ANALISIS PORTOFOLIO MODEL *MIXTURE* MENGGUNAKAN *BAYESIAN MARKOV CHAIN MONTE CARLO* (MCMC)

SKRIPSI

Untuk memenuhi sebagian persyaratan
mencapai derajat Sarjana S-1

Program Studi Matematika

Diajukan Oleh

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FAKULTAS SAINS DAN TEKNOLOGI

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Laely Uswatun Nur Khasanah
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DAFTAR ISI

DAFTAR GAMBAR

DAFTAR TABEL

DAFTAR LAMPIRAN

DAFTAR SIMBOL

μ : *Mean*

σ_p : Risiko portofolio

σ_i : Standar deviasi

σ_p^2 : Varians

t : Anggota titik waktu

P_t : Harga investasi pada saat t

P_{t-1} : Harga saham pada saat $t-1$

R_t : *Return* data harga saham pada periode t

R_i : *Return* saham ke-i.

r_t : *Continuously Componunded Return*

X : Data runtun waktu

$\bar{\bar{X}}$: Rata-rata sampel

S : *Skewness*

K : Kurtosis

L : Fungsi *likelihood*

α : Tingkat signifikansi

n : Jumlah data

x : Total failures

$f(x|\theta,w)$: Fungsi densitas dari model *Mixture*

$g_j(x|\theta_j)$: Fungsi densitas ke-j dari sebanyak k komponen penyusun model *Mixture*

θ_j : Vektor parameter dengan elemen-elemen $(\theta_1, \theta_2, \dots, \theta_k)$

w : Vektor parameter proporsi dengan elemen-elemen $(w_1, w_2, \dots, w_k)$

k : Banyaknya komponen dalam *Mixture*

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ABSTRAK

Portofolio merupakan kombinasi atau sekumpulan aset baik berupa aset riil maupun aset finansial yang dimiliki oleh investor. Portofolio yang baik merupakan portofolio yang optimal. Portofolio akan diperoleh optimal ketika portofolio yang dibentuk mampu menghasilkan *return* yang maksimal dengan risiko yang terbatas.

Pada penelitian ini analisis portofolio model *Mixture* menggunakan *Bayesian Markov Chain Monte Carlo* (MCMC) yang kemudian dilanjutkan dengan menghitung besar risiko investasi menggunakan *Value at Risk* (VaR). Adapun data yang digunakan adalah saham-saham yang selalu konsisten masuk dalam saham *Jakarta Islamic Index* (JII). Dipilih 4 (empat) saham yang konsisten masuk dalam saham JII periode 01 Juli 2014 sampai dengan 31 Maret 2017.

Penelitian ini berdasarkan model *Mixture of Mixture* diperoleh model portofolio optimal dengan proporsi terbesar yaitu 49,95%untuk saham AKRA, proporsi terbesar selanjutnya yaitu 25,67% untuk saham UNVR, kemudian 18,90% untuk saham TLKM dan proporsi terkecil yaitu 5,48% pada saham ADRO. Dengan e*xpected return* yang diperoleh sebesar adalah 0,00199 (0,199%), dan risiko maksimum portofolio 0,01003 (1,003%).

Kata kunci: *Bayesian Markov Chain Monte Carlo* (MCMC), *Mixture*, *Mixture of Mixture*, Portofolio, Saham, *Value at Risk* (VaR).

PORTFOLIO ANALYSIS OF MODEL MIXTURE USING BAYESIAN MARKOV CHAIN MONTE CARLO (MCMC)

by
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ABSTRACT

Portfolio is a combination or a set of assets in the form of real assets and financial assets owned by investors. A good portfolio is an optimal portfolio.The portfolio will be optimized when the portfolio is able to generate a maximum return with limited risk.

In this research, portfolio analysis Mixture model using Bayesian Markov Chain Monte Carlo (MCMC) which then continued by calculating the big investment risk using Value at Risk (VaR). The data used are stocks that are always consistent entry in the stock Jakarta Islamic Index (JII). 4 (four) shares were selected consistently entered into JII shares from 01 July 2014 to 31 March 2017.

This research is based on Mixture of Mixture model obtained by optimal portfolio model with the biggest proportion that is 49,95% for AKRA stock, next biggest proportion is 25,67% for UNVR share, then 18,90% for TLKM stock and smallest proportion that is 5,48 % on ADRO shares. With expected return obtained by 0,00199 (0,199%), and maximum risk of portfolio 0,01003 (1,003%).

Keywords: Bayesian Markov Chain Monte Carlo (MCMC), Mixture, Mixture of Mixture, Portfolio, Stock, Value at Risk (VaR).

BAB I

PENDAHULUAN

1.1. Latar Belakang

Investasi merupakan salah satu pilihan dalam menanamkan modal. Investasi dapat diartikan sebagai komitmen untuk mengalokasikan sejumlah dana pada satu atau lebih aset (pada saat ini) yang diharapkan mampu memberikan keuntungan (*return*) dimasa yang akan datang. Investasi dalam dunia bisnis, dibedakan menjadi dua yaitu investasi pada aset real dan investasi pada aset finansial. Pertama investasi pada aset finansial dilakukan dipasar uang, misalnya berupa sertifikat deposito, *commercial paper*, Surat Berharga Pasar Uang (SBPU), dan lainnya. Kedua investasi pada aset real dapat dilakukan dengan pembelian aset produktif, pendirian pabrik, pembukaan pertambangan, perkebunan, dan yang lainnya (Huda, 2008).

Pada era modern investasi dalam bentuk kepemilikan aset finansial lebih menggiurkan, sehingga masyarakat di Indonesia lebih memilih aset finansial daripada aset real. Tempat ataupun kegiatan yang menjadi pemasaran aset finansial adalah pasar modal. Pasar modal merupakan tempat bertemu antara penjual dan pembeli dengan resiko untung dan rugi. Pasar modal memiliki peranan penting dalam investasi. Dengan adanya pasar modal memungkinkan perusahaan menghimpun dana dalam bentuk modal sendiri dengan menerbitkan saham, sehingga perusahaan dapat menghindari diri dari keadaan dimana perusahaan tersebut berada pada posisi harus menanggung rasio hutang dengan modal sendiri yang terlampau tinggi. Pasar modal juga dapat memberikan alternatif tambahan untuk menginvestasikan dana yang dimiliki oleh para pemodal. Salah satu bentuk investasi finansial yang ada di pasar modal Indonesia yaitu saham syariah, dimana indeks saham ini tercemin dalam *Jakarta Islamic Index* (JII) (Huda, 2007).

Menurut Fatwa Dewan Syariah Nasional NO: 40/DSN-MUI/X/2003, *Jakarta Islamic Index* (JII) merupakan indek terakhir yang dikembangkan oleh BEI yang bekerjasama dengan PT. *Danareksa Invesment Managemen*. Indeks ini merupakan indeks yang berdasarkan syariah islam setelah melalui *Islamic Screening Process*. Karena saham-saham yang masuk ke dalam Jakarta Islamic Index (JII) harus lulus dari keharaman dalam pandangan Majelis Ulama Indonesia (MUI). Unsur keharaman menurut MUI umumnya terkait dengan pornografi , produk dengan babi hutan, perjudian, alkohol, jasa keuangan dan asuransi konvensional. Selain itu saham yang masuk kriteria JII yaitu saham-saham yang operasionalnya tidak mengandung unsur *ribawi*, permodalan perusahaan juga bukan mayoritas dari hutang.

Investor dalam melakukan investasi, akan mendapatkan keuntungan (*return*) dan menghadapi risiko (*risk*). Keuntungan dan risiko berbanding lurus, apabila keuntungannya rendah maka risiko juga akan rendah, begitu pula sebaliknya. Investor dalam hal ini tidak dapat mengetahui dengan pasti tingkat keuntungan yang akan diperolehnya, investor hanya dapat mengharapkan tingkat keuntungan yang akan diperolehnya. Semua investor tentunya ingin mempunyai tujuan untuk mendapatkan keuntungan dari penyertaan modalnya ke perusahaan.

Untuk mencapai tujuan tersebut, pihak investor harus melakukan suatu analisis terhadap saham-saham yang akan dibeli. Untuk dapat meminimalkan risiko investasi, investor dapat melakukan diversifikasi, yaitu dengan mengkombinasikan berbagai sekuritas dalam investasi, dengan kata lain investor membentuk portofolio (Husnan, 2005).

Portofolio merupakan kombinasi atau gabungan atau sekumpulan aset, baik berupa aset riil maupun aset finansial yang dimiliki oleh investor. Portofolio yang baik, diberikan pembobotan yang berbeda sehingga diketahui optimal tidaknya portofolio tersebut. Portofolio yang optimal didefinisikan sebagai portofolio yang memberikan ekspektasi *return* terbesar atau memberikan risiko yang terkecil dengan ekspektasi *return* yang sudah tertentu. Portofolio yang optimal dapat ditentukan dengan memilih tingkat ekspektasi *return* tertentu dan kemudian meminimumkan risikonya atau menentukan tingkat risiko yang tertentu kemudian memaksimumkan ekspektasi *return*nya (Jogiyanto, 2003).

Portofolio yang optimal memerlukan suatu analisa terhadap portofolio yang dibentuk sehingga nantinya didapatkan suatu portofolio yang maksimal, dimana saham-saham yang ada didalam portofolio tersebut mampu menghasilkan *return* yang maksimal dengan risiko yang terbatas. Pemodelan portofolio dapat memberikan informasi besarnya proporsi *return* optimal dalam suatu instrumen sehingga investor dapat menentukan besarnya alokasi dana yang diinvestasikan.

Veronica (2013) menyebutkan bahwa pembentukan portofolio optimal dapat menggunakan berbagai macam model dan metode, antara lain dengan model indeks tunggal, model *Mixture of Mixture* atau model Markowitz. Model *Mixture* merupakan suatu model khusus yang mampu memodelkan sifat multimodal data yang mencerminkan susunan beberapa sub-populasi atau grup dimana setiap sub-populasi merupakan komponen penyusun dari model *Mixture* yang mempunyai proporsi yang bervariasi untuk masing-masing komponennya (Mc Lachlan dan Basford,1988) dan (Gelmanetal.,1995).

Pendekatan model *Mixture* digunakan untuk menghitung seberapa besar *return* yang akan didapatkan, yang mana distribusi *return* saham didekati dengan distribusi *Mixture* dengan banyaknya komponen penyusun tertentu. Estimasi parameter model *Mixture* dimungkinkan akan menemui kesulitan jika menggunakan metode lain misalnya MPLE (*Maximum Partial Likelihood Estimation*), masing-masing fungsi distribusi harus di *likelihood*-kan dan akan menghasilkan persamaan yang rumit sehingga digunakan analisis *Bayesian Markov Chain Monte Carlo* (MCMC) untuk mempermudah.

