Output for Trajectorial Asset Models with Operational Assumptions

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Abstract

We present output that illustrates risky asset models described in the papers "Trajectorial Asset Models with Operational Assumptions" and "Algorithm XXX: Trajectorial Asset Models in Matlab".

0.1 Output for $\mathcal{N}_E$, τ and Γ

Figures 1 and 2 illustrate some structure induced in the set of pairs $(m, q) \in \mathcal{N}_E$ which takes place by changing δ for the FB data. Figure 6 indicates how τ and Γ change with increasing δ for the FB data. Similarly, Figures 9, 10 and 17 illustrate the same information, respectively, for the SPY data. Unless indicated otherwise in the figure captions, the output uses $\delta_0 = 0.1$ and $\delta = 0.5$ (in case this parameter is fixed) for both data sets and $\Delta = 1$ hr for FB data and $\Delta = 1/2$ hr for SPY data.

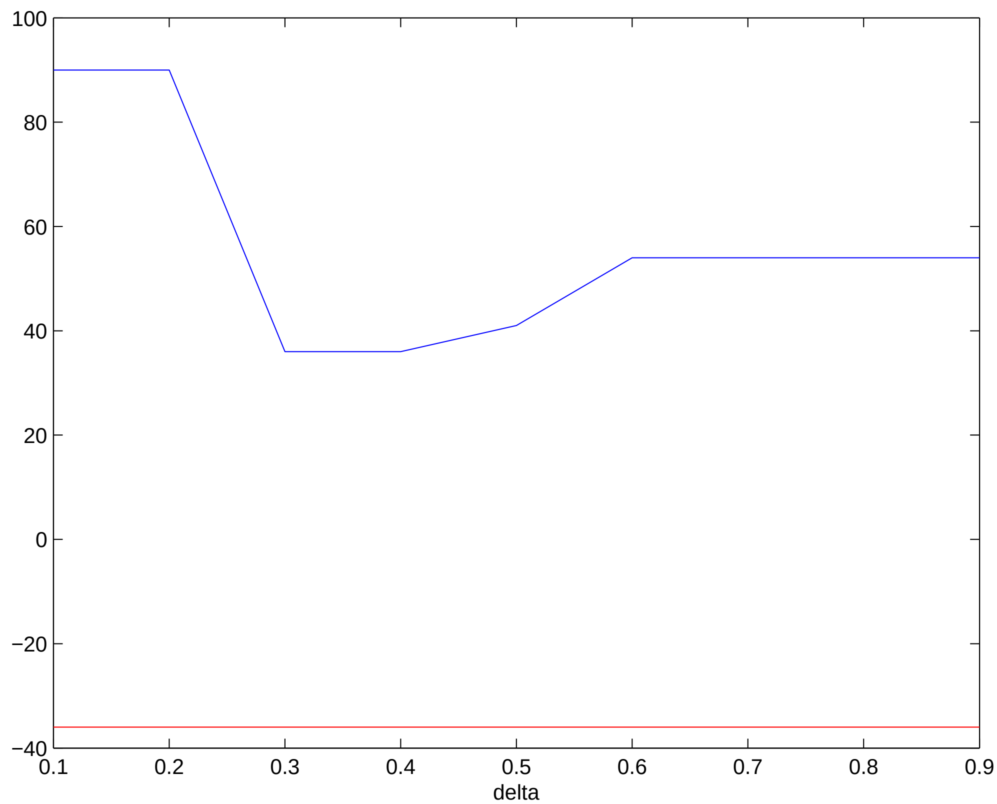

Figure 1: maximum and minimum of m_i with respect to δ. FB data, $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$, $\Delta = 1$ hr

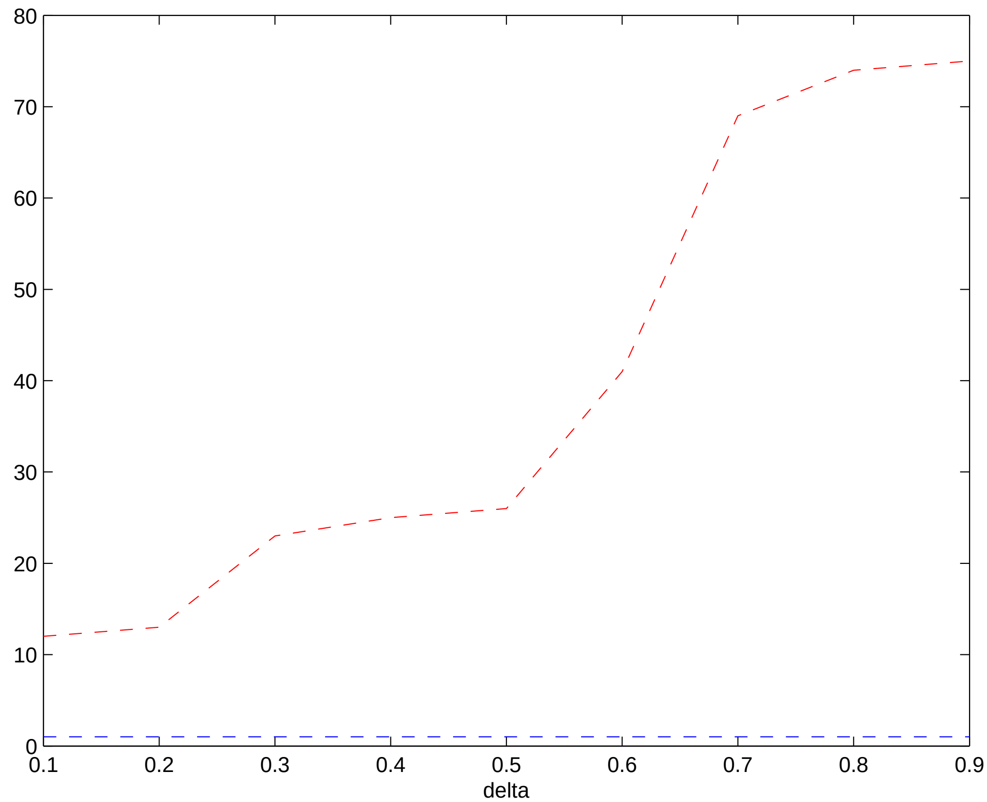

Figure 2: maximum and minimum of q_i with respect to δ. FB data. $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$

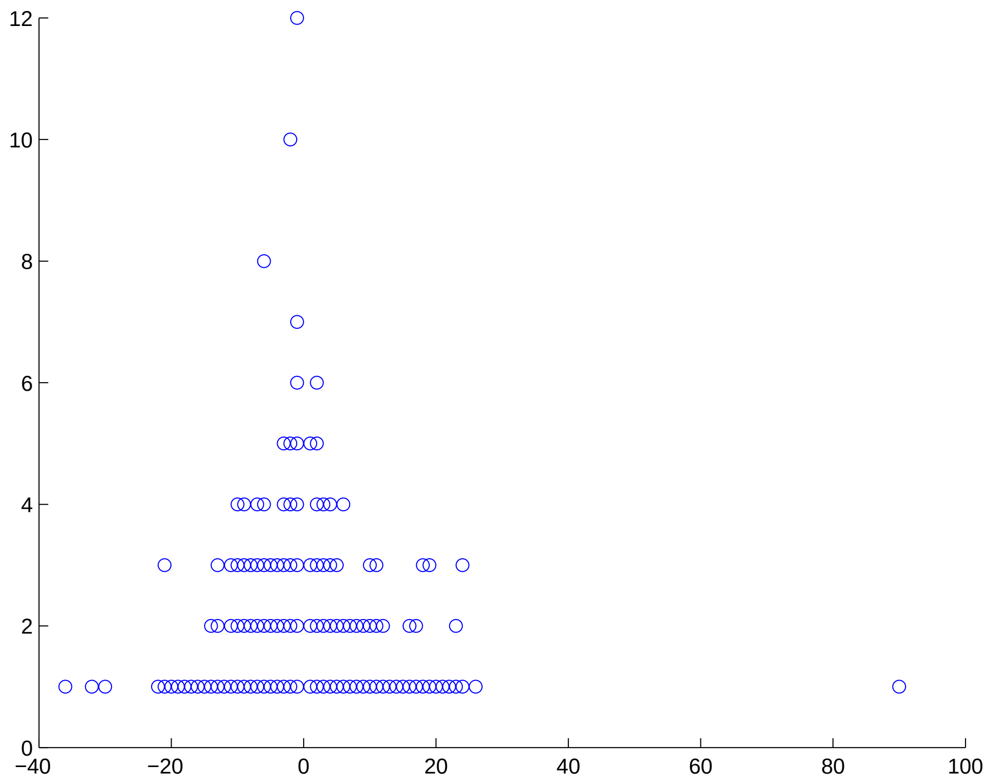

Figure 3: Set $\mathcal{N}_E$ of observable pairs (m, q). FB data. $\delta = 0.1$, $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$.

