

## DAFTAR ISI

|  |      |
|--|------|
| HALAMAN JUDUL.....   | i    |
| HALAMAN PENGESAHAN.....  | ii   |
| HALAMAN PERNYATAAN .....                                       | iii  |
| HALAMAN PERSEMBAHAN .....                                      | iv   |
| KATA PENGANTAR .....   | v    |
| DAFTAR ISI.....  | vii  |
| DAFTAR TABEL.....  | x    |
| DAFTAR GAMBAR .....  | xi   |
| DAFTAR LAMPIRAN .....  | xii  |
| INTISARI.....  | xiii |
| ABSTRACT.....  | xiv  |
| BAB I PENDAHULUAN .....  | 1    |
| 1.1 Latar Belakang Masalah .....                               | 1    |
| 1.2 Tujuan Penulisan.....                                      | 4    |
| 1.3 Pembatasan Masalah .....                                   | 4    |
| 1.4 Tinjauan Pustaka.....                                      | 5    |
| 1.5 Metode Penulisan.....                                      | 6    |
| 1.6 Sistematika Penulisan .....                                | 7    |
| BAB II LANDASAN TEORI .....                                    | 9    |
| 2.1 Variabel Random dan Distribusi .....                       | 9    |
| 2.2 Saham <i>Intraday</i> .....                                | 12   |
| 2.3 Analisis Runtun Waktu .....                                | 13   |
| 2.3.1 Proses <i>White Noise</i> .....                          | 13   |
| 2.3.2 Proses <i>Auto Regressive</i> (AR).....                  | 14   |
| 2.3.3 Proses <i>Moving Average</i> (MA) .....                  | 15   |
| 2.3.4 Proses <i>Auto Regressive Moving Average</i> (ARMA)..... | 16   |
| 2.3.5 Model GARCH.....   | 16   |
| 2.3.6 Model Component-GARCH.....                               | 18   |
| 2.3.7 <i>Augmented Deckey Fuller Test</i> .....                | 19   |

|  |   |    |
|--|---|----|
| 2.3.8  | <i>Weighted Lagrange Multiplier Engle</i> ..... | 20 |
| 2.3.9  | Uji Weighted Ljung Box Q-Statistics .....       | 21 |
| 2.4  | Metode Maximum Like-Lihood .....                | 21 |
| 2.5  | Gradien dan Matriks Hessian .....               | 22 |
| 2.5.1  | Gradien .....                                   | 22 |
| 2.5.2  | Matriks Hessian .....                           | 23 |
| 2.6  | Metode Newton Raphson .....                     | 24 |
| 2.7  | Konsep Dependensi .....                         | 25 |
| 2.8  | Copula .....                                    | 26 |
| 2.8.1  | Teorema Sklar .....                             | 26 |
| 2.9  | Extreme Value Theory .....                      | 28 |
| 2.9.1  | Peak Over Threshold (POT) .....                 | 29 |
| 2.9.2  | Generalized Pareto Distribution (GPD) .....     | 30 |
| 2.9.3  | Penentuan Nilai Threshold .....                 | 32 |
| 2.10   | <i>Akaike Criterion Infomation</i> .....        | 33 |
| 2.11   | <i>Value at Risk</i> .....                      | 33 |
| 2.12   | Backtesting <i>Value at Risk</i> .....          | 33 |
| <b>BAB III ESTIMASI VALUE AT RISK INTRADAY PORTOFOLIO DENGAN</b> |   |    |
| <b>METODE CGARCH(1,1)-EVT-COPULA .</b> .....                     |   | 35 |
| 3.1  | Fungsi Copula .....                             | 35 |
| 3.2  | Keluarga Copula .....                           | 36 |
| 3.2.1  | Copula Eliptik .....                            | 36 |
| 3.2.2  | Copula Archimedean .....                        | 38 |
| 3.3  | Estimasi Parameter .....                        | 40 |
| 3.3.1  | Estimasi Parameter C-GARCH .....                | 40 |
| 3.3.2  | Estimasi Parameter GPD .....                    | 45 |
| 3.3.3  | Estimasi Parameter Copula .....                 | 49 |
| 3.4  | Estimasi Value at Risk .....                    | 53 |
| <b>BAB IV STUDI KASUS</b> .....                                  |   | 56 |
| 4.1  | Deskripsi Data .....                            | 56 |
| 4.2  | Perangkat Lunak Yang Digunakan .....            | 56 |

