Table A1 Kupiec Test for the Test Set

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Institution |  | | |  | | |
| QRNN | QRCNN | QRDCCNN | QRNN | QRCNN | QRDCCNN |
| Bank of New York Mellon | 8 | 2 | 2 | 6 | 5 | 6 |
| [0.464] | [0.047] | [0.047] | [0.95] | [0.623] | [0.95] |
| Bank of America | 4 | 5 | 5 | 7 | 6 | 6 |
| [0.343] | [0.623] | [0.623] | [0.731] | [0.95] | [0.95] |
| Citigroup | 6 | 5 | 6 | 9 | 6 | 5 |
| [0.95] | [0.623] | [0.95] | [0.269] | [0.95] | [0.623] |
| Comerica | 12 | 5 | 4 | 6 | 5 | 5 |
| [0.031] | [0.623] | [0.343] | [0.95] | [0.623] | [0.623] |
| Huntington Bancshares | 7 | 4 | 5 | 6 | 6 | 5 |
| [0.731] | [0.343] | [0.623] | [0.95] | [0.95] | [0.623] |
| JP Morgan Chase | 9 | 6 | 6 | 4 | 6 | 6 |
| [0.269] | [0.95] | [0.95] | [0.343] | [0.95] | [0.95] |
| M & T Bank | 9 | 5 | 5 | 7 | 6 | 5 |
| [0.269] | [0.623] | [0.623] | [0.731] | [0.95] | [0.623] |
| PNC Financial Services Group | 8 | 7 | 6 | 4 | 5 | 6 |
| [0.464] | [0.731] | [0.95] | [0.343] | [0.623] | [0.95] |
| State Street | 4 | 4 | 4 | 15 | 6 | 6 |
| [0.343] | [0.343] | [0.343] | [0.002] | [0.95] | [0.95] |
| Synovus Financial | 10 | 4 | 4 | 6 | 6 | 6 |
| [0.142] | [0.343] | [0.343] | [0.95] | [0.95] | [0.95] |
| Wells Fargo | 5 | 5 | 5 | 6 | 5 | 6 |
| [0.623] | [0.623] | [0.623] | [0.95] | [0.623] | [0.95] |
| Zions Bancorp | 6 | 5 | 5 | 10 | 6 | 6 |
| [0.95] | [0.623] | [0.623] | [0.142] | [0.95] | [0.95] |
| Goldman Sachs | 9 | 7 | 7 | 7 | 5 | 5 |
| [0.269] | [0.731] | [0.731] | [0.731] | [0.623] | [0.623] |
| Morgan Stanley | 6 | 6 | 5 | 4 | 6 | 6 |
| [0.95] | [0.95] | [0.623] | [0.343] | [0.95] | [0.95] |
| Charles Schwab | 5 | 4 | 4 | 3 | 6 | 5 |
| [0.623] | [0.343] | [0.343] | [0.15] | [0.95] | [0.623] |
| T Rowe Price | 6 | 6 | 6 | 5 | 5 | 5 |
| [0.95] | [0.95] | [0.95] | [0.623] | [0.623] | [0.623] |
| AFLAC | 8 | 7 | 7 | 9 | 6 | 5 |
| [0.464] | [0.731] | [0.731] | [0.269] | [0.95] | [0.623] |
| Allstate | 6 | 5 | 5 | 8 | 6 | 6 |
| [0.95] | [0.623] | [0.623] | [0.464] | [0.95] | [0.95] |
| American International Group | 8 | 5 | 5 | 6 | 6 | 6 |
| [0.464] | [0.623] | [0.623] | [0.95] | [0.95] | [0.95] |
| AON | 5 | 9 | 8 | 9 | 6 | 6 |
| [0.623] | [0.269] | [0.464] | [0.269] | [0.95] | [0.95] |
| Berkley W R | 9 | 4 | 4 | 4 | 6 | 6 |
| [0.269] | [0.343] | [0.343] | [0.343] | [0.95] | [0.95] |
| CIGNA | 8 | 7 | 7 | 7 | 5 | 6 |
| [0.464] | [0.731] | [0.731] | [0.731] | [0.623] | [0.95] |
| C N A Financial Corp. | 7 | 4 | 4 | 7 | 5 | 6 |
| [0.731] | [0.343] | [0.343] | [0.731] | [0.623] | [0.95] |
| Chubb | 4 | 5 | 5 | 10 | 5 | 5 |
| [0.343] | [0.623] | [0.623] | [0.142] | [0.623] | [0.623] |
| Cincinnati Financial Corp. | 4 | 5 | 5 | 4 | 5 | 6 |
| [0.343] | [0.623] | [0.623] | [0.343] | [0.623] | [0.95] |
| Hartford Financial Services | 11 | 4 | 4 | 5 | 5 | 6 |
| [0.069] | [0.343] | [0.343] | [0.623] | [0.623] | [0.95] |