Dalam pembentukan portofolio, setiap aset memiliki konstribusi dengan pembobotan w. Untuk menentukan komposisi pembobotan w pada portofolio optimal ada beberapa metode yang dapat digunakan, diantaranya adalah metode *Mean Variance*. *Mean variance* portofolio didefinisikan sebagai portofolio yang memiliki variansi yang minimum diantara keseluruhan kemungkinan portofolio yang dapat dibentuk dengan *mean* yang sama (Markowitz, 1959). Metode ini masih sering digunakan praktisi walaupun masih ada yang meragukan ketepatan metode ini dalam menghasilkan komposisi pembobotan pada pembentukan portofolio optimal. Masalah lain yang muncul setelah dilakukan penyusunan portofolio optimal adalah adanya risiko dalam berinvestasi, untuk menghitung besarnya risiko suatu investasi menggunakan metode *Value at Risk* (VaR).

Pada penelitian ini akan menerapkan model *Mixture* menggunakan *Bayesian Markov Chain Monte Carlo* (MCMC) dan metode *Mean Variance* dalam penyelesain optimalisasi portofolio pada saham *Jakarta Islamic Index* (JII) yang kemudian menggunakan *Value at Risk* (VaR) untuk menghitung besarnya risiko investasi.

1.2. Batasan Masalah

Mengingat banyaknya metode dalam analisis portofolio maka pembatasan masalah dalam penelitian ini sangatlah penting, untuk membantu penulis lebih fokus dan terarah sesuai dengan tema penelitian. Batasan masalah dalam penelitian ini adalah:

1. Metode yang digunakan adalah model *Mixture*.
2. Studi kasus menggunakan data saham *Jakarta Islamic Index (JII)* pada periode 1 Juli 2014 sampai dengan 31 Maret 2017
3. Alat bantu yang digunakan dalam penelitian ini adalah *software* Ms. Excel, SPSS 16.0, dan WinBugs14.
4. Metode *Value at Risk* (VaR) digunakan untuk menghitung risiko.
5. Banyaknya komponen ditentukan yaitu 2 dan 3 komponen penyusun.

1.3. Rumusan Masalah

Berdasarkan latar belakang dan batasan masalah, maka dapat dirumuskan permasalahan sebagai berikut :

1. Bagaimana langkah-langkah analisis portofolio dengan pendekatan model *Mixture* dengan analisis *Bayesian Markov Chain Monte Carlo* (MCMC) saham harian JII periode 1 Juli 2014 sampai 31 Maret 2017?
2. Berapa proporsi portofolio optimal model *Mixture of Mixture* dengan analisis *Mean Variance* periode 1 Juli 2014 sampai 31 Maret 2017?
3. Berapa *return* dan risiko optimal yang diperoleh dari portofolio optimal saham harian periode 1 Juli 2014 sampai 31 Maret 2017?

1.4. Tujuan Penelitian

Berdasarkan rumusan masalah diatas, maka tujuan penelitian ini adalah sebagai berikut :

1. Mengetahui langkah-langkah analisis portofolio dengan model *Mixture* menggunakan *Bayesian Markov Chain Monte Carlo* (MCMC) saham harian JII periode 1 Juli 2014 sampai 31 Maret 2017.
2. Memperoleh proporsi portofolio optimal model *Mixture of Mixture* dengan analisis *Mean Variance* saham harian periode 1 Juli 2014 sampai 31 Maret 2017.
3. Mengetahui besar nilai *return* dan risiko optimal portofolio saham harian periode 1 Juli 2014 sampai 31 Maret 2017.

1.5. Manfaat Penelitian

Hasil penelitian ini diharapkan memberikan manfaat terhadap berbagai pihak sebagai berikut :

1. Bagi Penulis

   Memperdalam dan memperluas pengetahuan penulis tentang matematika statistik serta dapat mengaplikasikannya dalam kasus nyata.

2. Bagi Program Studi Matematika

   Menambah referensi atau literatur tentang ilmu statistik.

3. Bagi Investor

   Membantu investor dalam memilih sasaran investasi yang terbaik dan meminimalisir kerugian dalam berinvestasi.

1.6. Tinjauan Pustaka

Tinjauan pustaka yang digunakan oleh peneliti adalah beberapa penelitian yang relevan dengan tema yang diambil peneliti, antara lain :

1. Penelitian Nurul Utaminingsih (2013) berjudul Optimalisasi Portofolio Obligasi Bank Dengan Metode *Bayesian Markov Chain Monte Carlo* Melalui Model *Gaussian Mixture*. Penelitian ini diaplikasikan pada satu aset yaitu nilai *return* saham yang terdiri dari saham BCA, BRI, Permata, BNI, dan Mandiri. Penelitian ini menggunakan metode *Bayesian Markov Chain Monte Carlo*. Untuk menghitung risiko investasi digunakan *Value at Risk* (VaR).
2. Penelitian Midian (2014) berjudul Pemilihan Portofolio Dengan Menggunakan Pemodelan *Mixture of Mixture*. Penelitian ini diaplikasikan pada dua aset yaitu

aset pertama, nilai *return* saham yang terdiri dari saham BBNI.JK, BNGK.JK, BMRI.JK, AALI.JK dan aset kedua, Emas dengan periode data Januari 2014 sampai dengan Desember 2013 dengan interval waktu akhir periode setiap bulannya. Penelitian ini menggunakan metode *Bayesian Markov Chain Monte Carlo* pada pemilihan model terbaik dan *Mean Variance* pada pembentukan portofolio optimal.

3. Peneliti Fitri Yana Sari (2014) berjudul Optimalisasi Portofolio Saham Menggunakan Model *Mixture of Mixture*. Penelitian ini diaplikasikan pada satu aset yaitu nilai *return* saham Indofood, Indofarma, Unilever dan Gudang Garam. Penelitian ini menggunakan metode *Bayesian Markov Chain Monte Carlo*. Penghitung risiko investasi menggunakan *Conditional Value at Risk* (CvaR).

Pada penelitian yang sekarang memiliki persamaan dan perbedaan dengan penelitian terdahulu baik itu dari metode yang digunakan maupun objek yang diteliti. Adapun persamaan yang dimiliki yaitu penggunaan model *Mixture of Mixture* dalam pembentukan model saham seperti yang digunakan oleh peneliti kedua dan ketiga. Perbedaan dari peneliti pertama yaitu pada pembentukan model saham menggunakan model *Gaussian Mixture*. Persamaan selanjutnya yang dimiliki adalah dalam mengestimasi parameter dari model *Mixture of Mixture* menggunakan metode *Bayesian Markov Chain Monte Carlo* (MCMC) seperti yang dilakukan pada peneliti sebelumnya. Kemuadian dalam pembentuakan portofolio optimal peneliti menggunakan metode *Mean Variance* seperti yang dilakukan oleh peneliti kedua. Penentuan besar risiko investasi dari portofolio berdasarkan model digunakan metode *Value at Risk* (VaR) seperti yang digunakan pada peneliti pertama.

Berikut ringkasan dalam bentuk tabel :

Tabel 1.1 Kajian Pustaka

Nama Peneliti	**Metode**	**Model**	**Objek**
Nurul Utaminingsih (2013)	*Bayesian Markov Chain Monte Carlo, Value at Risk (VaR)*	*Gaussian Mixture*	BCA, BRI, Permata, BNI, dan Mandiri
Midian Raja GukGuk (2014)	*Bayesian Markov Chain Monte Carlo, Mean Variance*	*Mixture of Mixture*	BNGK, BMRI, AALI, dan Emas
Fitri Yana Sari (2014)	*Bayesian Markov Chain Monte Carlo, Conditional Value at Risk (CVaR)*	*Mixture of Mixture*	Indofood, Indofarma, Unilever dan Gudang Garam
Laely Uswatun Nur Khasanah (2017)	*Bayesian Markov Chain Monte Carlo, Value at Risk (VaR)*	*Mixture of Mixture*	Saham di *Jakarta Islamic Index* (JII)

1.7. Sistematika Penulisan

Penulisan skripsi ini terdiri atas enam bab dengan sistematika penulisan sebagai berikut :

BAB I PENDAHULUAN

Bab ini berisi latar belakang masalah, batasan masalah, rumusan masalah, tujuan penelitian, manfaat penelitian, tinjauan pustaka dan sistematika penulisan.

BAB II LANDASAN TEORI

Bab ini berisi tentang teori penunjang yang digunakan dalam pembahasan analisis portofolio saham syariah model *Mixture* menggunakan *Bayesian Markov Chain Monte Carlo*.

BAB III METODOLOGI PENELITIAN

Bab ini berisi tentang pengertian metodologi penelitian, jenis dan sumber data, populasi dan sampel, metode pengumpulan data, metode analsis data.

BAB IV ANALISIS PORTOFOLIO MODEL *MIXTURE* DENGAN *BAYESIAN MARKOV CHAIN MONTE CARLO*

Bab ini berisi tentang pembahasan mengenai model *Mixture* mengunakan metode *Bayesian Markov Chain Monte Carlo*.

BAB V STUDI KASUS

Bab ini membahas tentang penerapan dan aplikasi analisis portofolio saham syari'ah dengan model *Mixture* menggunakan *Bayesian Markov Chain Monte Carlo* pada data indeks saham syari'ah JII dan memberikan interpretasi terhadap hasil yang diperoleh.

BAB VI KESIMPULAN DAN SARAN

Bab ini berisi tentang kesimpulan yang dapat diambil dari pembahasan permasalahan yang ada, pemecahan masalah, dan saran-saran yang berkaitan dengan penelitian sejenis untuk penelitian berikutnya.

BAB VI

KESIMPULAN

6.1. KESIMPULAN

Berdasarkan perumusan masalah dan hasil penelitian, maka dapat diambil beberapa kesimpulan sebagai berikut:

1. Langkah-langkah analisis portofolio dengan pendekatan model *Mixture* menggunakan analisis *Bayesian Markov Chain Monte Carlo* saham harian JII periode 1 Juli 2014 sampai 31 Maret 2017 adalah sebagai berikut
   a) Mengumpulkan data saham
   b) Menghitung statistik deskriptif *return* 4 (empat) saham terpilih.
   c) Mengidentifikasi distribusi *return* 4 (empat) saham terpilih.
   d) Menghitung statistik deskriptif *return* 4 (empat) saham terpilih berdasarkan komponen penyusunnya.
   e) Mengestimasi parameter dan analisis model *Mixture* dengan analisis *Bayesian Markov Chain Monte Carlo* (MCMC).
   f) Menentukan model terbaik *return* 4 (empat) saham menggunakan Struktur Perkalian Distribusi (SPD).
   g) Mengestimasi parameter model *Mixture of Mixture* dan penyusunan portofolio menggunakan *Mean Variance*.
   h) Perhitungan nilai *return* dan risiko portofolio.

