I extended the code slightly to study the relationship between k and h. The mesh size in space . The mesh size in time . Since T is constant for each option, we see that the relationship between k and h can be proxied by the relationship between and . I used grid-search to find, for each J/K, the smallest N (“”) that would produce reasonable estimated prices using FDM. I used three rough criteria for reasonableness: 1) for a put option, the price should never be greater than strike price; 2) the price should not be negative; 3) the price should not be NAN. These criteria have the advantage that they are helpful even when true prices are not known. The results are the following:

|  |  |  |  |
| --- | --- | --- | --- |
| Batch |  |  |  |
| 1 | 5 | 2110 | 84 |
| 1 | 7 | 4328 | 88 |
| 1 | 10 | 9067 | 91 |
| 2 | 5 | 9540 | 382 |
| 2 | 7 | 18931 | 386 |
| 2 | 10 | 38978 | 390 |
| 3 | 5 | 486 | 19 |
| 3 | 7 | 1028 | 21 |
| 3 | 10 | 2202 | 22 |
| 4 | 5 | 650237 | 26009 |

First, we see that Batch 4 has very high . This is likely due to its long expiry. Next, for each of the other batches, increases in a quadratic rate as increases. This is clear as the ratio remains relatively constant for each batch. This makes sense for a process.

Next, we examine the accuracy of the estimated prices. Here, deviation is calculated as .

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Estimated at N = 9999 | |  | Estimated at | |
| Batch | Exact Price | Price | Deviation |  | Price | Deviation |
| 1 | 5.84628 | 5.842068 | -0.072% |  | 5.842161 | -0.070% |
| 2 | 7.96557 | 7.963211 | -0.030% |  | 7.963216 | -0.030% |
| 3 | 4.07326 | 4.071285 | -0.048% |  | 4.070942 | -0.057% |
| 4 | 1.2475 | NAN | NA |  | 1.195856 | -4.140% |

There is no clear relationship between N and accuracy. Higher N does not seem to significantly increase accuracy of estimation. Not surprisingly though, the stressed case of Batch 4 has the lowest accuracy.