| Humana | 9 | 5 | 5 | 5 | 7 | 5 |
| [0.269] | [0.623] | [0.623] | [0.623] | [0.731] | [0.623] |
| Lincoln National Corp. | 9 | 4 | 4 | 10 | 5 | 5 |
| [0.269] | [0.343] | [0.343] | [0.142] | [0.623] | [0.623] |
| Loews | 9 | 4 | 4 | 7 | 6 | 6 |
| [0.269] | [0.343] | [0.343] | [0.731] | [0.95] | [0.95] |
| Marsh & McLennan | 8 | 5 | 5 | 7 | 5 | 5 |
| [0.464] | [0.623] | [0.623] | [0.731] | [0.623] | [0.623] |
| MBIA | 10 | 4 | 4 | 12 | 6 | 5 |
| [0.142] | [0.343] | [0.343] | [0.031] | [0.95] | [0.623] |
| Progressive Insurance | 6 | 9 | 9 | 7 | 6 | 6 |
| [0.95] | [0.269] | [0.269] | [0.731] | [0.95] | [0.95] |
| Unum Group | 6 | 3 | 3 | 12 | 6 | 5 |
| [0.95] | [0.15] | [0.15] | [0.031] | [0.95] | [0.623] |
| American Express | 7 | 4 | 4 | 5 | 5 | 6 |
| [0.731] | [0.343] | [0.343] | [0.623] | [0.623] | [0.95] |
| Fifth Third | 12 | 4 | 4 | 13 | 5 | 5 |
| [0.031] | [0.343] | [0.343] | [0.013] | [0.623] | [0.623] |
| Franklin Resources | 5 | 8 | 8 | 8 | 7 | 6 |
| [0.623] | [0.464] | [0.464] | [0.464] | [0.731] | [0.95] |
| SEI Investments | 5 | 5 | 5 | 10 | 6 | 6 |
| [0.623] | [0.623] | [0.623] | [0.142] | [0.95] | [0.95] |
| Union Pacific | 6 | 2 | 2 | 9 | 6 | 6 |
| [0.95] | [0.047] | [0.047] | [0.269] | [0.95] | [0.95] |
| Average | 7.263 | 5.053 | 5 | 7.342 | 5.658 | 5.605 |
| [0.51] | [0.506] | [0.517] | [0.488] | [0.81] | [0.821] |

Table A2 Kupiec test for overall data

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Institution |  | | | | |  | | | | | |
| DCC-GARCH | Quantile Regression | QRNN | QRCNN | QRDCCNN | DCC-GARCH | | Quantile Regression | QRNN | QRCNN | QRDCCNN |
| Bank of New York Mellon | 119 | 125 | 125 | 124 | 121 | | 112 | 126 | 122 | 124 | 126 |
| [0.751] | [0.81] | [0.81] | [0.882] | [0.897] | | [0.328] | [0.74] | [0.97] | [0.882] | [0.74] |
| Bank of America | 95 | 126 | 121 | 132 | 124 | | 105 | 126 | 124 | 124 | 125 |
| [0.008] | [0.74] | [0.897] | [0.379] | [0.882] | | [0.098] | [0.74] | [0.882] | [0.882] | [0.81] |
| Citigroup | 114 | 125 | 124 | 121 | 123 | | 111 | 127 | 126 | 127 | 125 |
| [0.431] | [0.81] | [0.882] | [0.897] | [0.956] | | [0.283] | [0.671] | [0.74] | [0.671] | [0.81] |
| Comerica | 116 | 127 | 129 | 124 | 124 | | 139 | 127 | 123 | 122 | 123 |
| [0.549] | [0.671] | [0.544] | [0.882] | [0.882] | | [0.132] | [0.671] | [0.956] | [0.97] | [0.956] |
| Huntington Bancshares | 113 | 125 | 125 | 121 | 122 | | 128 | 128 | 123 | 127 | 123 |
| [0.377] | [0.81] | [0.81] | [0.897] | [0.97] | | [0.606] | [0.606] | [0.956] | [0.671] | [0.956] |
| JP Morgan Chase | 99 | 126 | 125 | 122 | 124 | | 86 | 127 | 121 | 123 | 124 |
| [0.025] | [0.74] | [0.81] | [0.97] | [0.882] | | [0] | [0.671] | [0.897] | [0.956] | [0.882] |
| M & T Bank | 113 | 126 | 126 | 124 | 122 | | 118 | 126 | 124 | 125 | 123 |
| [0.377] | [0.74] | [0.74] | [0.882] | [0.97] | | [0.682] | [0.74] | [0.882] | [0.81] | [0.956] |