2. Model portofolio optimal berdasarkan model *Mixture of Mixture* yang terbentuk dari 4 (empat) saham terpilih adalah sebagai berikut:

$$h_{portofolio} = 0{,}0548\left(f_1(x|w_1,\mu_1,{\sigma_1}^2)\right)$$
$$+0{,}4995\left(f_2(x|w_2,\mu_2,{\sigma_2}^2)\right)$$
$$+0{,}1890\left(f_3(x|w_3,\mu_3,{\sigma_3}^2)\right)$$
$$+0{,}2567\left(f_4(x|w_4,\mu_4,{\sigma_4}^2)\right)$$

dimana

$$f_1(x|w_1,\mu_1,\sigma_1^2) = 0{,}2002\ g_{11}(x|\mu_{11},{\sigma_{11}}^2) + 0{,}1011\ g_{12}(x|\mu_{12},{\sigma_{12}}^2)$$
$$+ 0{,}6987\ g_{13}(x|\mu_{13},{\sigma_{13}}^2)$$
$$f_2(x|w_2,\mu_2,\sigma_2^2) = 0{,}2013\ g_{21}(x|\mu_{21},{\sigma_{21}}^2) + 0{,}1009\ g_{22}(x|\mu_{22},{\sigma_{22}}^2)$$
$$+ 0{,}6978\ g_{23}(x|\mu_{23},{\sigma_{23}}^2)$$
$$f_3(x|w_3,\mu_3,\sigma_3^2) = 0{,}2008\ g_{31}(x|\mu_{31},{\sigma_{31}}^2) + 0{,}1014\ g_{32}(x|\mu_{32},{\sigma_{32}}^2)$$
$$+ 0{,}6978\ g_{33}(x|\mu_{33},{\sigma_{33}}^2)$$
$$f_4(x|w_4,\mu_4,\sigma_4^2) = 0{,}2005\ g_{41}(x|\mu_{41},{\sigma_{41}}^2) + 0{,}1012\ g_{42}(x|\mu_{42},{\sigma_{42}}^2)$$
$$+ 0{,}6982\ g_{43}(x|\mu_{43},{\sigma_{43}}^2)$$

Berdasarkan persamaan diatas, diperoleh informasi untuk besarnya masing-masing saham dalam satu portofolio. Proporsi terbesar dimiliki oleh saham AKRA yaitu sebesar 49,95%, proporsi terbesar selanjutnya adalah saham UNVR yaitu sebesar 25,67%, kemudian 18,90% untuk saham TLKM dan proporsi terkecil yaitu 5,48% pada saham ADRO.

3. Besar nilai *return* dan risiko optimal portofolio syariah model *Mixture of Mixture* saham harian periode 1 Juli 2014 sampai 31 Maret 2017 diperoleh

nilai *expected return* portofolio sebesar 0,00199 (0,199%), dengan risiko maksimum 0,01003 (1,003%). Jika investor akan menginvestasikan dengan dana awal investasi sebesar Rp. 1.000.000.000 maka keuntungan yang diperoleh yaitu sebesar Rp.1.990.000,00 dengan kerugian maksimum sebesar Rp. 10.034.500,00 dalam jangka waktu satu hari.

6.2. SARAN

Penelitian ini membahas analisis portofolio saham syariah yaitu saham *Jakarta Islamic Indeks* (JII) menggunakan model *Mixture of Mixture*. Bagi pembaca yang tertarik dengan analisis saham syariah menggunakan model *Mixture of Mixture* dapat memperluas data yang bervariasi seperti harga emas, deposito dan obligasi. Perlu penelitian lebih lanjut bagaimana menentukan banyaknya komponen dan berapa proporsi sampel untuk masing-masing komponen tersebut.

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Lampiran 1

Data *Return* Saham Harian Periode 01 Juli 2014 – 31 Maret 2017

ADRO	AKRA	TLKM	UNVR
0,030043	0,0210279	0,0080644	0,0193277
-0,0083332	0,0263159	-0,0099998	-0,004122
0	0,0078038	0,0202019	0,0033113
0,0042016	0,0121681	0,0297029	0,0198018
-0,0125524	-0,0131147	0,0057693	0,0105179
0	0	0	0
0	0,0442968	-0,0095603	0,0056045
-0,0423729	-0,0127253	-0,0057914	-0,0318472
-0,0221238	-0,0225565	0,0135922	0
0,0361991	0,0164836	0,0172413	0,0320725
0,0043668	0,0183784	-0,0018831	-0,0039841
-0,0347825	-0,0339704	-0,0018868	-0,0112
0,0045045	-0,0087912	0,0132325	0,0008091
0,0134528	0,0022174	0,005597	0,0056589
-0,0309733	-0,0254424	-0,0166976	0,0032153
0,0091324	0,0068104	-0,0150944	0,0008013
0,0452487	0,0135288	0,0114942	-0,002402
0,0259741	-0,0211346	0,003788	-0,012841
0,0421941	0,0499999	0,0150943	0,0235773
0,0161944	0	0,007435	-0,0182685
0	0,0064935	-0,0202952	-0,0048544
0,0119522	-0,0096775	0,0131827	0,0008131
-0,011811	-0,0010857	0,0037176	-0,0089358
0,0079681	0,0195651	0,0185185	0,0245902
0	-0,0031983	0,010909	0,0032
0,0158102	0,026738	0,0017986	0,0207336
0,0077822	0	-0,0107721	-0,0007811
0	0,0270833	-0,0163339	-0,0023456
0,0193049	0,0243407	0,0055351	-0,0125392
0,0075758	-0,0198019	-0,0091742	-0,0015873
-0,0075188	-0,0212122	0,0092592	0,0143085
-0,0303031	0,0299278	-0,0036696	0

-0,0195311	0,012024	-0,0110498	-0,0094044
-0,0199203	-0,0099011	0	-0,0031646
0,0325203	-0,0039999	0,0074488	0,0055555
0,0551181	-0,0130523	0,0110907	0,0086818
-0,0186567	0,0376399	-0,0054847	0,0046949
0	0,0294118	-0,0202204	-0,0334891
0,0038022	0,047619	0,0168855	0,0314262
0,0113637	0,0318182	-0,0036899	0
0,0262171	-0,0132159	0,0092592	0
0,0036495	-0,0535714	0,0018349	-0,0101562
-0,0145454	-0,009434	0	0,0047355
0,0221403	0,0095238	0,0384616	0,0007857
-0,0397111	0,004717	-0,005291	-0,0172685
-0,0338346	0,0094786	-0,0035461	-0,0047925
0	-0,0140845	-0,0053381	0,0008026
0,0155642	-0,0047618	-0,001789	0,0040097
-0,0229886	0	-0,0053764	0,0007986
-0,0039215	0	0,0072073	0,0087791
0,0393701	0	0,0196779	0,0094937
-0,0227271	0,0047846	0,0087719	0,0023511
-0,0193799	0	0,0243479	-0,0070368
-0,0079052	0	-0,0254669	0,0070867
0,0119522	-0,0047618	0,0069686	-0,0148554
-0,003937	0,0095693	-0,0069204	-0,0055557
0,0079051	-0,0094786	0,0052264	-0,0007979
-0,062745	-0,0047847	-0,001733	0,0159745
-0,0251048	0,0240383	0,0104166	0,0062892
0,0085838	0,0234742	0,0017182	-0,0062498
-0,0127659	-0,0183486	-0,0171526	0
-0,0344828	-0,0327103	-0,0366492	-0,004717
-0,0133927	-0,004831	0,0108694	-0,0276461
0,0316741	-0,0194174	0,0197134	-0,0008124
0	-0,0049504	0,0052723	-0,0032521
0,0131579	-0,0288558	-0,020979	-0,0024469
-0,012987	-0,0020491	0	0,0040883
-0,0438596	-0,0225873	-0,0089287	0,0032573
-0,0733945	0,0084034	0	-0,0097403
0	-0,0197918	0	0,0139344
-0,0693068	0,021254	0,028829	0,0056589

0,0265957	0,0156087	-0,0175132	-0,0056271
0,0155441	0,0081968	0	0,0331446
-0,0204083	-0,0060975	0,0142603	-0,0242566
0,015625	-0,01636	0,0017574	0,0144346
0,0564103	0,0322246	0,0035088	0,0126482
0,0194175	-0,0120845	0,0069931	-0,0257611
0,0047619	0,0030581	-0,0034722	-0,0192308
-0,0094787	0,0050812	-0,0226481	-0,0179737
-0,0143541	-0,0283114	-0,0427808	-0,0058238
0,0679614	-0,0083247	0,0130353	0,0410043
0	0,0073453	0,0147061	-0,0209004
0,0318181	0,0260416	-0,0036232	-0,0016421
0,0132158	-0,0152284	0,0036364	0,0016448
-0,0086957	0,0061854	-0,0072466	-0,002463
-0,0350876	-0,0081966	0	-0,0016461
-0,018182	-0,0041322	-0,0109488	-0,0074197
0,0138891	-0,0093362	-0,0350553	-0,0099667
-0,0091326	-0,0188482	0,0057361	0,0041946
0,0046084	-0,0256137	0,0323194	0,0200501
-0,0642202	0,0120482	0,0055248	0,000819
-0,0196078	0,004329	0,0018316	0,0032733
0	0,0096983	0,001828	-0,0065253
0,0049999	-0,0053362	0,0036498	0,0197045
0,0099503	0,0075108	0,001818	0,0177134
0,0147783	0,0021298	0,0072595	-0,0158228
0,0388349	-0,0223167	-0,0198198	0,0096462
0,0046729	0,0076088	0,0165442	0,0015923
0,0139536	0,0075512	0,0180832	0,0015899
0,0045873	-0,0096359	-0,0106572	0,0063491
0,0091324	-0,0043244	0,010772	-0,0031545
-0,0045248	0,0097721	-0,0017762	0,0126581
-0,018182	0	0,005338	-0,0062498
-0,0138889	-0,0096775	0,0194691	-0,0133648
0,0187793	-0,0010858	-0,0017362	-0,0031873
0,0092168	-0,0358695	-0,0086957	0,0108602
0,0365296	0,0191658	-0,0017543	0,0095923
-0,0132159	0,0011063	-0,0017576	0,003167
-0,0223212	0,0022098	-0,0123239	-0,0165746
-0,0045663	-0,0132303	-0,0035651	-0,0040128

-0,0229358	0,021229	0,0143113	0,0024174
-0,0046948	0,0054704	0	-0,0064308
-0,0330189	0,0163221	-0,0035274	0,0024271
0	0	-0,0141592	0,008071
0,0146342	-0,0256958	-0,0143627	-0,0008007
0,0096154	-0,0263737	-0,007286	-0,0160256
0,0142857	-0,0225733	0,027523	0,0325733
-0,0046948	-0,0103927	0,0053571	0,0094637
0	-0,0256709	0,0035523	-0,015625
-0,0047169	0,0071857	0	0
0,0047393	-0,0297265	0,0070797	0,0007936
-0,018867	0	0,0017574	0,0134814
0	0,0098039	0,0052633	0,0109546
0	0,0922329	-0,0017453	0,006966
-0,0144232	0,0111113	-0,0087412	-0,0015372
-0,0146341	0	-0,0070547	0
0	-0,0021978	-0,0017762	0,0200154
-0,0247525	0,0077092	0,0088968	0,0075471
0,0203046	0,0065574	0,0088183	-0,0044943
-0,0099502	-0,0054288	-0,0087412	-0,03386
-0,0301508	0,0010917	0,0017636	0,0280374
-0,0207254	-0,0119956	-0,0052817	-0,0106061
-0,010582	0,0110376	0,00177	0,0022971
0	0,0021834	0,0053004	0,0236822
0,0106952	-0,0174293	0,0035149	0,0149253
0,0370369	0	0,0157618	0,0058825
0,0255102	0,0144124	0,0051723	0,0511694
0,0099503	-0,009836	-0,0120068	-0,0041723
-0,0147783	-0,0154525	0,0034722	0,0111732
-0,02	-0,0011211	-0,0242215	-0,0193371
0,0204082	0,0347924	0,0035461	0,0007043
-0,0049999	0,0021691	0,0053004	-0,0007038
-0,0100503	0,0173161	0,0052723	-0,0035211
0,0152284	-0,0010639	-0,0104894	0,012721
-0,0049999	-0,0095846	-0,0088339	0,0097697
-0,0050252	-0,0139785	0,00713	0,0055287
0,010101	0,0010906	0,0070797	0,0006872
-0,0049999	-0,0054467	-0,0105448	-0,0315936
0	0,0087623	0,0053286	0,0397165