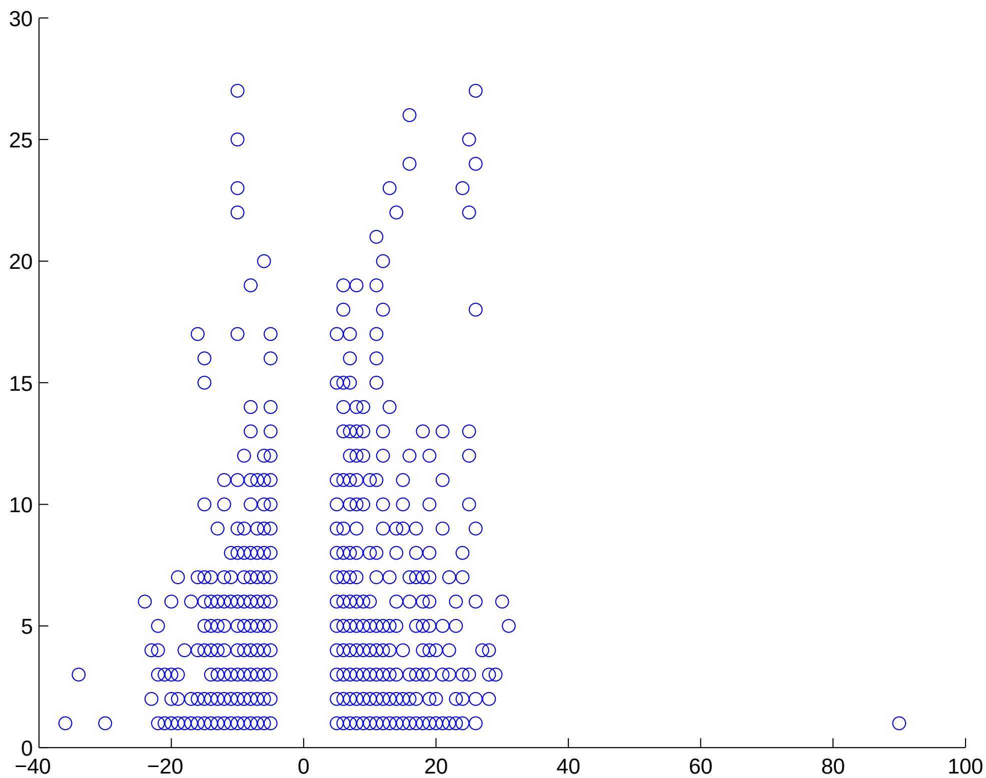

Figure 4: Set $\mathcal{N}_E$ of observable pairs (m, q). FB data. $\delta = 0.5$, $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$.

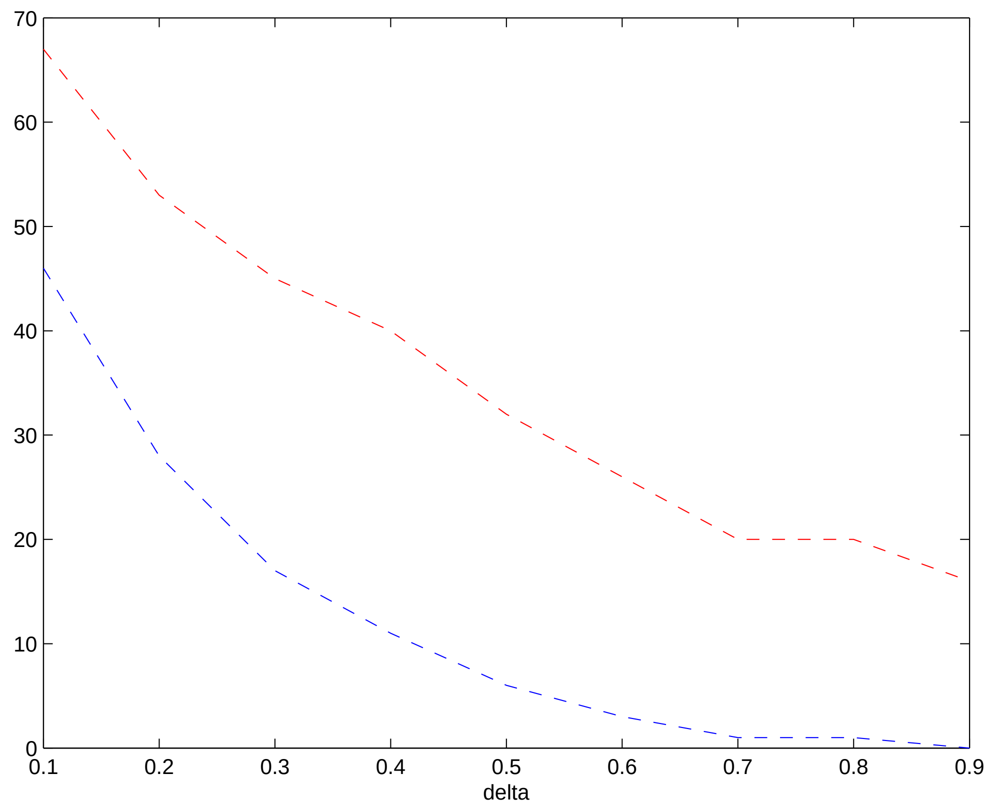

Figure 5: N_* and N^*, i.e. minimum and maximum number of δ-increments over historical data with respect to δ. FB data. $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$

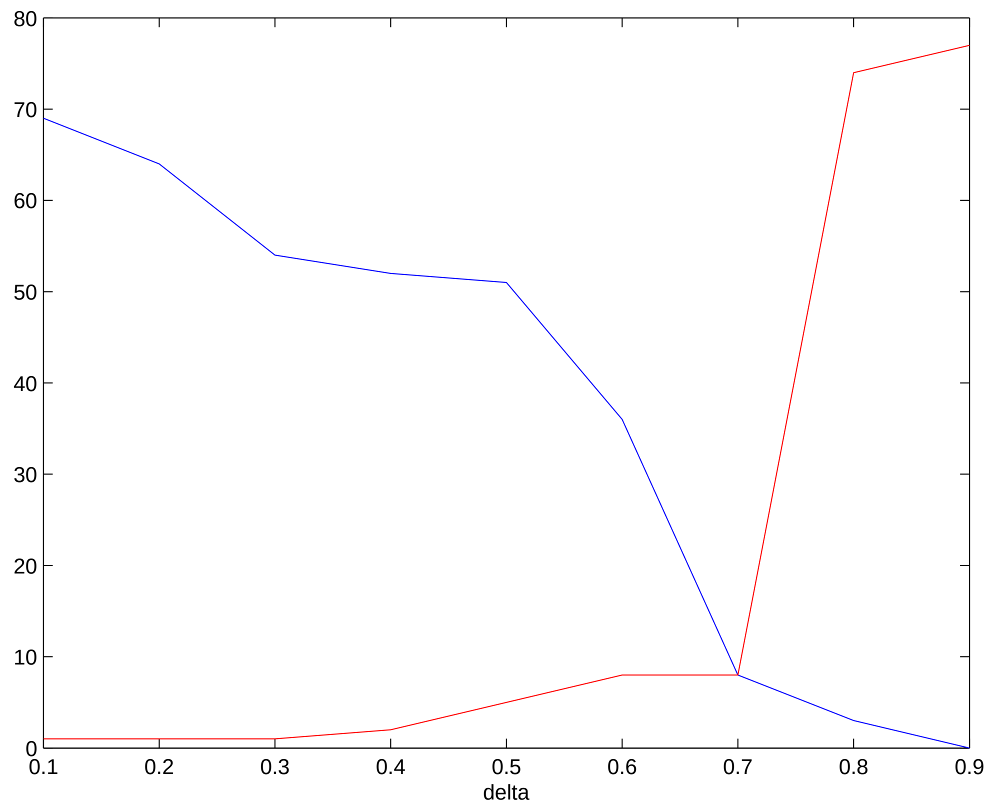

Figure 6: τ (blue, decreases) and Γ (red, increases) with respect to δ. FB data. $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$

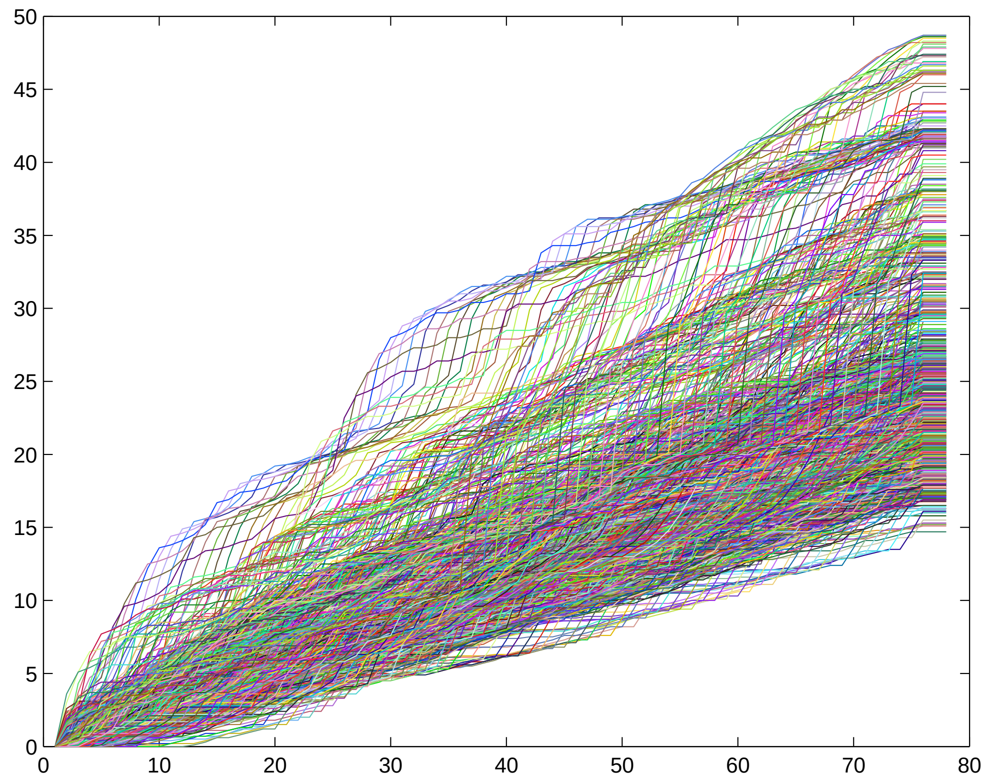

Figure 7: Variation estimate. FB data. $\delta = 0.5$, $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$

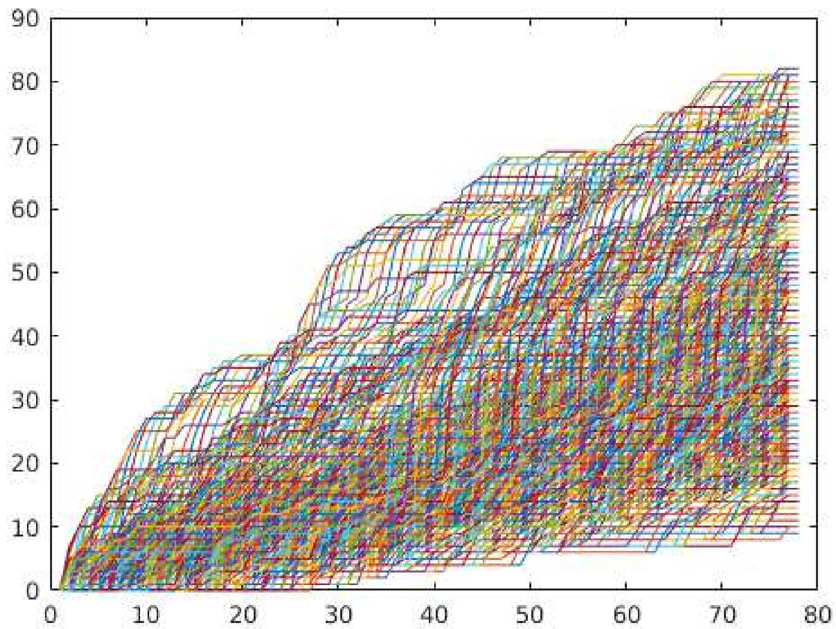

Figure 8: Historical variation constraint sets for FB data. Obtained for $\delta = 1$, $\delta_0 = 0.5$.