| PNC Financial Services Group | 112 | 127 | 125 | 125 | 123 | | 94 | 127 | 119 | 122 | 124 |
| [0.328] | [0.671] | [0.81] | [0.81] | [0.956] | | [0.006] | [0.671] | [0.751] | [0.97] | [0.882] |
| State Street | 120 | 127 | 121 | 123 | 124 | | 119 | 127 | 132 | 125 | 126 |
| [0.823] | [0.671] | [0.897] | [0.956] | [0.882] | | [0.751] | [0.671] | [0.379] | [0.81] | [0.74] |
| Synovus Financial | 108 | 126 | 128 | 118 | 121 | | 132 | 127 | 125 | 127 | 126 |
| [0.173] | [0.74] | [0.606] | [0.682] | [0.897] | | [0.379] | [0.671] | [0.81] | [0.671] | [0.74] |
| Wells Fargo | 105 | 127 | 122 | 121 | 121 | | 111 | 126 | 123 | 126 | 124 |
| [0.098] | [0.671] | [0.97] | [0.897] | [0.897] | | [0.283] | [0.74] | [0.956] | [0.74] | [0.882] |
| Zions Bancorp | 114 | 125 | 123 | 123 | 123 | | 133 | 127 | 126 | 126 | 124 |
| [0.431] | [0.81] | [0.956] | [0.956] | [0.956] | | [0.332] | [0.671] | [0.74] | [0.74] | [0.882] |
| Goldman Sachs | 110 | 124 | 125 | 125 | 124 | | 98 | 127 | 121 | 124 | 123 |
| [0.242] | [0.882] | [0.81] | [0.81] | [0.882] | | [0.019] | [0.671] | [0.897] | [0.882] | [0.956] |
| Morgan Stanley | 103 | 126 | 122 | 123 | 123 | | 121 | 125 | 122 | 125 | 125 |
| [0.065] | [0.74] | [0.97] | [0.956] | [0.956] | | [0.897] | [0.81] | [0.97] | [0.81] | [0.81] |
| Charles Schwab | 112 | 127 | 122 | 118 | 117 | | 124 | 128 | 121 | 126 | 123 |
| [0.328] | [0.671] | [0.97] | [0.682] | [0.614] | | [0.882] | [0.606] | [0.897] | [0.74] | [0.956] |
| T Rowe Price | 122 | 124 | 123 | 125 | 122 | | 94 | 126 | 108 | 123 | 123 |
| [0.97] | [0.882] | [0.956] | [0.81] | [0.97] | | [0.006] | [0.74] | [0.173] | [0.956] | [0.956] |
| AFLAC | 109 | 126 | 125 | 127 | 128 | | 94 | 125 | 125 | 125 | 123 |
| [0.206] | [0.74] | [0.81] | [0.671] | [0.606] | | [0.006] | [0.81] | [0.81] | [0.81] | [0.956] |
| Allstate | 98 | 125 | 122 | 123 | 123 | | 76 | 128 | 119 | 127 | 126 |
| [0.019] | [0.81] | [0.97] | [0.956] | [0.956] | | [0] | [0.606] | [0.751] | [0.671] | [0.74] |
| American International Group | 95 | 126 | 124 | 127 | 126 | | 122 | 127 | 124 | 126 | 125 |
| [0.008] | [0.74] | [0.882] | [0.671] | [0.74] | | [0.97] | [0.671] | [0.882] | [0.74] | [0.81] |
| AON | 90 | 126 | 121 | 127 | 126 | | 76 | 127 | 126 | 124 | 124 |
| [0.002] | [0.74] | [0.897] | [0.671] | [0.74] | | [0] | [0.671] | [0.74] | [0.882] | [0.882] |
| Berkley W R | 106 | 125 | 126 | 120 | 119 | | 72 | 125 | 121 | 124 | 124 |
| [0.12] | [0.81] | [0.74] | [0.823] | [0.751] | | [0] | [0.81] | [0.897] | [0.882] | [0.882] |
| CIGNA | 93 | 126 | 126 | 125 | 126 | | 124 | 125 | 123 | 123 | 128 |
| [0.004] | [0.74] | [0.74] | [0.81] | [0.74] | | [0.882] | [0.81] | [0.956] | [0.956] | [0.606] |
| C N A Financial Corp. | 100 | 126 | 124 | 124 | 126 | | 84 | 127 | 126 | 126 | 126 |
| [0.032] | [0.74] | [0.882] | [0.882] | [0.74] | | [0] | [0.671] | [0.74] | [0.74] | [0.74] |