-0,0150755	0,015201	0,0106006	-0,0143246
0,0153062	0,0053476	-0,0052447	-0,0173012
-0,0150755	0,0127659	0,0052723	0,0049296
0,005102	0,019958	0,0122378	0
0,0152284	0,0082389	0,0293611	0,01822
-0,01	-0,0214505	-0,0302014	-0,0337231
0,010101	0,0052192	0,00173	0,0227917
-0,0049999	0,0093458	0	-0,011142
0	0,0020576	-0,001727	-0,0049295
-0,0150755	-0,0123204	0,0069203	0,0205238
-0,0153061	0,0062371	-0,0017182	-0,0006935
-0,0051814	0,001033	0,0223752	0,0090216
-0,015625	0	0,0016835	0,0041266
0,015873	0,00516	-0,0134453	-0,0136987
0,0625	0,0215606	0,0051106	0,0111111
-0,004902	0,0030151	-0,0016948	-0,0089285
-0,0295567	0,012024	-0,0118847	0,000693
0,0203046	0,0049505	0	0,004155
-0,0199005	-0,0197044	0,0257732	0,0427587
0,0050761	0,005025	-0,0134003	-0,0079365
-0,0050505	0,0350001	0	0,008
-0,0304568	-0,004831	-0,0016979	0,0251322
0,0157068	-0,0145631	-0,005102	0,0277418
0	0,0098523	0,0102563	0,0012557
-0,0257731	-0,0195122	0,0067682	-0,0075235
0,010582	-0,0049752	-0,0067227	-0,0145294
0	0,0050001	-0,001692	-0,0384615
0,0157068	-0,0139303	0	0,0213332
-0,0206185	-0,0312816	-0,0101695	0
0,0210526	0,046875	0	0,0084858
0,0051546	0,0099502	0	0,0071197
-0,0102564	-0,0147784	-0,0136986	-0,001928
-0,0207254	-0,0009999	-0,0243056	-0,008371
0,0052909	0	0	0,0155844
0,0105263	0,0010009	0,019573	0,0140666
-0,0104167	0,0250002	0,008726	0
0,0105263	0,0439024	-0,0190312	-0,0157629
0,0208333	0,0327103	-0,0035274	0,0006405
0	0	0,0035399	0,006402

0	0,0135747	0,0070547	0,0127227
-0,0153061	-0,0044644	0,0017512	-0,0276382
0,015544	-0,0224215	-0,006993	0,016796
-0,005102	-0,0412843	-0,0052817	0,0012705
-0,0205128	-0,0191387	-0,0106194	0,0095178
0	-0,0243904	0	-0,0257699
0,0052356	0,0050001	0,0035778	-0,0032258
0,0052083	0,0099502	0,0017825	-0,0135923
-0,0051814	0,049261	-0,0017794	0,0006562
-0,0104167	0,0093898	0,0106952	0,0072131
0,0263158	0,0232559	0	0,0416667
-0,0051282	0	-0,0017637	0,00875
0,0103093	-0,0181819	0,0088339	0,0346963
-0,0102041	-0,0462964	0,0175131	0,0299401
-0,0515463	-0,0097086	-0,007225	-0,0215116
0,0108697	0,0196078	-0,0071175	0,0576351
-0,0376344	0	-0,032258	-0,0505618
-0,0223465	0	-0,0314815	0,0082841
-0,0134037	-0,0384616	0,0573614	0,0093897
0,0295858	0,0050001	-0,0054249	0,0273256
0,0057471	0,0497512	0,0072727	0,0226373
-0,0228572	-0,014218	0,0216607	-0,0392916
0,0058479	0,0192307	0,0106007	0,0138248
0,0523256	0,0047169	-0,0052447	-0,0079546
0,0110498	-0,0422534	-0,0158173	-0,0263459
0,0163934	0,0305719	0,0125001	-0,0047058
-0,0268817	0,0287081	0,0017636	0,0283688
-0,0276242	0,0093024	-0,0035211	0,0080459
0,0170454	0,032258	0	0
-0,0055867	0,0223215	0,0017668	-0,0114025
-0,0112358	-0,0218341	-0,0017637	0,0098038
0,0056818	-0,0089285	0,0141342	0,0142777
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-0,0585939		-0,0045663	0,0145903
0,0788382		-0,0137614	-0,0033185
0,0038462		-0,0209302	-0,0049945
-0,0114943		-0,0023754	0,0078081
0,0542636		-0,0095238	-0,0149418
0,0110294		0	0,0022472
0,0072727		-0,0048076	0,014574
0,0108303		0,0096618	-0,0055249
0,0035715		0,007177	-0,0111111
0		0,0071259	0,011236
0,0142349		-0,0023586	-0,0061112
0,0245614		-0,0070922	-0,0055896
-0,0136987		0	-0,0033727
0,0625		0,002381	-0,000564
-0,0130718		0,0023753	-0,003386
-0,0066225		-0,0047394	0,0056624
0,0166666		-0,002381	0,0005631
0		0,0119332	0,0016883
0,0196722		-0,0023586	-0,0016855
-0,0032154		-0,002364	0,0022511
0,0193548		-0,0047394	-0,001123
0,0031646		0	-0,0005621
0,0347003		-0,0119048	-0,0005625
0,0487805		0	-0,0056274
-0,0465116		0	-0,0045274
0,0182927		0,0313253	0,0005685
0,0089821		-0,0373831	0,0085227
-0,0326409		0,0169903	0
-0,0368099		-0,0548925	-0,0152113
0,0509554		-0,0429293	-0,061785
0,0060606		0,0131926	0
-0,0331325		0,0416667	-0,0006097
-0,0872274		0	0,0030506
0,0477816		-0,0075	-0,0145985
-0,0130293		-0,0100756	-0,0061729

-0,009901		0,005089	-0,0062111
0,02		-0,0025316	-0,005
0,0588236		-0,032995	0,0163317
0,0061729		0,0052494	-0,0086528
0,0092024		0,002611	0,0024939
-0,0030395		0	-0,0024877
0,0243903		-0,015625	0,0130924
-0,0297619		0,021164	-0,0024615
-0,0613497		0,0129533	0,0345465
0,0522876		0,0127878	0,0113298
0,0341615		-0,0126263	-0,0041273
0,039039		-0,0153452	-0,0011948
0		0,0233766	-0,0113637
-0,0115606		0,0050762	0,0030249
-0,0350878		0,0025252	0
0,0181819		-0,0125945	-0,017491
0,0119048		0,0024045	-0,0165746
-0,0058824		-0,0230179	0,0024969
-0,0118343		-0,0052356	-0,0043586
-0,005988		-0,018421	-0,0031269
0,0210844		0,0134049	-0,0050189
0,0029499		-0,0079365	-0,0290038
-0,0176471		-0,016	-0,0136363
0,005988		0,0108401	-0,0026333
-0,014881		0,0268097	0,0085809
0,0120845		0,0287206	0,0287958
0,0089553		0,0101522	0,0178117
0,0153931		0	-0,03
0,0029586		-0,0075376	0
0		0	0,0006443
0,0265487		0	0,0354154
-0,0229885		0,0126582	0,0087064
-0,0205882		0,005	0,0012331
0,0180181		-0,0049751	-0,0110838
0,0147493		-0,01	-0,0012453
-0,0203488		0	-0,0031173
0,0356083		-0,0025253	-0,0006254
-0,0171919		0	-0,0087609
-0,0087464		0,0050632	0,0006313

0		-0,0025188	0
0		0,0025252	0,0321766
0,0117647		-0,0352645	-0,0122249
0,005814		0,002611	0,0024752
0		0,0182292	0,017284
-0,0028902		-0,0025576	0,0194174
0		0,0102564	-0,0023809
0,0086957		-0,0126904	-0,0023866
-0,0057471		-0,007712	-0,0023923
-0,0028902		0,0025907	-0,0089929
-0,005797		0,0180878	-0,0030248
-0,0116618		0,0025381	0,0018204
0,0324483		0	0,0066626
-0,0057142		0,0025317	0,0108303
-0,0114943		-0,010101	-0,0071428
0,0116279		-0,0127551	0,0005995
-0,0057471		0	0
-0,0057804		0,0051679	0,0023966
0,0029069		0,0077121	0,0185297
-0,0086956		-0,0153061	-0,0041081
-0,0175438		0	0
-0,0208333		0,0025907	0
0		0	0,004125
0,0334346		0	0
-0,0235294		0,0025839	-0,0117371
0,0210843		0	0,0154394
0,0147493		-0,0103092	0,002924
-0,0087209		0	-0,0145773
0,0058651		0,0078125	0
-0,0087464		-0,005168	0
0		0	-0,0017752
-0,0029411		-0,0051948	0
-0,0117994		0,0052219	-0,0017782
0,0059702		0,0181818	-0,0029692
0		0,0076531	0,0095295
0		-0,0177216	0,0023599
0,0059347		0,0206186	-0,0011772
0		-0,0025253	0
-0,0058997		0	-0,0029463

-0,0504451		0,0253165	0,002364
0,015625		-0,0024691	-0,0047169
0,0123077		0,0247525	-0,0005925
0,0030395		-0,0072464	0,0337878
0,0181819		-0,0024331	0,0091743
0,0148809		-0,002439	-0,0017046
0		-0,00489	0
0,0146627		0,004914	-0,0244735
0		-0,002445	-0,0081681
0,0057804		0	0,0152941
0,0172413		0,0171568	0,004635
0,0169492		-0,0024096	0,0069205
0,0111111		-0,0024155	0,0011455
0			-0,0085813
-0,0384615			