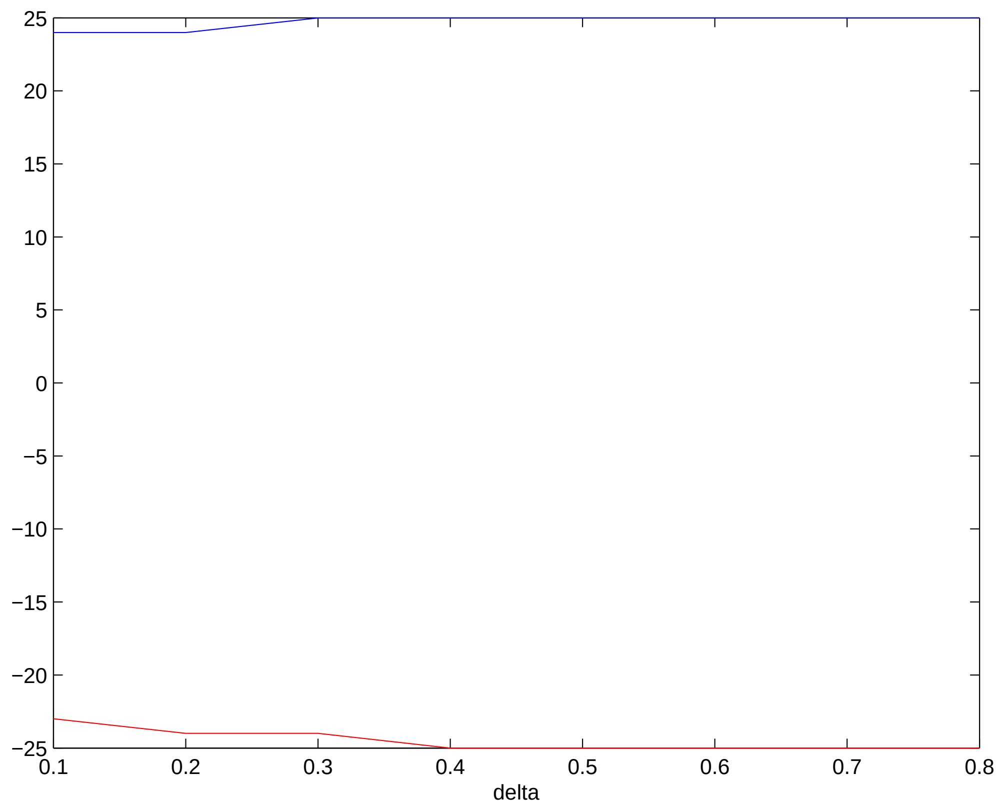

Figure 9: maximum and minimum of m_i with respect to δ. SPY data, $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$, $\Delta = 0.5$ hr

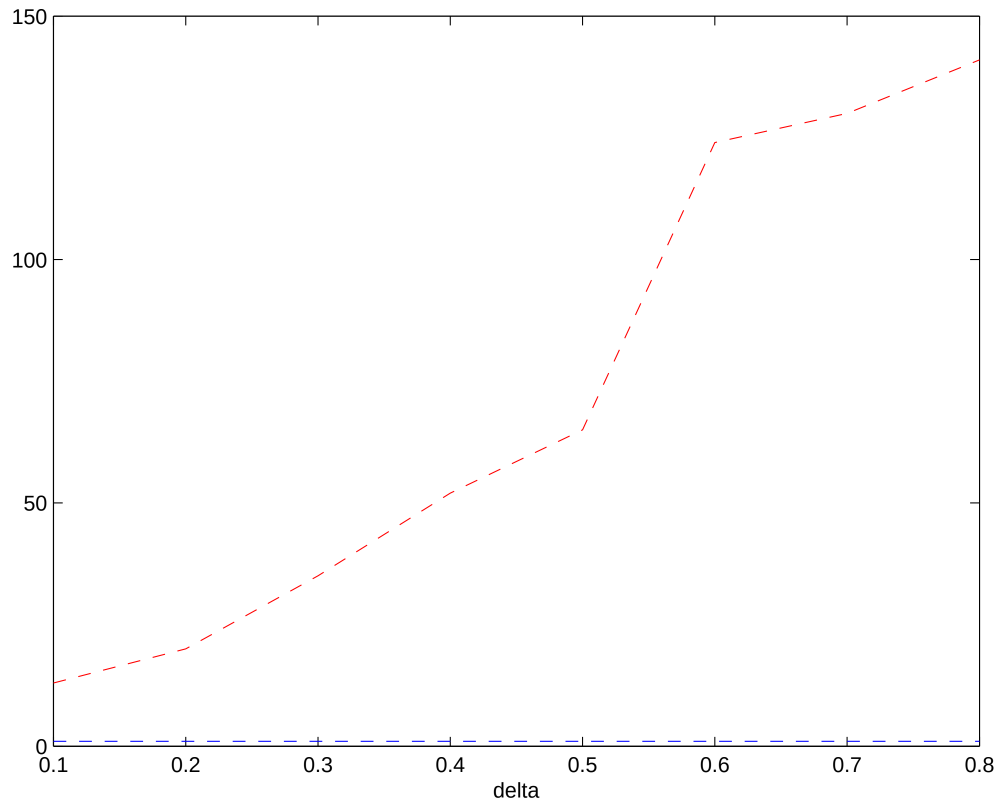

Figure 10: maximum and minimum of q_j with respect to δ. SPY data, $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$.

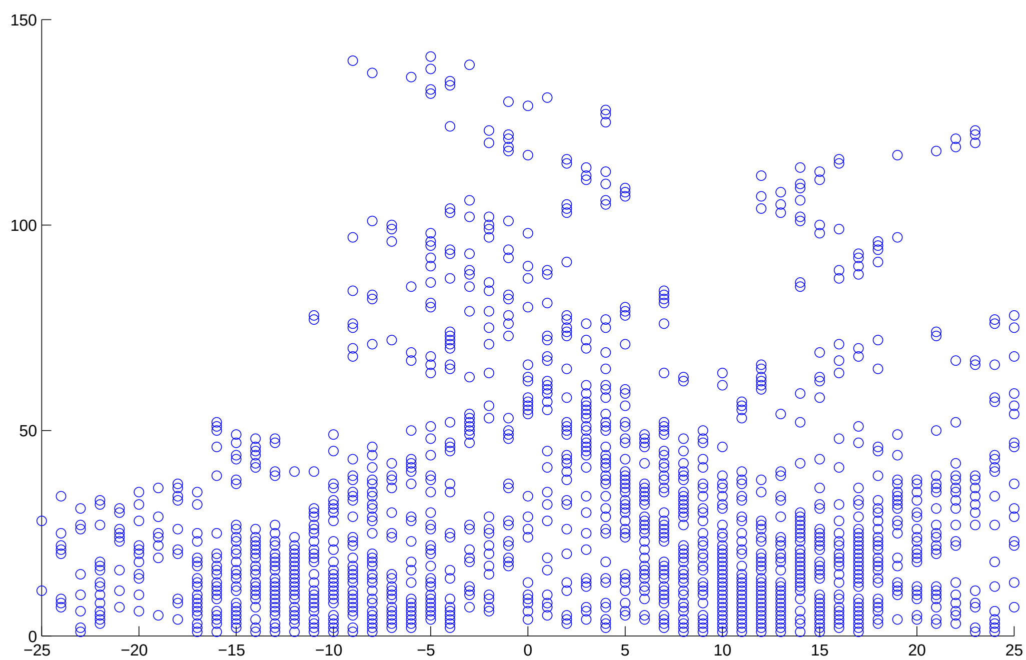

Figure 11: Set $\mathcal{N}_E$ of observable pairs (m, q). SPY data. $\delta = 0.1$, $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$.

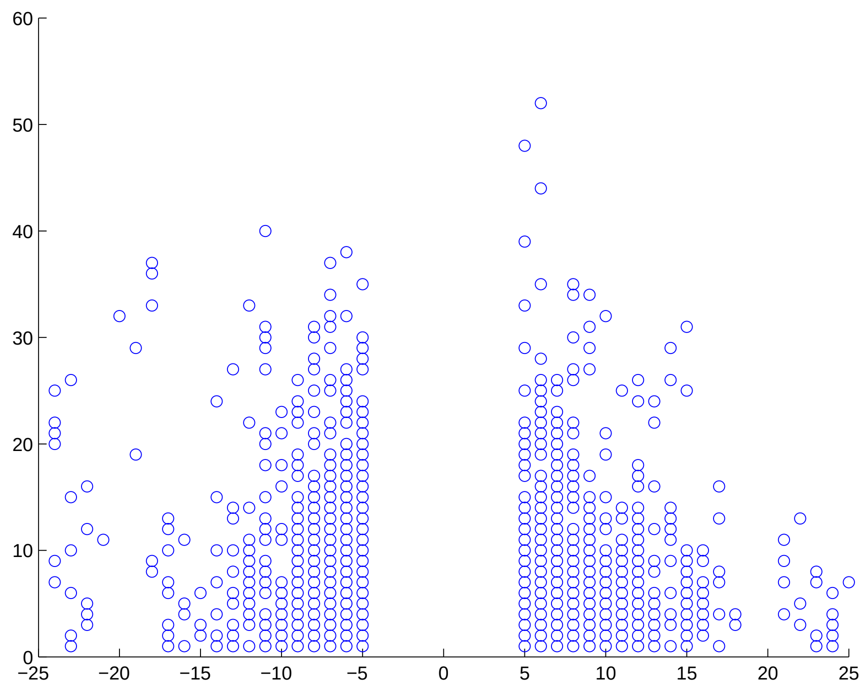

Figure 12: Set $\mathcal{N}_E$ of observable pairs (m, q). SPY data. $\delta = 0.5$, $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$.