| Chubb | 105 | 125 | 121 | 123 | 123 | | 80 | 126 | 129 | 124 | 123 |
| [0.098] | [0.81] | [0.897] | [0.956] | [0.956] | | [0] | [0.74] | [0.544] | [0.882] | [0.956] |
| Cincinnati Financial Corp. | 100 | 126 | 121 | 125 | 123 | | 98 | 127 | 122 | 123 | 124 |
| [0.032] | [0.74] | [0.897] | [0.81] | [0.956] | | [0.019] | [0.671] | [0.97] | [0.956] | [0.882] |
| Hartford Financial Services | 107 | 126 | 128 | 122 | 122 | | 119 | 126 | 122 | 125 | 126 |
| [0.145] | [0.74] | [0.606] | [0.97] | [0.97] | | [0.751] | [0.74] | [0.97] | [0.81] | [0.74] |
| Humana | 90 | 126 | 126 | 127 | 126 | | 139 | 126 | 122 | 128 | 125 |
| [0.002] | [0.74] | [0.74] | [0.671] | [0.74] | | [0.132] | [0.74] | [0.97] | [0.606] | [0.81] |
| Lincoln National Corp. | 118 | 127 | 126 | 119 | 121 | | 139 | 125 | 127 | 125 | 124 |
| [0.682] | [0.671] | [0.74] | [0.751] | [0.897] | | [0.132] | [0.81] | [0.671] | [0.81] | [0.882] |
| Loews | 121 | 124 | 126 | 119 | 121 | | 83 | 126 | 133 | 126 | 124 |
| [0.897] | [0.882] | [0.74] | [0.751] | [0.897] | | [0] | [0.74] | [0.332] | [0.74] | [0.882] |
| Marsh & McLennan | 105 | 126 | 125 | 122 | 122 | | 62 | 127 | 124 | 125 | 124 |
| [0.098] | [0.74] | [0.81] | [0.97] | [0.97] | | [0] | [0.671] | [0.882] | [0.81] | [0.882] |
| MBIA | 86 | 125 | 127 | 124 | 122 | | 249 | 127 | 129 | 126 | 123 |
| [0] | [0.81] | [0.671] | [0.882] | [0.97] | | [0] | [0.671] | [0.544] | [0.74] | [0.956] |
| Progressive Insurance | 98 | 127 | 123 | 122 | 123 | | 80 | 126 | 126 | 124 | 124 |
| [0.019] | [0.671] | [0.956] | [0.97] | [0.956] | | [0] | [0.74] | [0.74] | [0.882] | [0.882] |
| Unum Group | 102 | 125 | 123 | 121 | 122 | | 126 | 127 | 130 | 127 | 121 |
| [0.052] | [0.81] | [0.956] | [0.897] | [0.97] | | [0.74] | [0.671] | [0.485] | [0.671] | [0.897] |
| American Express | 122 | 126 | 125 | 128 | 127 | | 102 | 125 | 128 | 125 | 125 |
| [0.97] | [0.74] | [0.81] | [0.606] | [0.671] | | [0.052] | [0.81] | [0.606] | [0.81] | [0.81] |
| Fifth Third | 108 | 125 | 129 | 119 | 122 | | 128 | 126 | 130 | 125 | 123 |
| [0.173] | [0.81] | [0.544] | [0.751] | [0.97] | | [0.606] | [0.74] | [0.485] | [0.81] | [0.956] |
| Franklin Resources | 119 | 125 | 122 | 123 | 123 | | 115 | 126 | 124 | 126 | 124 |
| [0.751] | [0.81] | [0.97] | [0.956] | [0.956] | | [0.488] | [0.74] | [0.882] | [0.74] | [0.882] |
| SEI Investments | 105 | 127 | 122 | 122 | 123 | | 84 | 126 | 126 | 125 | 124 |
| [0.098] | [0.671] | [0.97] | [0.97] | [0.956] | | [0] | [0.74] | [0.74] | [0.81] | [0.882] |
| Union Pacific | 104 | 126 | 123 | 117 | 120 | | 91 | 128 | 126 | 126 | 124 |
| [0.08] | [0.74] | [0.956] | [0.614] | [0.823] | | [0.002] | [0.606] | [0.74] | [0.74] | [0.882] |
| Average | 106.737 | 125.763 | 124.237 | 123.026 | 122.947 | | 109.684 | 126.447 | 124.263 | 125.026 | 124.237 |
| [0.276] | [0.757] | [0.832] | [0.825] | [0.878] | | [0.275] | [0.71] | [0.768] | [0.807] | [0.861] |