Lampiran 2

Pengelompokan 2 dan 3 Komponen *Return* Saham ADRO

ADRO				
Komponen 1	**Komponen 2**	**Komponen 1**	**Komponen 2**	**Komponen 3**
0.00580361	0.00462012	0.00580361	-0.00659684	-0.00445431
0.00873001	0.01579425	0.00873001	-0.00659684	-0.02298373
0.00199663	0.01093990	0.00199663	0.01579425	0.00469531
0.00158186	0.00429987	0.00158186	0.00904829	-0.01665973
0.00807998	-0.00646590	0.00807998	0.00000000	-0.00981482
0.00000000	-0.00877392	0.00000000	0.00000000	-0.00586065
-0.00548577	0.00877385	-0.00548577	0.00454749	0.01266263
0.00429987	-0.00217692	0.00429987	-0.00659684	0.00248875
-0.02814223	-0.00438674	-0.02814223	-0.00217692	-0.01004187
-0.00413631	0.00656359	-0.00413631	-0.00454777	0.00253236
0.00000000	-0.00217692	0.00000000	0.00000000	0.02215030
-0.00856613	-0.00218783	-0.00856613	0.00457156	0.00477263
-0.01551229	0.00436480	-0.01551229	0.00229179	0.00706167
-0.01088538	-0.00217692	-0.01088538	0.01128110	-0.01183449
-0.00170665	0.00000000	-0.00170665	-0.00877392	-0.01216577
0.00164806	-0.00659684	0.00164806	-0.01343292	0.00734017
0.00570204	0.00659695	0.00570204	-0.00683942	-0.00243321
0.00630941	-0.00659684	0.00630941	0.00219890	-0.00490735
-0.00636320	0.00221014	-0.00636320	-0.00223279	0.00246068
0.00951038	0.00656359	0.00951038	-0.00218783	-0.00493503
-0.00363414	-0.00436481	-0.00363414	0.00659695	0.01223428
0.00182108	0.00436480	0.00182108	-0.00217692	-0.00241967
-0.00515998	-0.00217692	-0.00515998	0.00895470	0.00241965
0.00398456	0.00000000	0.00398456	-0.01302997	-0.01974386
-0.00630944	-0.00659684	-0.00630944	-0.00904833	0.00998430
-0.00196964	-0.00669871	-0.00196964	0.00000000	0.02165891
0.00000000	-0.00225593	0.00000000	0.00221014	-0.01675180
0.00202473	-0.00683942	0.00202473	-0.00225593	0.00243304
0.00189243	0.00683942	0.00189243	0.00454749	-0.01480713
0.00327781	0.02632894	0.00327781	0.00873001	-0.01532960
...	...	...	...	...
...	...	...	...	...
-0.00327780	0.00479884	-0.00327780	0.00877385	0.00479884
0.01558188	0.00000000	0.01558188	-0.00217692	0.00000000
0.00198755	-0.01703355	0.00198755	0.00676845	-0.01703355

Pengelompokan 2 dan 3 Komponen *Return* Saham AKRA

AKRA				
Komponen 1	**Komponen 2**	**Komponen 1**	**Komponen 2**	**Komponen 3**
-0.00570586	-0.00578419	-0.00570586	0.00912314	0.00926413
0.00187600	0.00912314	0.00187600	-0.00538392	0.00130747
0.00672641	0.00236929	0.00672641	-0.00763619	0.00519081
0.00317836	0.00703137	0.00317836	-0.00991580	0.00214467
-0.00980180	0.00000000	-0.00980180	0.00423704	-0.00864295
-0.01247289	-0.01130543	-0.01247289	-0.00524112	0.00217686
0.00419163	-0.01160770	0.00419163	0.00479896	0.01494039
0.00000000	-0.00991580	0.00000000	0.00621455	-0.00210316
0.00903761	-0.00453711	0.00903761	0.00047338	-0.00637118
-0.00420511	-0.01129433	-0.00420511	0.00047386	0.00425786
-0.00868614	0.00310955	-0.00868614	-0.00578419	-0.00855781
-0.00868167	-0.01310583	-0.00868167	0.00236929	-0.00216609
-0.02391214	0.00000000	-0.02391214	0.00000000	0.00216610
0.00220115	0.00423704	0.00220115	-0.00429287	-0.00609239
0.00324971	0.03831525	0.00324971	0.00231625	-0.01380245
0.01604666	0.00479896	0.01604666	-0.01129433	0.01989483
0.00525265	0.00000000	0.00525265	0.00333522	0.00429996
0.01128106	-0.00095554	0.01128106	-0.00046229	-0.00646608
-0.00716382	0.00333522	-0.00716382	0.00476731	-0.00043447
0.00281097	0.00283855	0.00281097	-0.00095554	0.00000000
0.00411656	-0.00236412	0.00411656	0.00000000	0.00043447
-0.00528020	0.00047386	-0.00528020	0.00223520	0.01072395
-0.01500957	-0.00524112	-0.01500957	0.00270033	0.01865990
0.00583609	0.00476731	0.00583609	-0.01310583	0.01397851
-0.00992202	0.00094720	-0.00992202	0.00000000	0.00000000
-0.00179831	-0.00763619	-0.00179831	0.00000000	0.00585576
0.00824484	0.00000000	0.00824484	0.00356345	-0.00194321
0.01007690	0.00621455	0.01007690	-0.00236412	-0.00984836
0.00354531	-0.00429287	0.00354531	0.00226078	-0.01831016
-0.00265622	-0.00676333	-0.00265622	-0.00941720	-0.00839240
-0.00215527	-0.00048716	-0.00215527	0.00403998	-0.01072393
0.00204375	0.01485323	0.00204375	0.00655204	0.00216610
...	...	...	...	...
...	...	...	...	...
-0.00666448	0.00340624	-0.00666448	0.00094101	0.00340624
-0.00383485	-0.00683942	-0.00383485	0.00858229	-0.00683942
0.00207297	-0.00346053	0.00207297	0.01485323	-0.00346053

Pengelompokan 2 dan 3 Komponen *Return* Saham TLKM

TLKM				
Komponen 1	**Komponen 2**	**Komponen 1**	**Komponen 2**	**Komponen 3**
-0.0027808	0.0035149	-0.0027808	0.0051723	0.0175131
0.0150943	0.0157618	0.0150943	-0.0136986	-0.0072250
0.0074350	0.0051723	0.0074350	0.0122378	-0.0071175
0.0165442	-0.0120068	0.0165442	0.0000000	-0.0022580
0.0055970	0.0034722	0.0055970	-0.0106194	-0.0014815
0.0180832	-0.0042215	0.0180832	-0.0118847	0.0073614
0.0185185	0.0035461	0.0185185	0.0053004	-0.0054249
0.0194691	0.0053004	0.0194691	-0.0088339	0.0072727
0.0097029	0.0052723	0.0097029	-0.0101695	0.0216607
-0.0017762	-0.0104894	-0.0017762	-0.0190312	0.0106007
0.0070797	-0.0088339	0.0070797	0.0052723	-0.0052447
0.0037880	0.0071300	0.0037880	-0.0016979	-0.0158173
0.0000000	0.0070797	0.0000000	0.0017300	0.0125001
0.0037176	-0.0105448	0.0037176	-0.0052817	0.0017636
0.0053004	0.0053286	0.0053004	0.0035778	-0.0035211
-0.0106572	0.0106006	-0.0106572	-0.0043056	0.0000000
0.0131827	-0.0052447	0.0131827	0.0000000	0.0017668
0.0035088	0.0052723	0.0035088	0.0070797	-0.0017637
-0.0143627	0.0122378	-0.0143627	-0.0016948	0.0141342
0.0072595	0.0093611	0.0072595	-0.0052447	-0.0139372
0.0055351	-0.0302014	0.0055351	0.0000000	0.0088339
0.0074488	0.0017300	0.0074488	-0.0067227	-0.0035026
-0.0109488	0.0000000	-0.0109488	-0.0105448	0.0000000
-0.0099998	-0.0017270	-0.0099998	0.0052723	0.0105448
0.0069931	0.0069203	0.0069931	0.0000000	-0.0173913
-0.0069204	-0.0017182	-0.0069204	0.0016835	0.0106194
-0.0050553	0.0223752	-0.0050553	0.0000000	0.0000000
0.0052264	0.0016835	0.0052264	0.0070547	-0.0087565
-0.0123239	-0.0134453	-0.0123239	0.0035149	0.0106007
0.0143113	0.0051106	0.0143113	-0.0017182	0.0034965
0.0114942	-0.0016948	0.0114942	-0.0104894	-0.0069686
0.0018316	-0.0118847	0.0018316	-0.0017794	-0.0140351
...	...	...	...	...
...	...	...	...	...
-0.01444344	0.0171568	-0.01444344	-0.0017270	0.0171568
0.00095865	-0.0024096	0.00095865	0.0106952	-0.0024096
-0.00207296	-0.0024155	-0.00207296	-0.0042215	-0.0024155

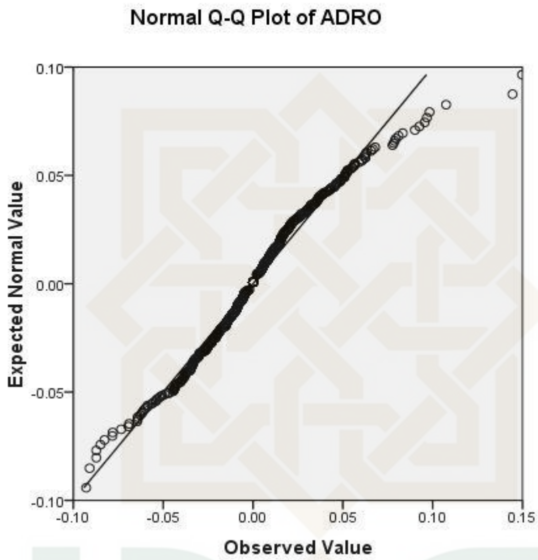
Pengelompokan 2 dan 3 Komponen *Return* Saham UNVR

