt Disney*.

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