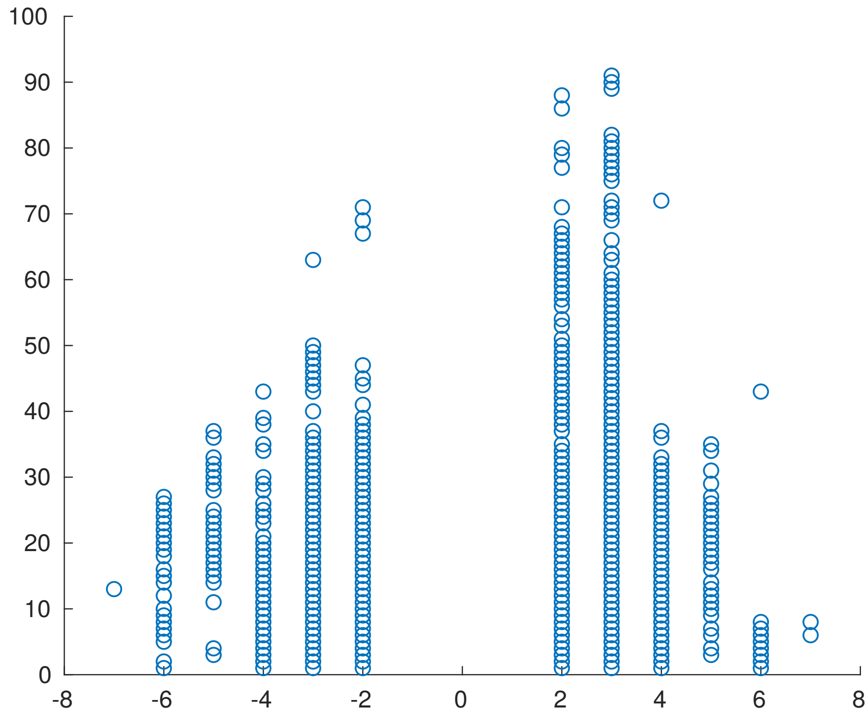

Figure 13: Set $\mathcal{N}_E$ of observable pairs (m, q). SPY data. $\delta = 0.8$, $\delta_0 = 0.4$, $\hat{\delta}_0 = 0.01$

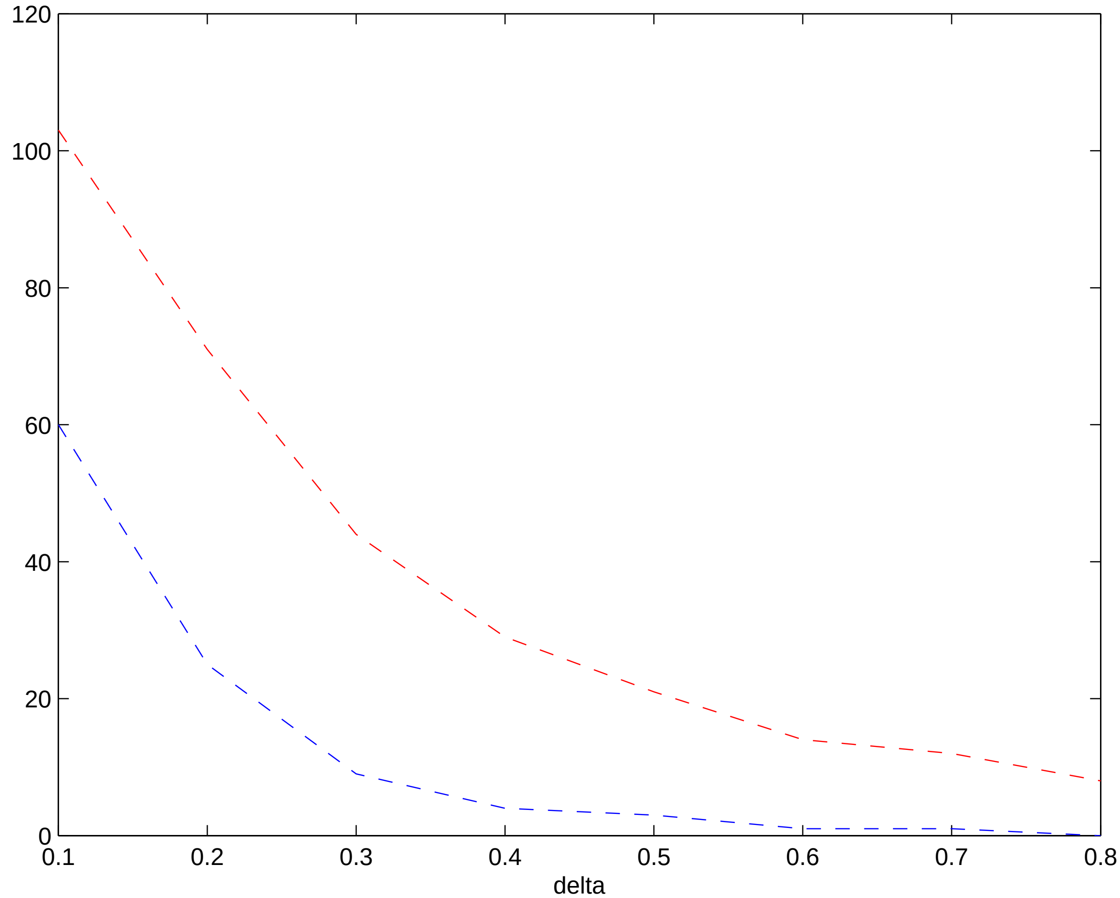

Figure 14: N_* and N^*, i.e. minimum and maximum number of δ-increments over historical data with respect to δ. SPY data, $\delta_0 = 0.1$, $\hat{\hat{\delta}}_0 = 0.01$.

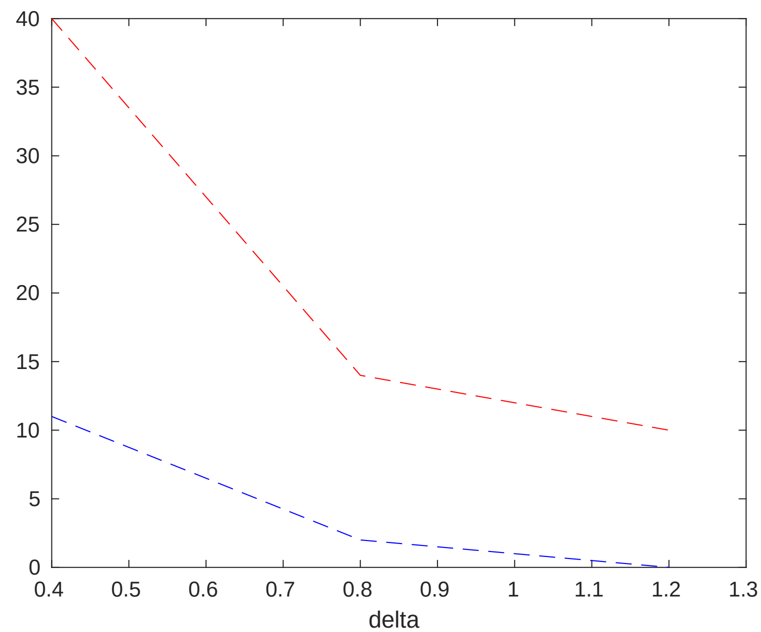

Figure 15: N_* and N^*, i.e. minimum and maximum number of δ-increments over historical data with respect to δ. SPY data, $\delta_0 = 0.4$, $\hat{\delta}_0 = 0.01$.

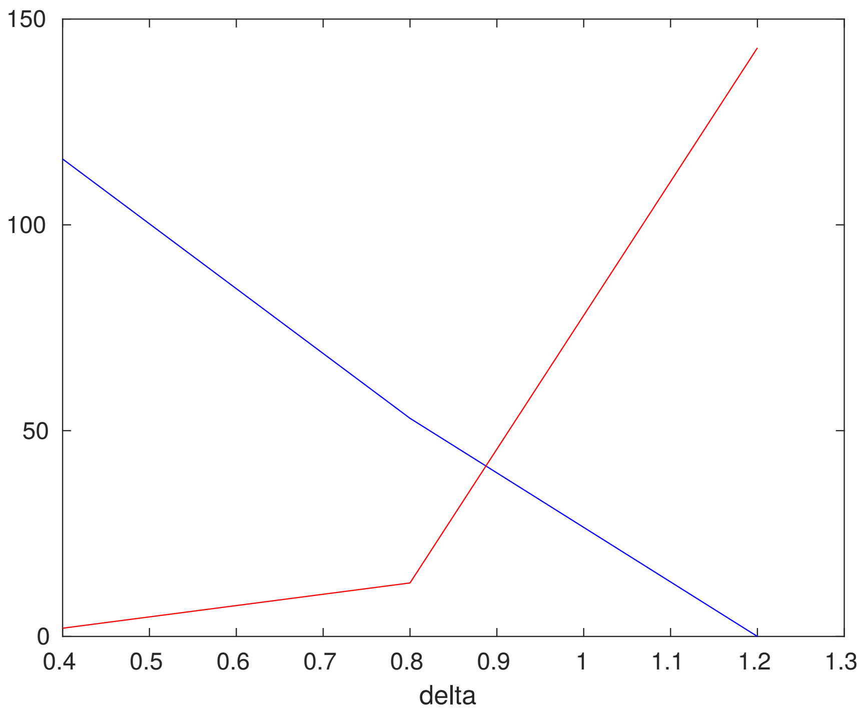

Figure 16: τ (blue, decreases) and Γ (red, increases) with respect to δ. SPY data, $\delta_0 = 0.4$, $\hat{\delta}_0 = 0.01$.