UNVR				
Komponen 1	**Komponen 2**	**Komponen 1**	**Komponen 2**	**Komponen 3**
0.0054586	0.0000000	0.0054586	0.0000000	0.0128120
0.0030148	0.0000000	0.0030148	0.0000000	-0.0094443
0.0076255	-0.0021461	0.0076255	-0.0021461	0.0160447
-0.0091731	0.0078416	-0.0091731	0.0078416	-0.0090230
0.0034911	-0.0003013	0.0034911	-0.0003013	0.0035829
-0.0007155	-0.0084803	-0.0007155	-0.0084803	0.0040589
0.0020342	0.0002849	0.0020342	0.0002849	0.0117081
0.0000000	0.0048256	0.0000000	0.0048256	0.0097216
0.0058158	-0.0015319	0.0058158	-0.0015319	-0.0174084
0.0013732	0.0118840	0.0013732	0.0118840	0.0059629
0.0018179	0.0034605	0.0018179	0.0034605	-0.0034685
0.0139209	-0.0170333	0.0139209	-0.0170333	-0.0115953
-0.0019562	-0.0008381	-0.0019562	-0.0008381	-0.0020485
0.0101652	-0.0121721	0.0101652	-0.0121721	0.0121489
-0.0013864	0.0036698	-0.0013864	0.0036698	0.0034803
-0.0020534	-0.0059435	-0.0020534	-0.0059435	0.0000000
-0.0010640	-0.0113385	-0.0010640	-0.0113385	-0.0049805
0.0105502	0.0018008	0.0105502	0.0018008	0.0042370
0.0083138	-0.0148984	0.0083138	-0.0148984	0.0061569
0.0000000	0.0148129	0.0000000	0.0148129	0.0127708
-0.0030668	0.0003009	-0.0030668	0.0003009	-0.0117937
0.0141611	0.0041140	0.0141611	0.0041140	0.0043697
0.0007137	0.0054898	0.0007137	0.0054898	-0.0162418
0.0041460	0.0003058	0.0041460	0.0003058	-0.0010041
0.0054628	-0.0062661	0.0054628	-0.0062661	0.0040027
0.0014193	0.0054905	0.0014193	0.0054905	-0.0095675
-0.0054801	-0.0048661	-0.0054801	-0.0048661	-0.0051215
0.0086215	0.0047989	0.0086215	0.0047989	-0.0062265
0.0041036	0.0027715	0.0041036	0.0027715	-0.0019695
-0.0028019	0.0091674	-0.0028019	0.0091674	0.0176850
0.0000000	-0.0063563	0.0000000	-0.0063563	-0.0074150
-0.0075651	0.0181838	-0.0075651	0.0181838	0.0061001
...	...	...	...	...
...	...	...	...	...
0.0000000	0.0029952	0.0000000	0.0002983	0.0029952
-0.0035651	0.0004972	-0.0035651	0.0031214	0.0004972
0.0075230	-0.0037429	0.0075230	0.0030811	-0.0037429

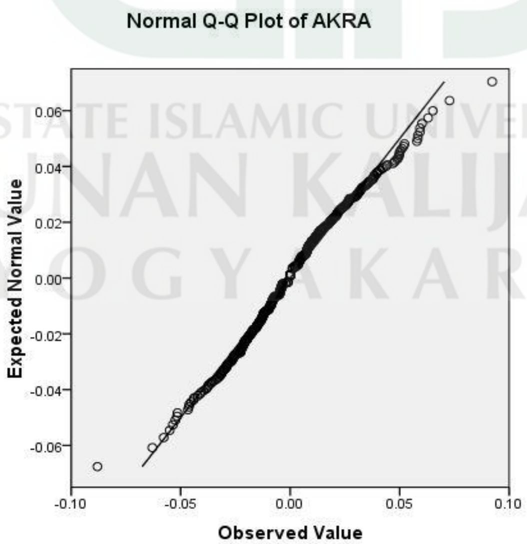
Lampiran 3

q-q Plot Setiap Saham

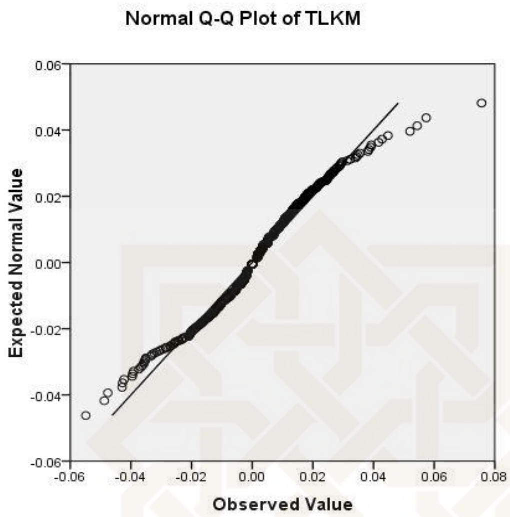
ADRO



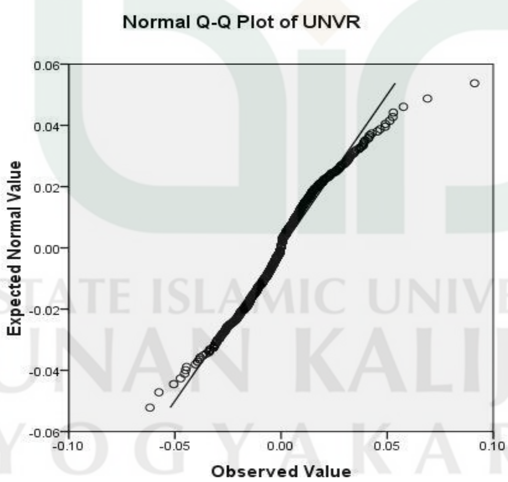
AKRA



TLKM


Normal Q-Q Plot of TLKM
Expected Normal Value
Observed Value
0.06
0.04
0.02
0.00
-0.02
-0.04
-0.06
-0.06
-0.04
-0.02
0.00
0.02
0.04
0.06
0.08

UNVR


Normal Q-Q Plot of UNVR
Expected Normal Value
Observed Value
0.06
0.04
0.02
0.00
-0.02
-0.04
-0.06
-0.10
-0.05
0.00
0.05
0.10

Lampiran 4

Uji Normalitas

1. PT. Adro Energi Tbk (ADRO)

One-Sample Kolmogorov-Smirnov Test

		ADRO
N		671
Normal Parameters[a]	Mean	.0011717
	Std. Deviation	.03063894
Most Extreme Differences	Absolute	.067
	Positive	.067
	Negative	-.046
Kolmogorov-Smirnov Z		1.748
Asymp. Sig. (2-tailed)		.004

a. Test distribution is Normal.

2. PT. AKR Corporindo Tbk (AKRA)

One-Sample Kolmogorov-Smirnov Test

		AKRA
N		543
Normal Parameters[a]	Mean	.0013989
	Std. Deviation	.02263247
Most Extreme Differences	Absolute	.059
	Positive	.059
	Negative	-.037
Kolmogorov-Smirnov Z		1.368
Asymp. Sig. (2-tailed)		.047

a. Test distribution is Normal.

3. PT. Telekomunikasi Indonesia Tbk (TLKM)

One-Sample Kolmogorov-Smirnov Test

		TLKM
N		669
Normal Parameters[a]	Mean	.0009574
	Std. Deviation	.01517048
Most Extreme Differences	Absolute	.072
	Positive	.051
	Negative	-.072
Kolmogorov-Smirnov Z		1.856
Asymp. Sig. (2-tailed)		.002

a. Test distribution is Normal.

4. Unilever Indonesia (UNVR)

One-Sample Kolmogorov-Smirnov Test

		UNVR
N		670
Normal Parameters[a]	Mean	.0007785
	Std. Deviation	.01702933
Most Extreme Differences	Absolute	.069
	Positive	.069
	Negative	-.054
Kolmogorov-Smirnov Z		1.793
Asymp. Sig. (2-tailed)		.003

a. Test distribution is Normal.

Lampiran 5

Program, Initial, Data Pemilihan Model Terbaik Menggunakan WinBugs 1.4

1. Program, Initial, Data Pemilihan Model Terbaik *Return* ADRO Menggunakan WinBugs 1.4

PROGRAM

```
Model {
   for (i in 1 : N) {
y [i] <-lambda*log(y1[i]+0.27) + (1-lambda)*log(y2[i]+0.27)
         }
         for(i in 1 : N) {
         y1 [ i ] ~ dnorm (mu1 [i], to1[i])
         }
         for(i in 1 : N) {
         y2 [ i ] ~ dnorm (mu2 [i], to2[i])
         }
         for(i in 1 : N) {
         mu1 [i] <- lambda1 [T1[i]]
         }
         for(i in 1 : N) {
         to1[i] <- tau1 [T1 [i]]
         }
         for(i in 1 : N) {
         T1 [i] ~ dcat (P1 [1:2])
         }
         for(i in 1 : N) {
         mu2 [i] <- lambda2 [T2[i]]
         }
         for(i in 1 : N) {
         to2 [i] <-tau2 [T2 [i]]
         }
         for(i in 1 : N) {
         T2 [i]~dcat(P2 [1:3])
         }
         P1[1:2]~ ddirch (alpha1[]);
         P2[1:3]~ ddirch (alpha2[]);
         lambda1[2] <- lambda1 [1] + theta1;
         lambda1[1] ~ dnorm (0.0,1.0E-6);
         theta1 ~ dnorm(0.0,1.0E-6) ;
         tau1 [1] ~ dgamma (0.1,0.1);
         tau1[2] ~ dgamma (0.01,0.01);
         sigma1 [1] <- 1/tau1 [1];
```

```
sigma1[2] <- 1/tau1 [2];
lambda2[3] <- lambda2 [1] + theta2 [2];
lambda2[2] <- lambda2 [1] + theta2 [1];
lambda2[1] ~ dnorm (0.0,1.0E-6) ;
theta2 [1] ~ dnorm (0.0,1.0E-6) ;
theta2 [2] ~ dnorm (0.0,1.0E-6) ;
tau2[1] ~ dgamma (0.01, 0.01);
tau2[2] ~ dgamma (0.01, 0.01);
tau2[3] ~ dgamma (0.01, 0.01);
sigma2[1] <- 1/tau2 [1];
sigma2[2] <- 1/tau2 [2];
sigma2[3] <- 1/tau2 [3];
lambda ~ dbeta(2,3);
}
```

INITIAL

```
list(lambda1= c(0.5, NA),
theta1= 2,
lambda2=c( 0.5, NA, NA),
theta2=c(2, 2),
lambda= 0.5)
```