|                      |  |    |
|----------------------|--|----|
| 4.3                  | Permasalahan .....                                   | 56 |
| 4.4                  | Karakteristik Data .....                             | 57 |
| 4.5                  | Estimasi VaR dengan ARMA-CGARCH-EVT-Copula.....      | 59 |
| 4.5.1                | Estimasi Parameter dengan ARMA(p,q)-CGARCH(1,1)..... | 60 |
| 4.5.2                | Estimasi Parameter GPD .....                         | 63 |
| 4.5.3                | Struktur Kebergantungan Model Copula .....           | 64 |
| 4.5.4                | Estimasi Parameter Copula Bivariat .....             | 65 |
| 4.5.5                | Simulasi Data Return .....                           | 65 |
| 4.5.6                | Perhitungan VaR Portofolio.....                      | 66 |
| 4.6                  | Backtesting.....                                     | 67 |
| BAB V PENUTUP.....   |  | 68 |
| 5.1                  | Kesimpulan .....                                     | 68 |
| 5.2                  | Saran .....  | 69 |
| DAFTAR PUSTAKA ..... |  | 70 |
| LAMPIRAN.....        |  | 73 |

## DAFTAR TABEL

|            |  |    |
|------------|--|----|
| Tabel 4.1  | Statistik Deskriptif Data Return .....                       | 59 |
| Tabel 4.2  | Uji ADF Return Saham .....                                   | 60 |
| Tabel 4.3  | Perbandingan Nilai AIC Model ARMA .....                      | 60 |
| Tabel 4.4  | Estimasi Parameter ARMA(p,q)-CGARCH(1,1) .....               | 61 |
| Tabel 4.5  | Uji Ljung Box .....  | 62 |
| Tabel 4.6  | Uji Weighted LM-ARCH .....                                   | 62 |
| Tabel 4.7  | Statistik Deskriptif Data Residual ARMA(p,q)-CGARCH(1,1) ... | 63 |
| Tabel 4.8  | Estimasi Parameter GPD .....                                 | 64 |
| Tabel 4.9  | Estimasi Parameter Copula Bivariat .....                     | 65 |
| Tabel 4.10 | Estimasi Value at Risk .....                                 | 66 |
| Tabel 4.11 | Backtesting dengan Uji Kupiec .....                          | 67 |

## DAFTAR GAMBAR

|            |                                     |    |
|------------|-------------------------------------|----|
| Gambar 4.1 | Plot Return Data .....              | 57 |
| Gambar 4.2 | Plot Return Data dalam 2 Hari ..... | 58 |
| Gambar 4.3 | Plot Kebergantungan Residual .....  | 64 |

## DAFTAR LAMPIRAN

|            |   |    |
|------------|---|----|
| Lampiran A | Data Harga Saham .....                        | 73 |
| Lampiran B | Output Karakteristik Data .....               | 75 |
| Lampiran C | Spesifikasi Model ARMA(p,q) .....             | 79 |
| Lampiran D | Estimasi Parameter Component-GARCH(1,1) ..... | 82 |
| Lampiran E | Estimasi Parameter GPD .....                  | 85 |
| Lampiran F | Kebergantungan Data .....                     | 86 |
| Lampiran G | Estimasi Parameter Copula Bivariat .....      | 87 |
| Lampiran H | Simulasi Value at Risk dan Backtesting .....  | 88 |
| Lampiran I | Syntax Program R .....                        | 89 |