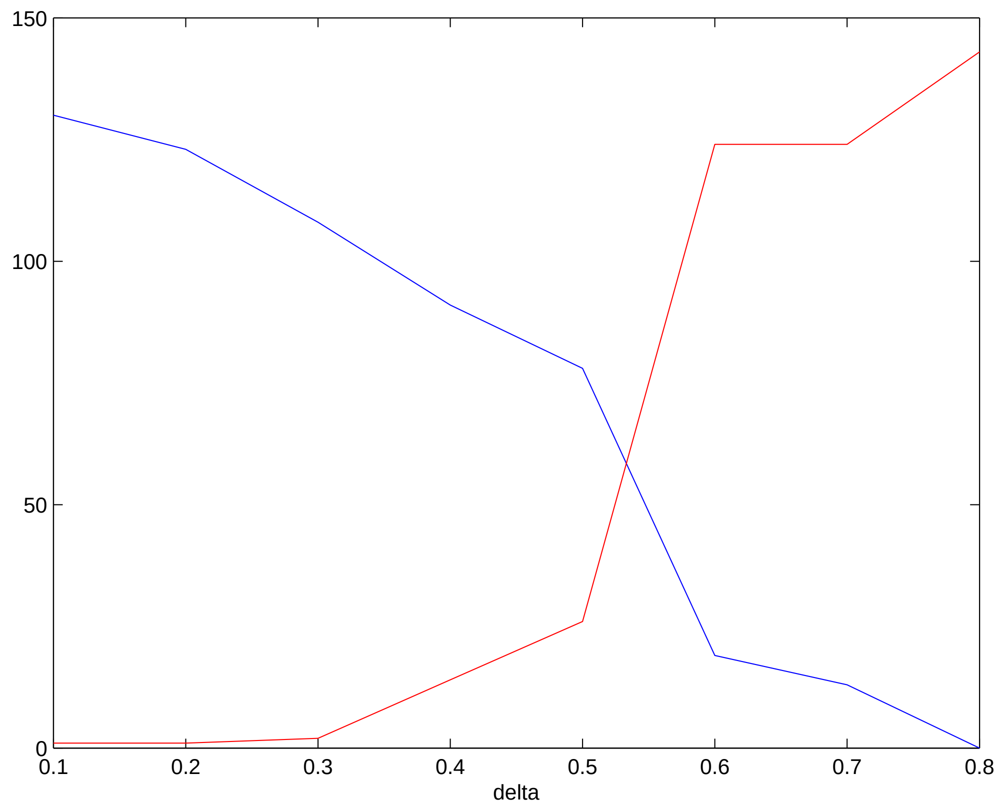

Figure 17: τ (blue, decreases) and Γ (red, increases) with respect to δ. SPY data, $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$.

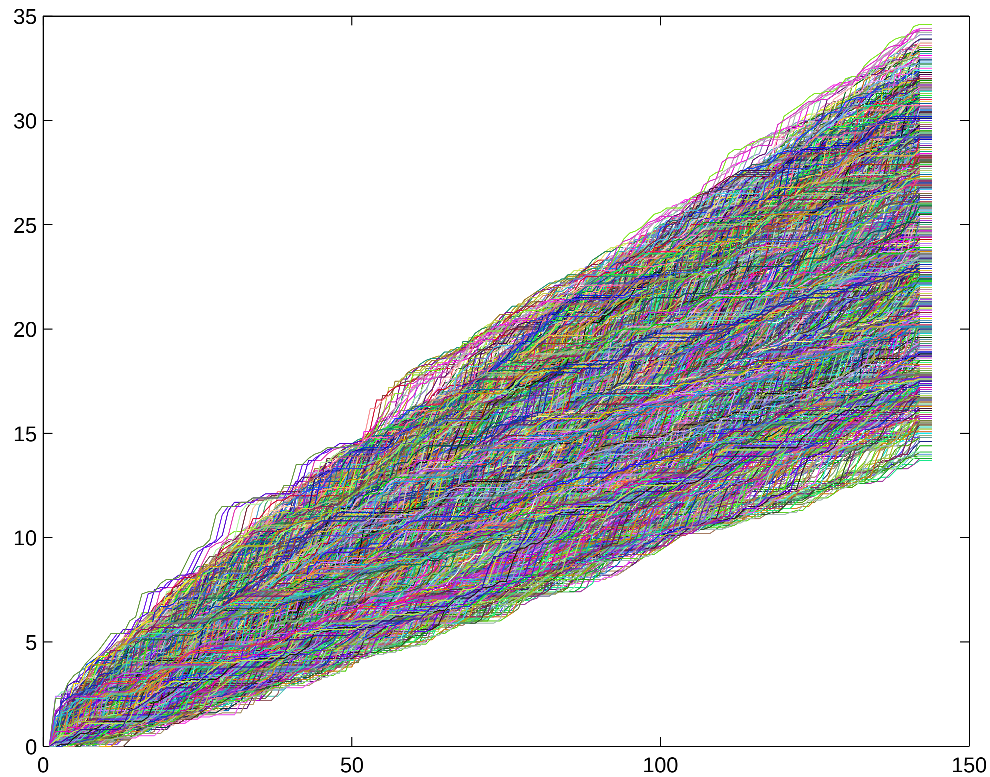

Figure 18: Variation estimate. SPY data. $\delta = 0.5$, $\delta_0 = 0.1$, $\hat{\delta}_0 = 0.01$

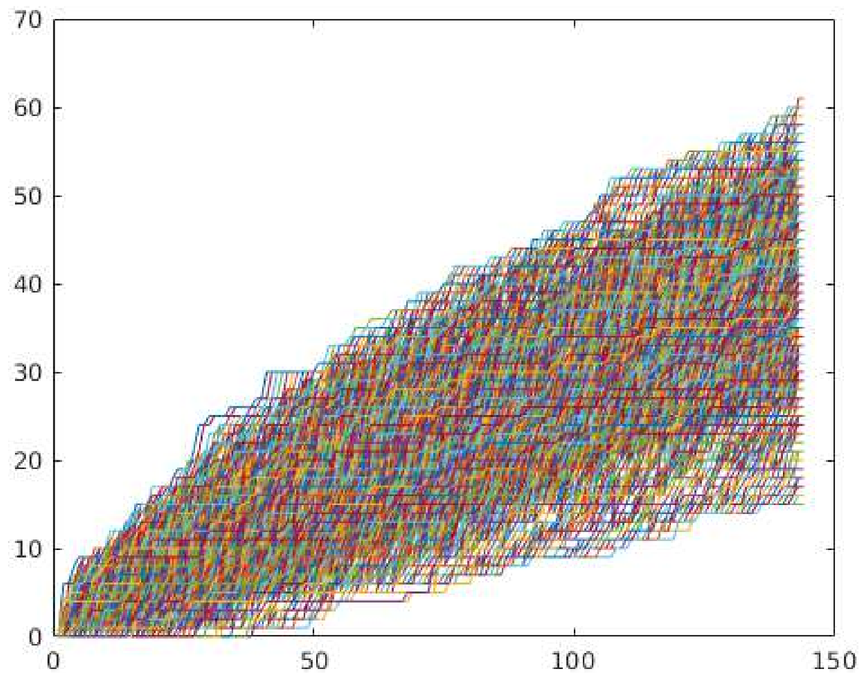

Figure 19: Historical variation constraint sets for SPY data. Obtained for $\delta = 0.8$, $\delta_0 = 0.4$.

0.2 Empirical Observations

Recall the inequality :

$$0 \leq s_i \leq q_i.$$

When looking at the extreme values of s_i and q_i, not only is the previous inequality preserved as stated but the relationship is surprisingly almost perfectly linear in both data sets. See Figures 20, 21, 22 and 23.

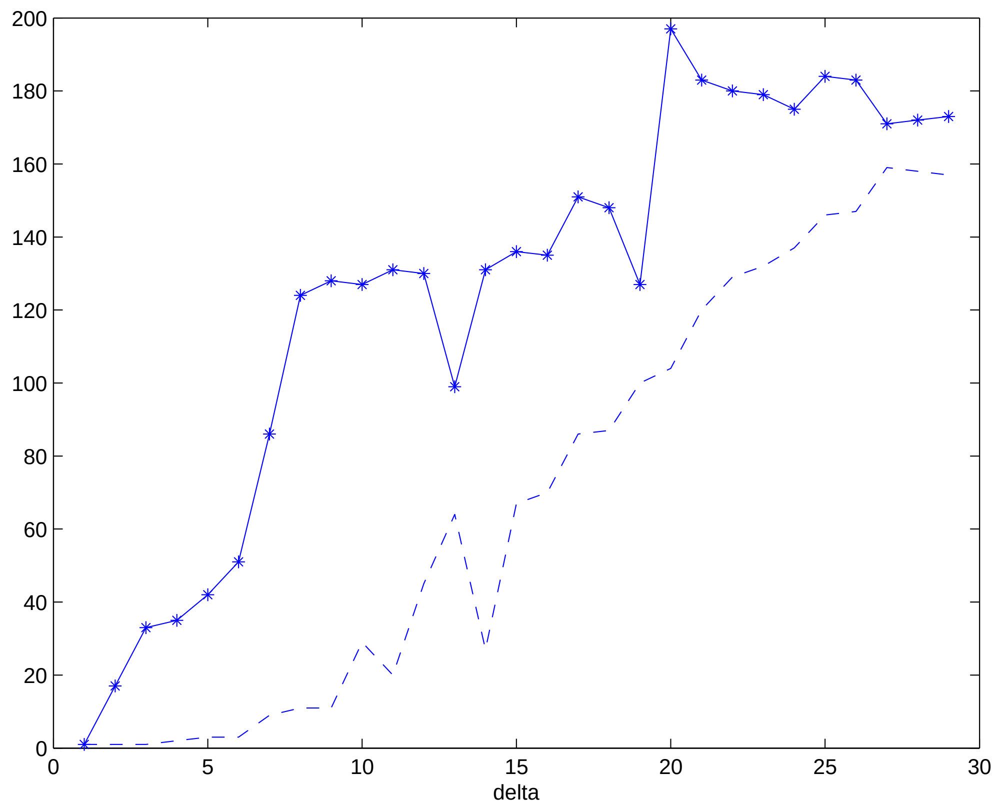

Figure 20: maximum (*) and minimum (–) of s_i with respect to δ. FB data.