DATA

list(N = 671, alpha1 = c(1, 1), alpha2 = c(1, 1, 1), y1 = c(0.00580361, 0.00873001, 0.00199663, 0.00158186, 0.00807998, 0.00000000, -0.00548577, 0.00429987, -0.02814223, -0.00413631, 0.00000000, -0.00856613, -0.01551229, -0.01088538, -0.00170665, 0.00164806, 0.00570204, 0.00630941, -0.00636320, 0.00951038, -0.00363414, 0.00182108, -0.00515998, 0.00398456, -0.00630944, -0.00196964, 0.00000000, 0.00202473, 0.00189243, 0.00327781, 0.00394798, -0.00567713, -0.00827212, 0.01794857, 0.01285536, -0.00895477, 0.00000000, -0.00971621, 0.01544317, -0.01947851, 0.00490749, -0.00198753, -0.00796901, 0.00830415, 0.00616043, -0.01880362, -0.01366412, -0.01494870, 0.00567718, -0.00640243, -0.01537459, -0.01010055, 0.00681248, 0.00000000, 0.00000000, -0.00379314, 0.00000000, 0.00341960, -0.01524008, 0.01654657, 0.01389847, -0.00462019, -0.00577790, -0.00796901, 0.00697663, -0.03119355, -0.00205341, -0.01104216, -0.00817917, 0.00515991, -0.00557990, 0.00000000, 0.01113636, -0.00585581, 0.01123920, 0.02383250, 0.00206320, -0.01329588, 0.00000000, 0.00344674, 0.00835230, -0.00398464, 0.00000000, 0.00601825, 0.00669874, 0.00000000, 0.00000000, 0.01921976, -0.00849925, -0.00434287, 0.00216606, 0.00000000, 0.00205326, 0.02855539, 0.01139957, -0.00980371, -0.01007699, -0.01759805, 0.00000000, -0.00344674, 0.00394798, 0.01360310, 0.01354249, 0.00000000, -0.00171319, 0.00599041, 0.00515991, -0.00873847, -0.03310536, 0.01677018, -0.00909533, 0.00000000, 0.00371207, 0.00336660, 0.00673338, 0.00000000, 0.00415579, 0.00195167, -0.00607420, -0.00627904, -0.01336395, 0.00670730, -0.00998410, -0.00860024, -0.02882624, 0.00637104, -0.01458206, -0.00204381, 0.02330103, 0.00000000, -0.00204381, -0.00327780, 0.01558188, 0.00198755, 0.00462012, 0.01579425, 0.01093990, 0.00429987, -0.00646590, -0.00877392, 0.00877385, -0.00217692, -0.00438674, 0.00656359, -0.00217692, -0.00218783, 0.00436480, -0.00217692, 0.00000000, -0.00659684, 0.00659695, -0.00659684, 0.00221014, 0.00656359, -0.00436481, 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0.00000000, 0.00632182, 0.00000000, 0.00250300, 0.00742386, 0.00729917, 0.00479884, 0.00000000, -0.01703355),
y2 =c(0.00580361, 0.00873001, 0.00199663, 0.00158186, 0.00807998, 0.00000000, -0.00548577, 0.00429987, -0.02814223, -0.00413631, 0.00000000, -0.00856613, -0.01551229, -0.01088538, -0.00170665, 0.00164806, 0.00570204, 0.00630941, -0.00636320, 0.00951038, -0.00363414, 0.00182108, -0.00515998, 0.00398456, -0.00630944, -0.00196964, 0.00000000, 0.00202473, 0.00189243, 0.00327781, 0.00394798, -0.00567713, -0.00827212, 0.01794857, 0.01285536, -0.00895477, 0.00000000, -0.00971621, 0.01544317, -0.01947851, 0.00490749, -0.00198753, -0.00796901, 0.00830415, 0.00616043, -0.01880362, -0.01366412, -0.01494870, 0.00567718, -0.00640243, -0.01537459, -0.01010055, 0.00681248, 0.00000000, 0.00000000, -0.00379314, 0.00000000, 0.00341960, -0.01524008, 0.01654657, 0.01389847, -0.00462019, -0.00577790, -0.00796901, 0.00697663, -0.03119355, -0.00205341, -0.01104216, -0.00817917, 0.00515991, -0.00557990, 0.00000000, 0.01113636, -0.00585581, 0.01123920, 0.02383250, 0.00206320, -0.01329588, 0.00000000, 0.00344674, 0.00835230, -0.00398464, 0.00000000, 0.00601825, 0.00669874, 0.00000000, 0.00000000, 0.01921976, -0.00849925, -0.00434287, 0.00216606, 0.00000000, 0.00205326, 0.02855539, 0.01139957, -0.00980371, -0.01007699, -0.01759805, 0.00000000, -0.00344674, 0.00394798, 0.01360310, 0.01354249, 0.00000000, -0.00171319, 0.00599041, 0.00515991, -0.00873847, -0.03310536, 0.01677018, -0.00909533, 0.00000000, 0.00371207, 0.00336660, 0.00673338, 0.00000000, 0.00415579, 0.00195167, -0.00607420, -0.00627904, -0.01336395, 0.00670730, -0.00998410, -0.00860024, -0.02882624, 0.00637104, -0.01458206, -0.00204381, 0.02330103, 0.00000000, -0.00204381, -0.00327780, 0.01558188, 0.00198755, -0.00659684, -0.00659684, 0.01579425, 0.00904829, 0.00000000, 0.00000000, 0.00454749, -0.00659684, -0.00217692, -0.00454777, 0.00000000, 0.00457156, 0.00229179, 0.01128110, -0.00877392, -0.01343292, -0.00683942, 0.00219890, -0.00223279, -0.00218783, 0.00659695, -0.00217692, 0.00895470, -0.01302997, -0.00904833, 0.00000000, 0.00221014, -0.00225593, 0.00454749, 0.00873001, -0.00225593, 0.00669874, -0.00213415, 0.01093990, -0.00219918, -0.01133984, -0.00436481, 0.00000000, 0.02632894, -0.00222144, 0.00462012, -0.00909533, 0.00223304, -0.00447712, 0.00445422, 0.00225594, 0.00683942, -0.00900132, -0.00873005, 0.00226803, -0.00438674, -0.00669871 ,-0.00646590, -0.00217692, -0.00669871, 0.00429987, 0.00000000, -0.00454777, 0.00000000, 0.00436480, 0.00436480, 0.00656359, 0.00656359, 0.00676845, 0.00877385, -0.00217692, 0.00676845, -0.00445431, -0.02298373, 0.00469531, -0.01665973, -0.00981482, -0.00586065, 0.01266263, 0.00248875, -0.01004187, 0.00253236, 0.02215030, 0.00477263, 0.00706167, -0.01183449, -0.01216577, 0.00734017, -0.00243321, -0.00490735, 0.00246068, -0.00493503, 0.01223428, -0.00241967, 0.00241965, -0.01974386, 0.00998430, 0.02165891, -0.01675180, 0.00243304, -0.01480713, -0.01532960, -0.00260837, 0.00520111, -0.00520130, -0.03541654, 0.00843323, 0.01370116, -0.01649414, 0.01918320, -0.01085777, -0.00275738, 0.00275725, -0.00553239, 0.00277494, -0.01405600, 0.00000000, -0.00286666, 0.00286685, 0.00000000, -0.01158197, -0.02413365, -0.02885687, -0.01690078, 0.00343339, -0.01038201, -0.02523600, 0.00736109, -0.01484892, 0.01484929, -0.02632916, -0.00389523, 0.03385823, -0.00729939, -

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T1 = c(1, 2, 2 ,2, 2),
T2 = c(1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,

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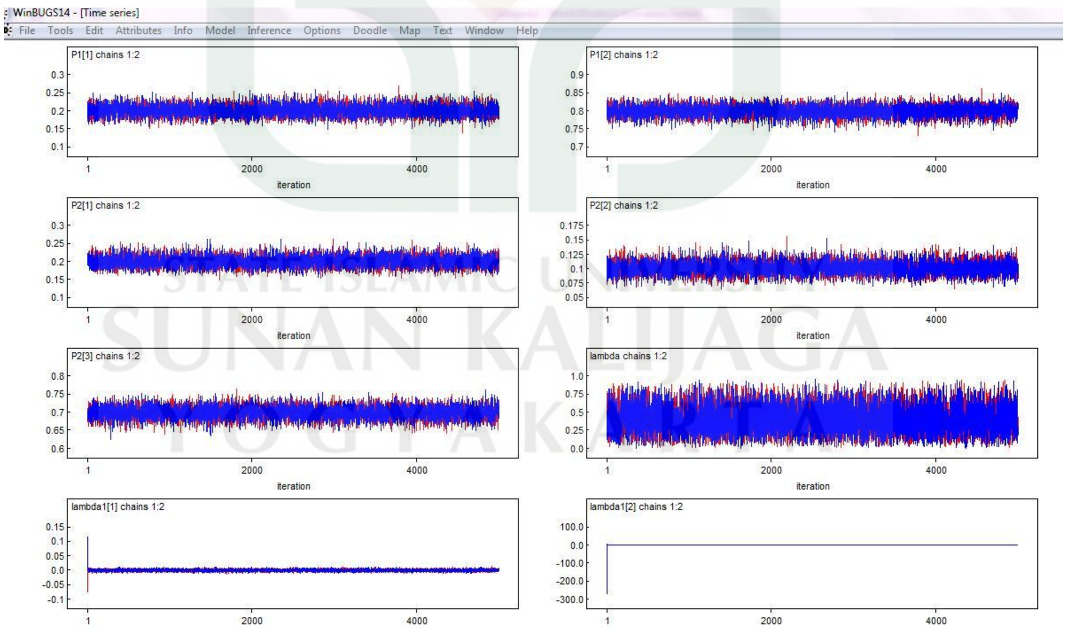
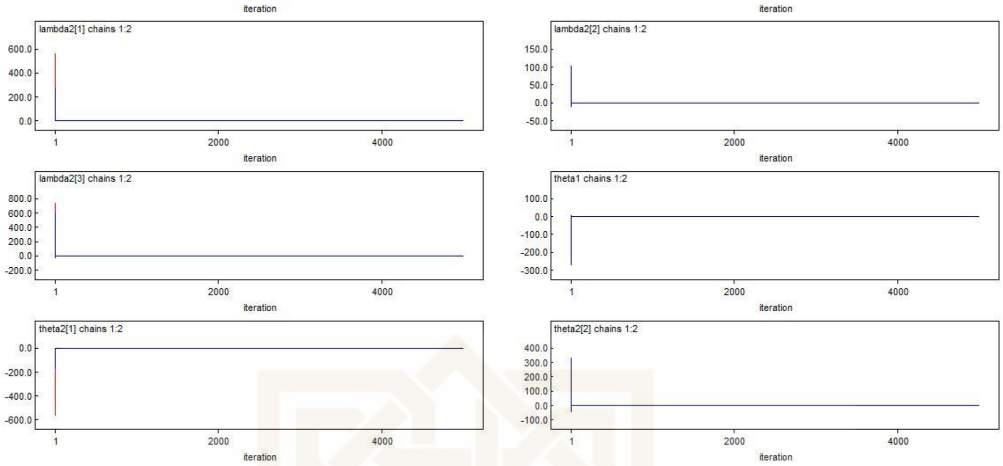
3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3))