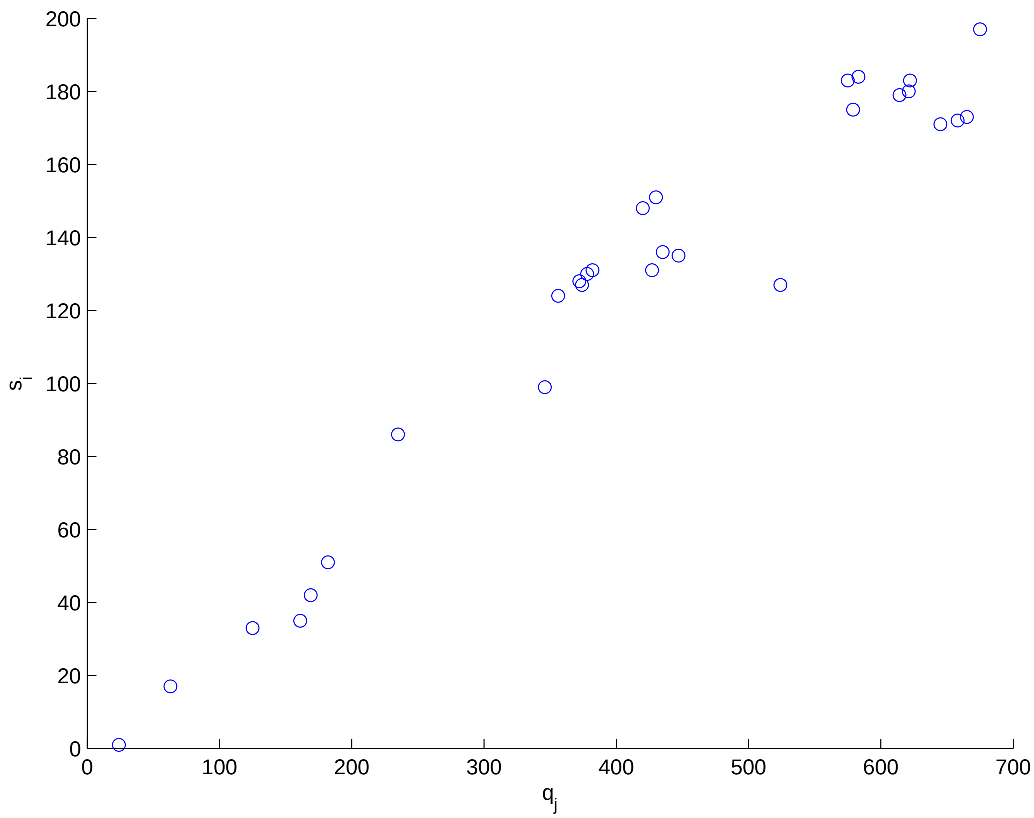

Figure 21: maximum of s_i vs. maximum of q_j. FB data.

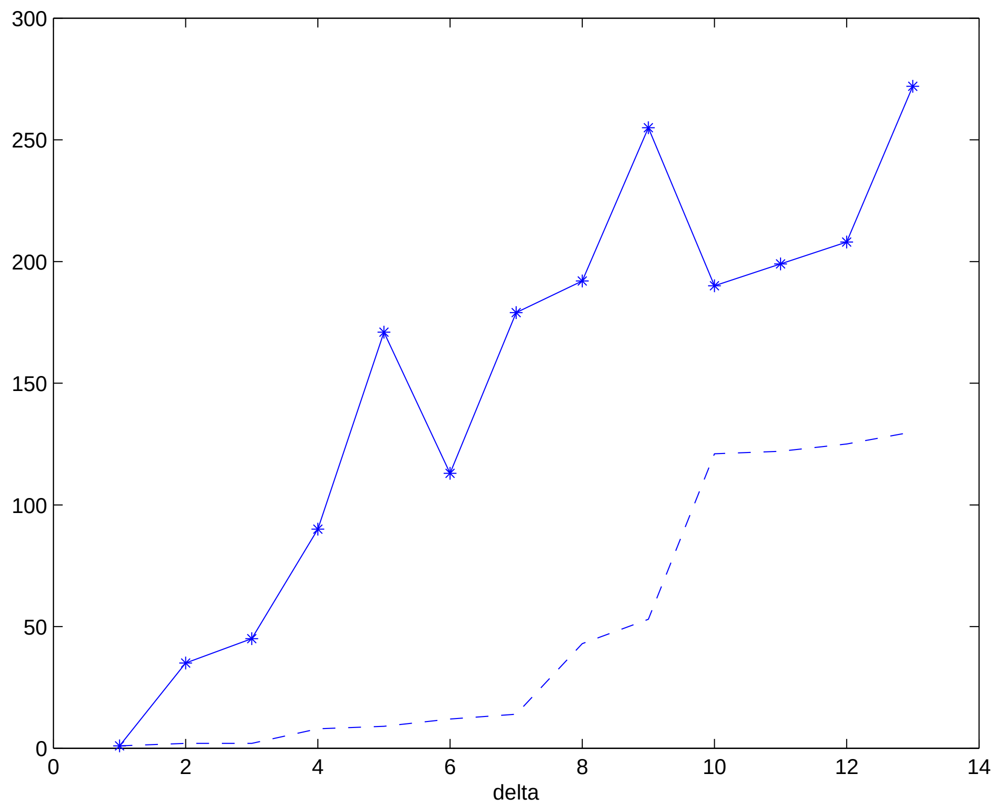

Figure 22: maximum (*) and minimum (–) of s_i with respect to δ. SPY data.

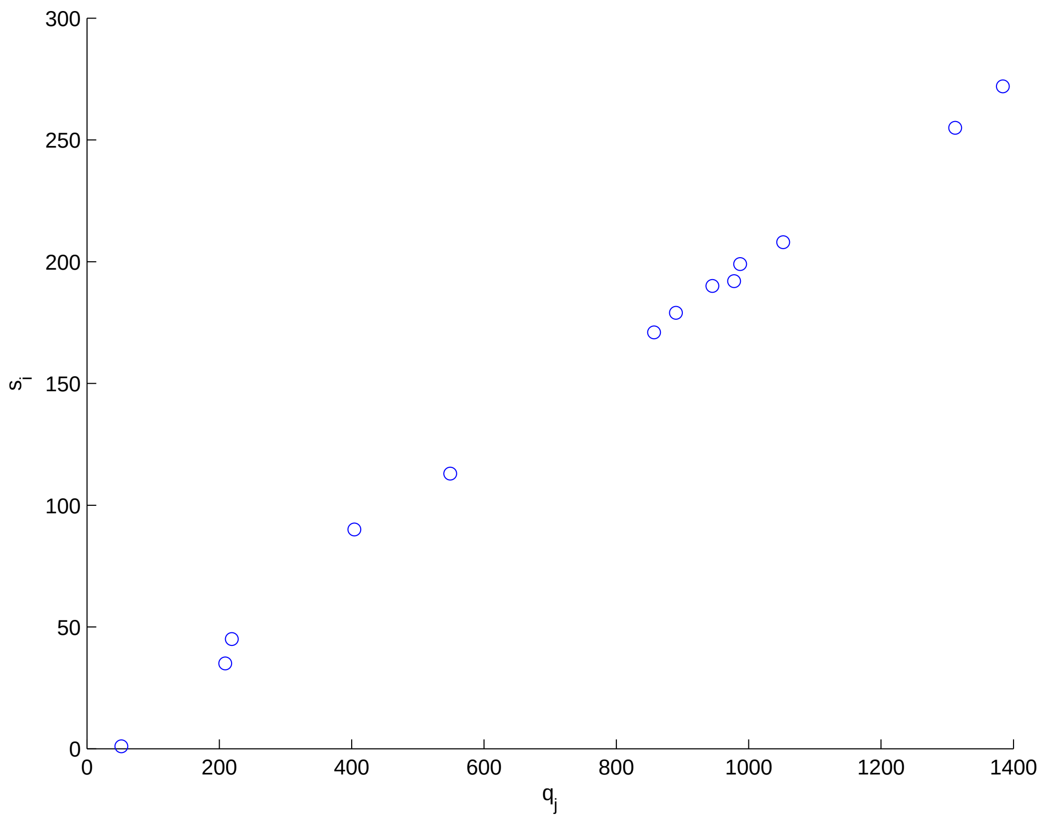

Figure 23: maximum of s_i vs. maximum of q_j. SPY data.

1 Price Bounds Output

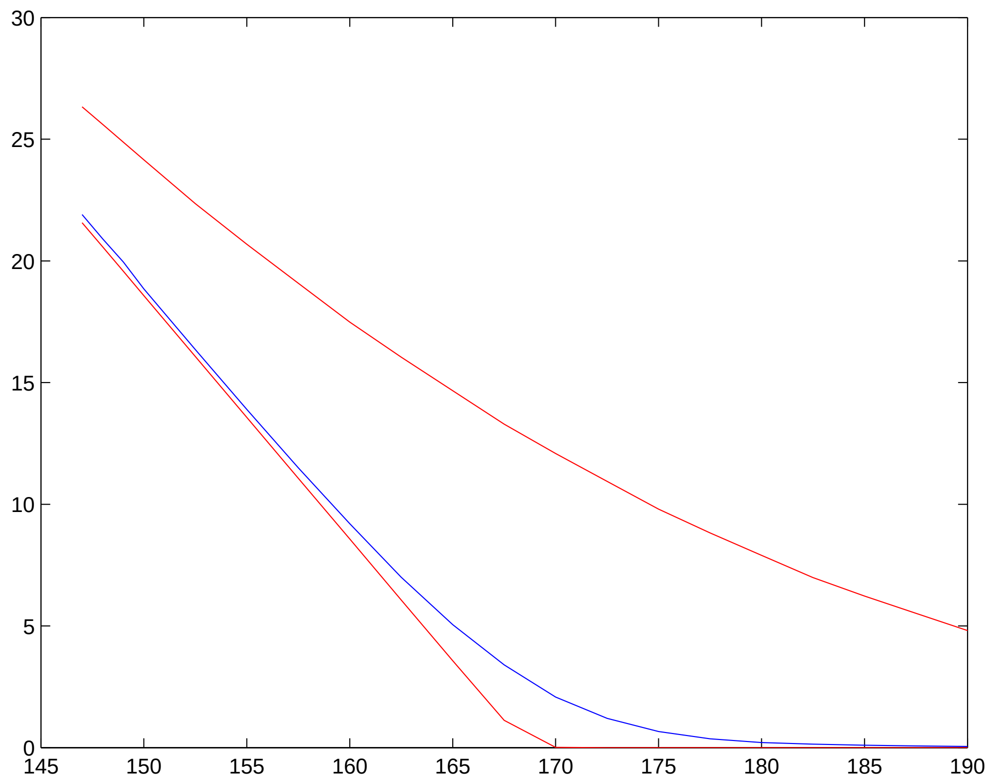

Figure 24: FB data model type I, `MIDP`. Price bounds and market price (in blue) as functions of European call strikes. $\delta = 0.5, \delta_0 = 0.1$

Figure 25 provides lower and upper bounds for the model `MIOBS` for the values: $\delta = 0.5$, $\delta_0 = 0.1$ for the FB data.

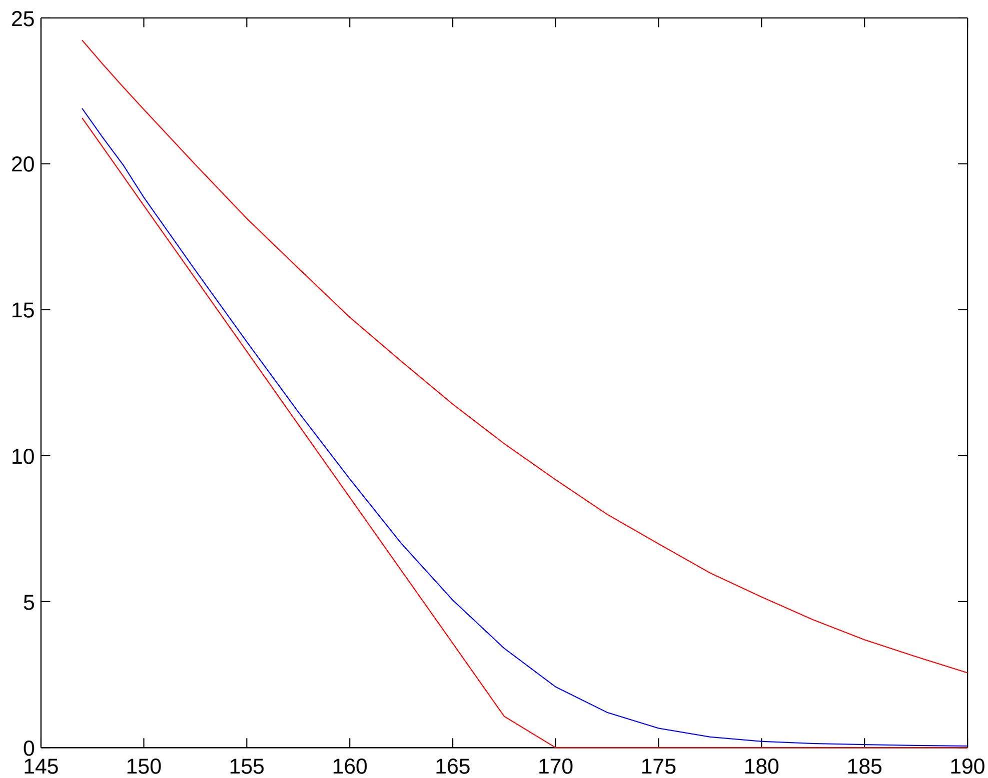

Figure 25: FB data model type I, `MIOBS`. Price bounds and market price (in blue) as functions of European call strikes. $\delta = 0.5, \delta_0 = 0.1$

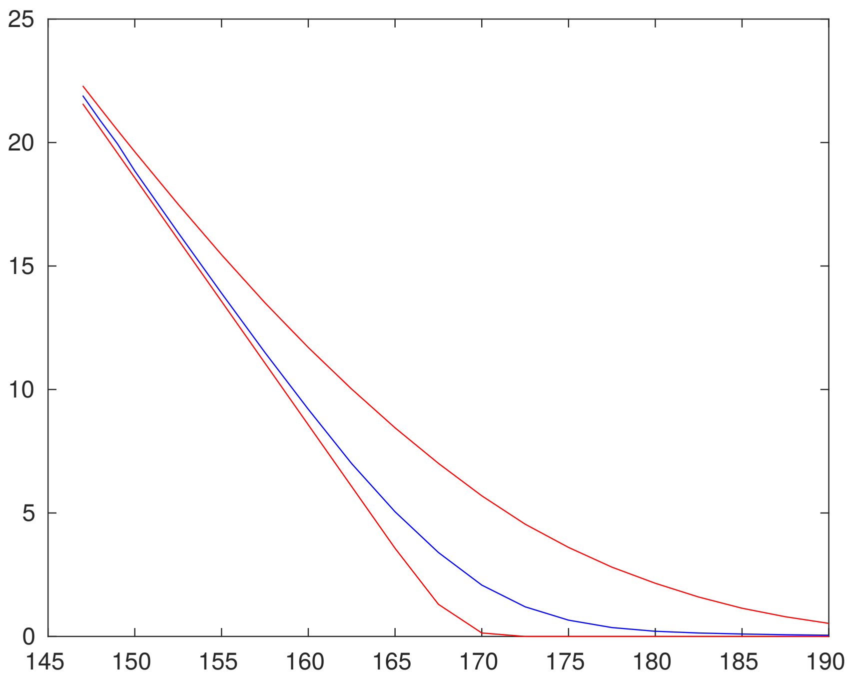

Figure 26: FB data model type II, `MIIDP`. Price bounds and market price (in blue) as functions of European call strikes. $\delta = 1$, $\delta_0 = 0.5$

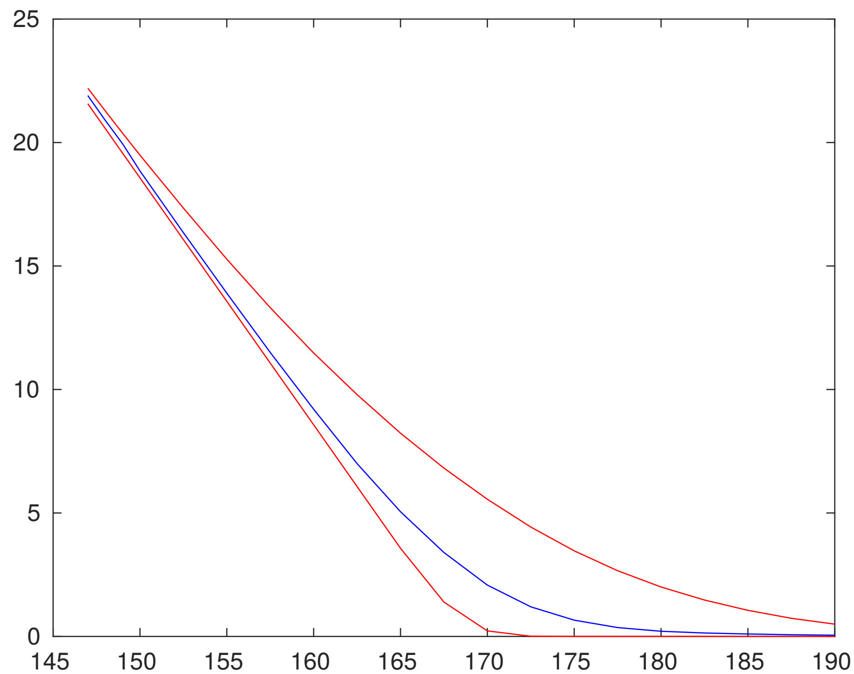

Figure 27: FB data model type II, `MIIOBS`. Price bounds and market price (in blue) as functions of European call strikes. $\delta = 1$, $\delta_0 = 0.5$

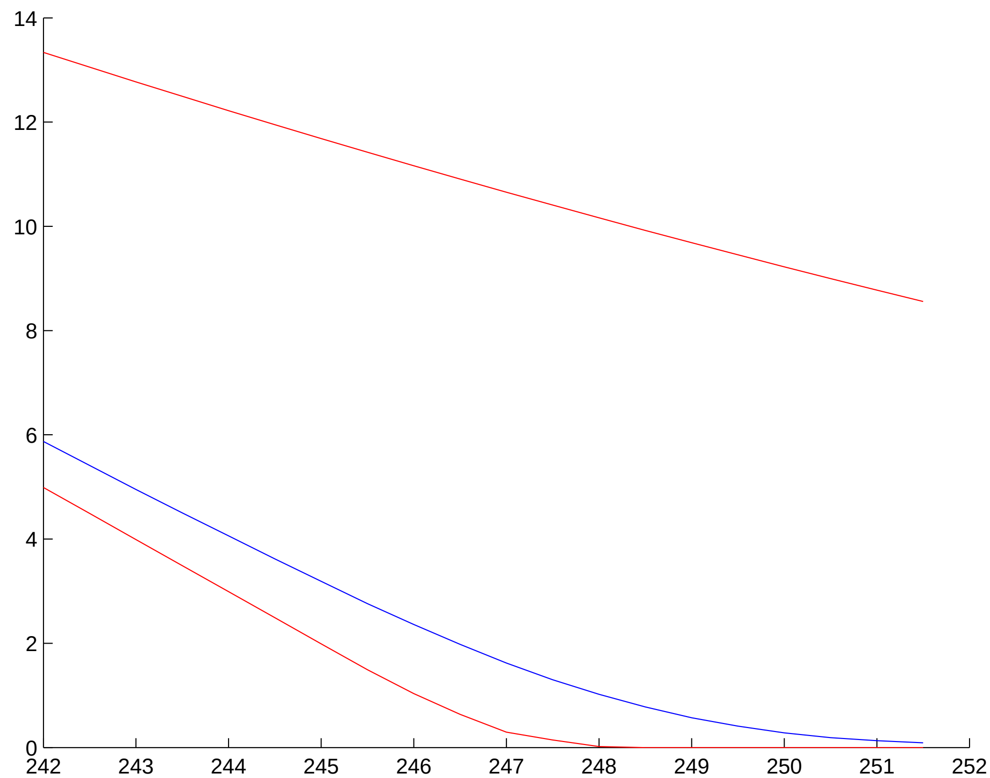

Figure 28: SPY data model type I, `MIDP`. Price bounds and market price (in blue) as functions of European call strikes. $\delta = 0.5$, $\delta_0 = 0.1$

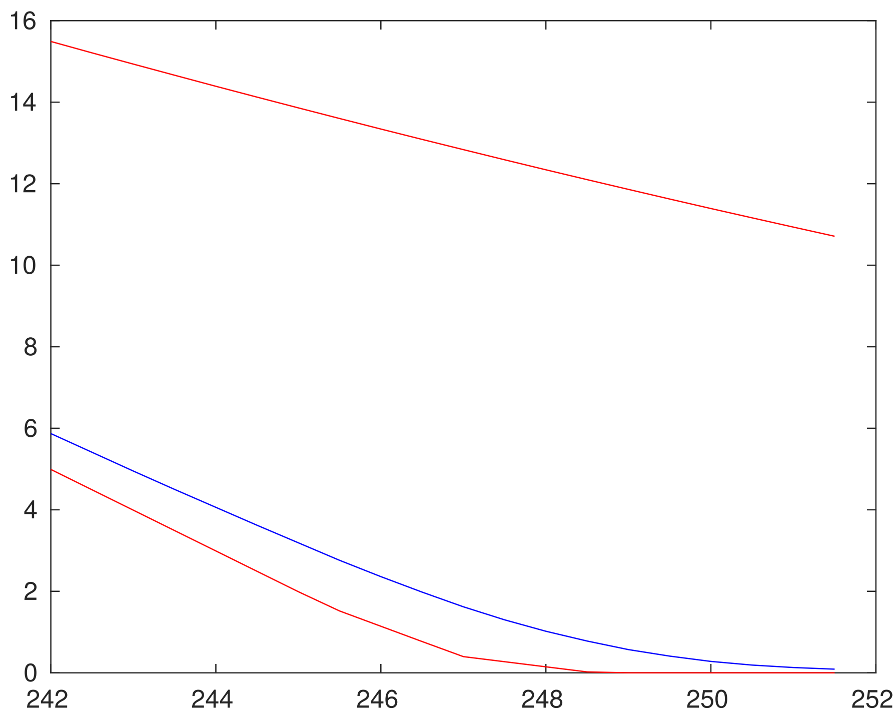

Figure 29: SPY data model type I, `MIDP`. Price bounds and market price (in blue) as functions of European call strikes. $\delta = 0.8$, $\delta_0 = 0.4$

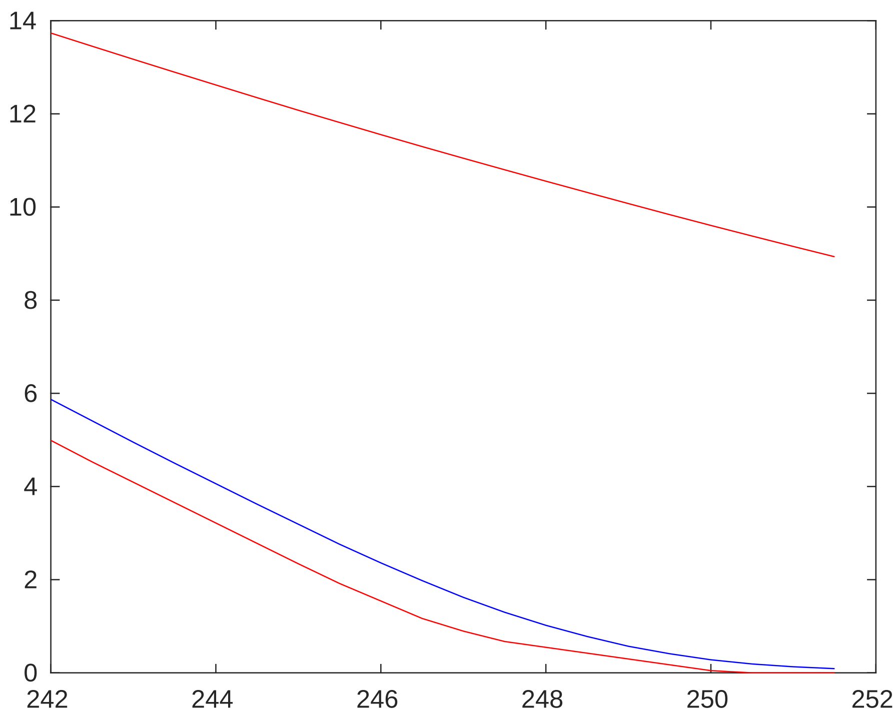

Figure 30: SPY data model type I, `MIOBS`. Price bounds and market price (in blue) as functions of European call strikes. $\delta = 0.8$, $\delta_0 = 0.4$

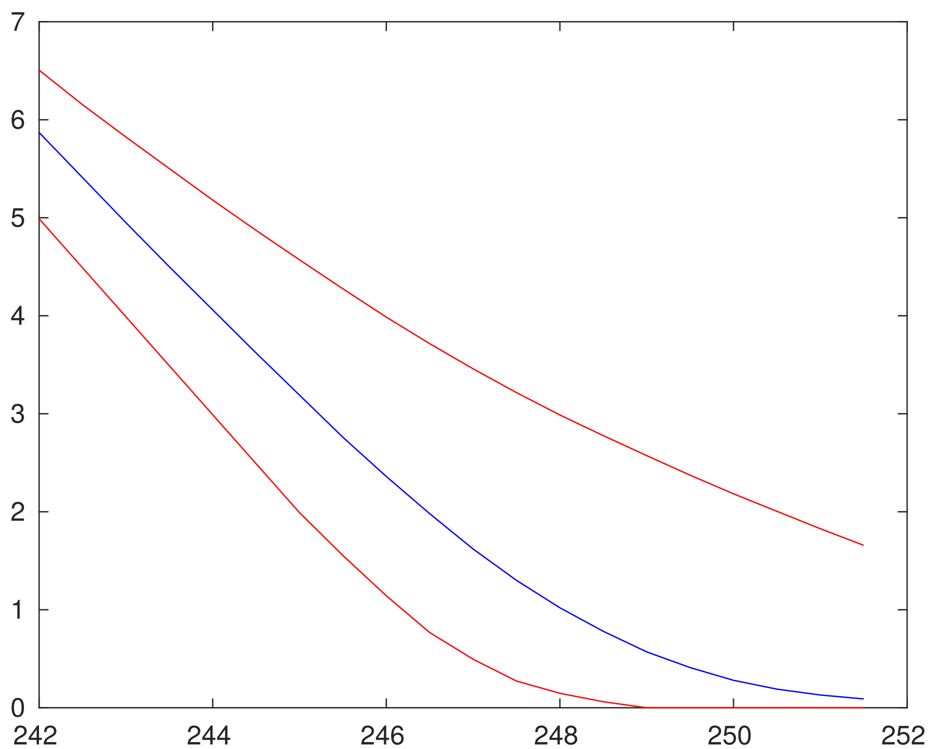

Figure 31: SPY data model type II, `MIIDP`. Price bounds and market price (in blue) as functions of European call strikes. $\delta = 0.8$, $\delta_0 = 0.4$

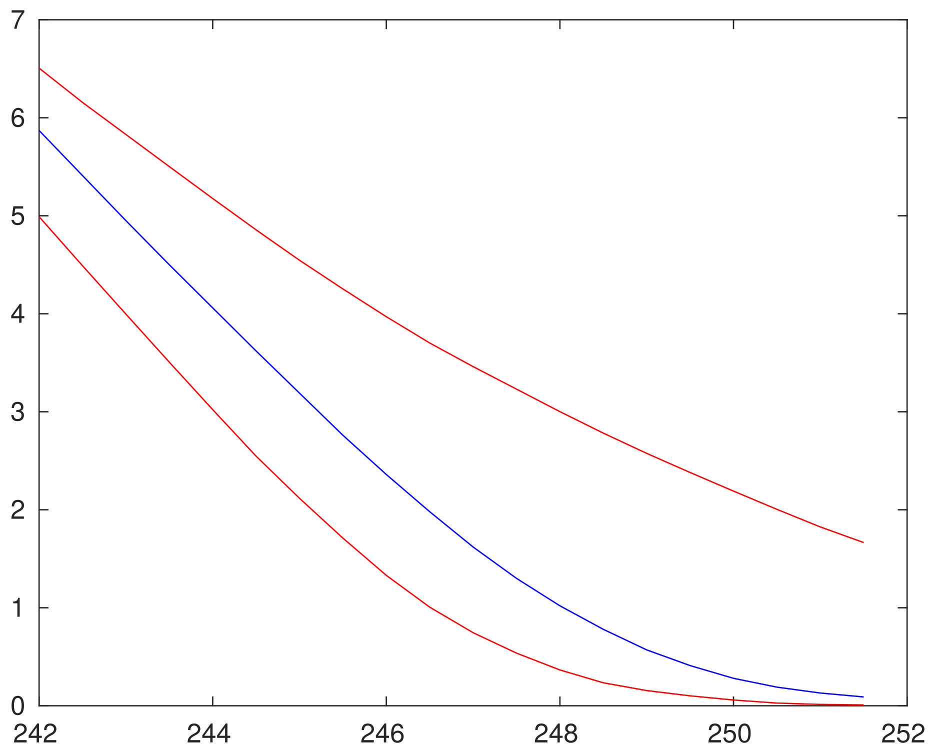

Figure 32: SPY data model type II, `MIIOBS`. Price bounds and market price (in blue) as functions of European call strikes. $\delta = 0.8$, $\delta_0 = 0.4$