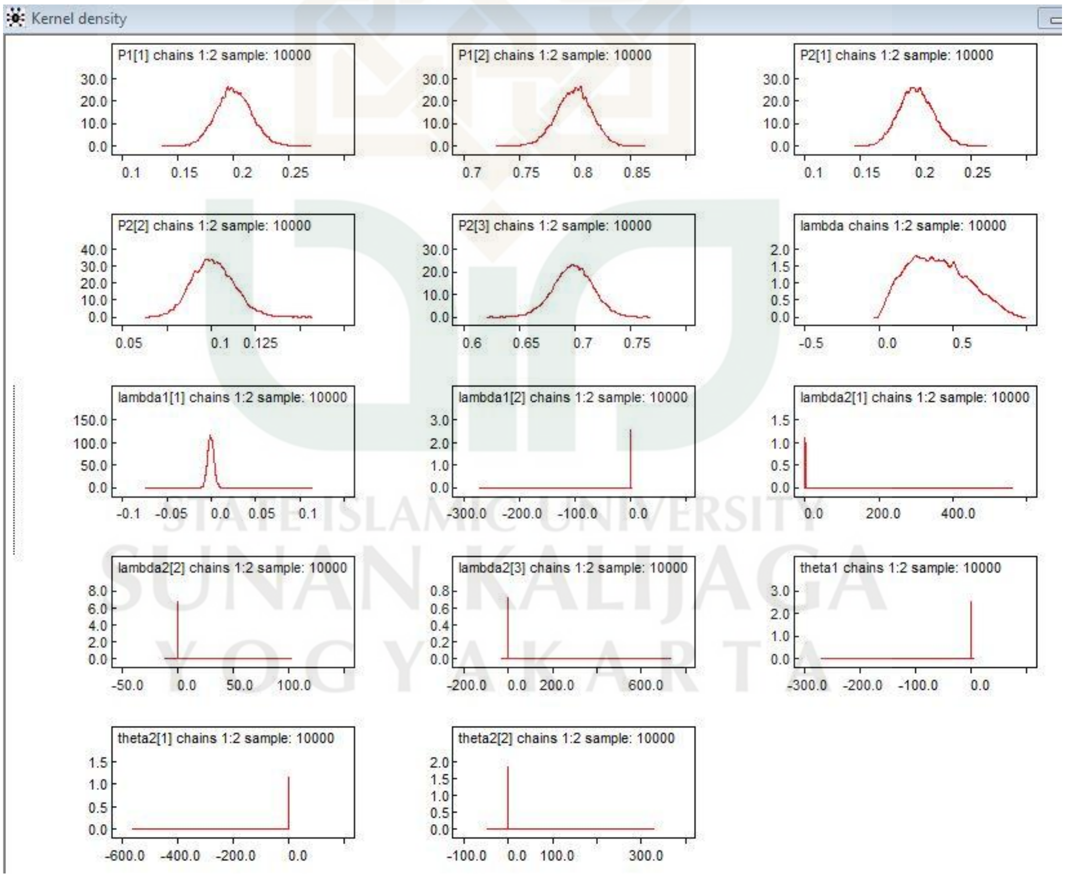
OUTPUT

Plot Time Series





Kernel Density



Statistik

Node statistics

node	mean	sd	MC error	2.5%	median	97.5%	start	sample
P1[1]	0.2006	0.01572	1.559E-4	0.1706	0.2001	0.2323	1	10000
P1[2]	0.7994	0.01572	1.559E-4	0.7677	0.7999	0.8295	1	10000
P2[1]	0.2002	0.01535	1.569E-4	0.1713	0.1998	0.2312	1	10000
P2[2]	0.1011	0.01166	1.177E-4	0.07971	0.1006	0.1251	1	10000
P2[3]	0.6987	0.0175	1.821E-4	0.6637	0.6988	0.7326	1	10000
lambda	0.3991	0.2013	0.002051	0.06722	0.3845	0.8081	1	10000
lambda1[1]	-6.868E-4	0.003721	3.723E-5	-0.007485	-7.159E-4	0.006122	1	10000
lambda1[2]	-0.02634	2.709	0.02677	-9.815E-4	2.416E-4	0.001432	1	10000
lambda2[1]	0.08686	6.254	0.06576	-0.003457	-6.615E-4	0.002043	1	10000
lambda2[2]	0.009587	1.033	0.009323	-0.004399	3.625E-4	0.004853	1	10000
lambda2[3]	0.1318	9.506	0.0942	-0.001156	2.235E-4	0.00158	1	10000
theta1	-0.02566	2.711	0.02678	-0.006012	9.638E-4	0.007774	1	10000
theta2[1]	-0.07727	5.888	0.0623	-0.004445	0.001056	0.006281	1	10000
theta2[2]	0.04497	3.765	0.03251	-0.002151	9.263E-4	0.003977	1	10000

2. Program, Initial, Data Pemilihan Model Terbaik *Return* AKRA Menggunakan WinBugs 1.4

PROGRAM

```
Model {
   for (i in 1 : N) {
y [i] <-lambda*log(y1[i]+0.25) + (1-lambda)*log(y2[i]+0.25)
         }
         for(i in 1 : N) {
         y1 [ i ] ~ dnorm (mu1 [i], to1[i])
         }
         for(i in 1 : N) {
         y2 [ i ] ~ dnorm (mu2 [i], to2[i])
         }
         for(i in 1 : N) {
         mu1 [i] <- lambda1 [T1[i]]
         }
         for(i in 1 : N) {
         to1[i] <- tau1 [T1 [i]]
         }
         for(i in 1 : N) {
         T1 [i] ~ dcat (P1 [1:2])
         }
         for(i in 1 : N) {
         mu2 [i] <- lambda2 [T2[i]]
```

```
}
for(i in 1 : N) {
to2 [i] <-tau2 [T2 [i]]
}
for(i in 1 : N) {
T2 [i]~dcat(P2 [1:3])
}
P1[1:2]~ ddirch (alpha1[]);
P2[1:3]~ ddirch (alpha2[]);
lambda1[2] <- lambda1 [1] + theta1;
lambda1[1] ~ dnorm (0.0,1.0E-6);
theta1 ~ dnorm(0.0,1.0E-6) ;
tau1 [1] ~ dgamma (0.1,0.1);
tau1[2] ~ dgamma (0.01,0.01);
sigma1 [1] <- 1/tau1 [1];
sigma1[2] <- 1/tau1 [2];
lambda2[3] <- lambda2 [1] + theta2 [2];
lambda2[2] <- lambda2 [1] + theta2 [1];
lambda2[1] ~ dnorm (0.0,1.0E-6) ;
theta2 [1] ~ dnorm (0.0,1.0E-6) ;
theta2 [2] ~ dnorm (0.0,1.0E-6) ;
tau2[1] ~ dgamma (0.01, 0.01);
tau2[2] ~ dgamma (0.01, 0.01);
tau2[3] ~ dgamma (0.01, 0.01);
sigma2[1] <- 1/tau2 [1];
sigma2[2] <- 1/tau2 [2];
sigma2[3] <- 1/tau2 [3];
lambda ~ dbeta(2,3);
}
```

INITIAL

```
list(lambda1= c(0.5, NA),
theta1= 2,
lambda2=c( 0.5, NA, NA),
theta2=c(2, 2),
lambda= 0.5)
```

DATA

list(N = 543, alpha1 = c(1, 1), alpha2 = c(1, 1, 1), y1 = c(-0.00570586, 0.00187600, 0.00672641, 0.00317836, -0.00980180, -0.01247289, 0.00419163, 0.00000000, 0.00903761, -0.00420511, -0.00868614, -0.00868167, -0.02391214, 0.00220115, 0.00324971, 0.01604666, 0.00525265, 0.01128106, -0.00716382, 0.00281097, 0.00411656, -0.00528020, -0.01500957, 0.00583609, -0.00992202, -0.00179831, 0.00824484, 0.01007690, 0.00354531, -0.00265622, -0.00215527, 0.00204375, -0.00207296, 0.00413614, 0.02118926, 0.00337599, -0.00089083, 0.01160567, 0.00913377, -0.00357441, 0.00000000, -0.01271628, 0.00294769, 0.00132609, 0.02020337, -0.00573332, 0.00363430, 0.00096194, 0.00326712, 0.01377420, -0.00047177, -0.00927702, 0.00000000, 0.00710038, -0.00208296, 0.00520120, -0.00047181, 0.00000000, 0.01280678, 0.01116497, -0.00413614, -0.00232369, 0.01145964, 0.01031620, -0.00363050, 0.00422337, -0.00990834, -0.00411658, -0.00851582, -0.00422335, 0.00790918, -0.00174062, -0.00616031, 0.00409712, 0.00267801, 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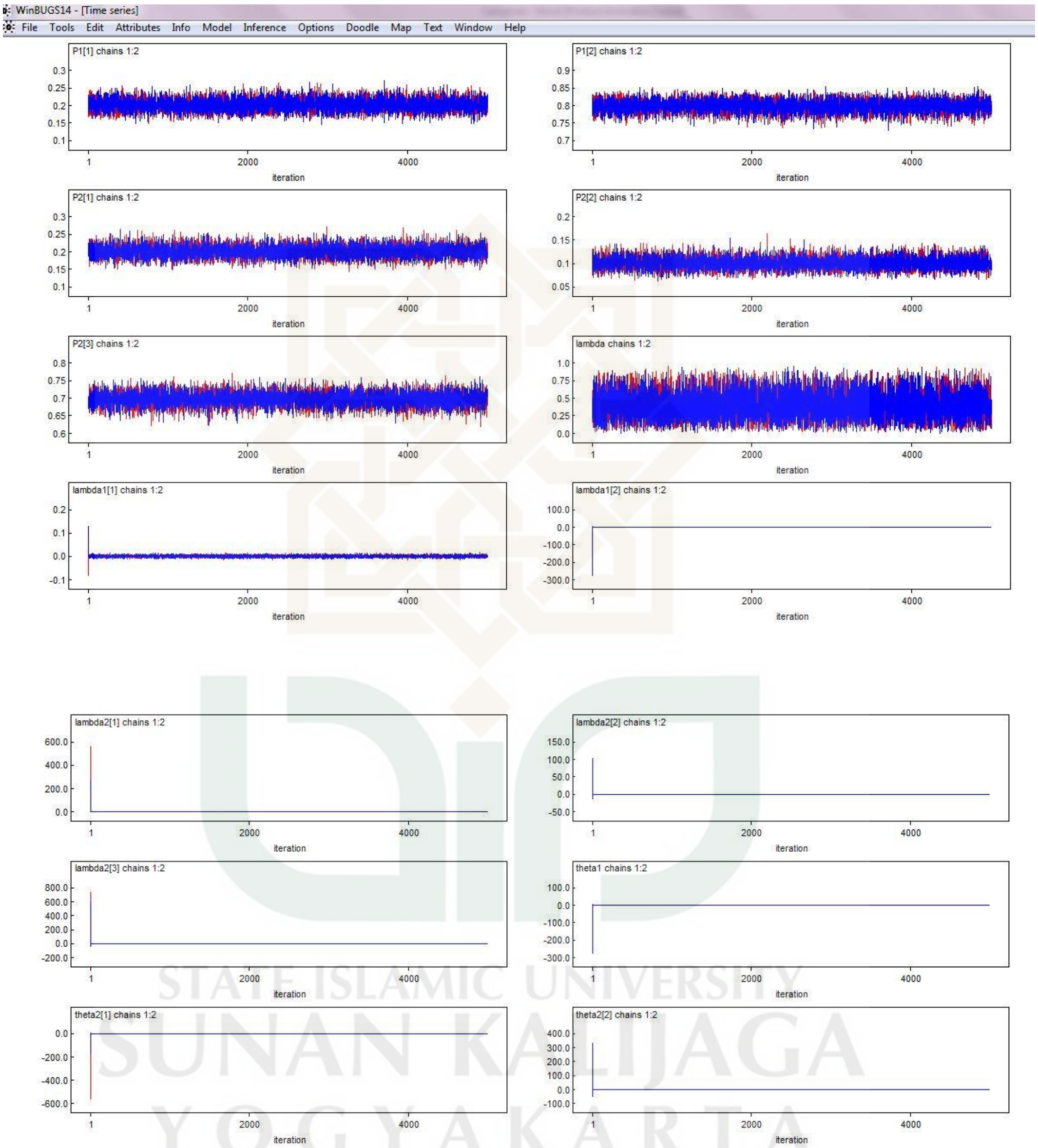
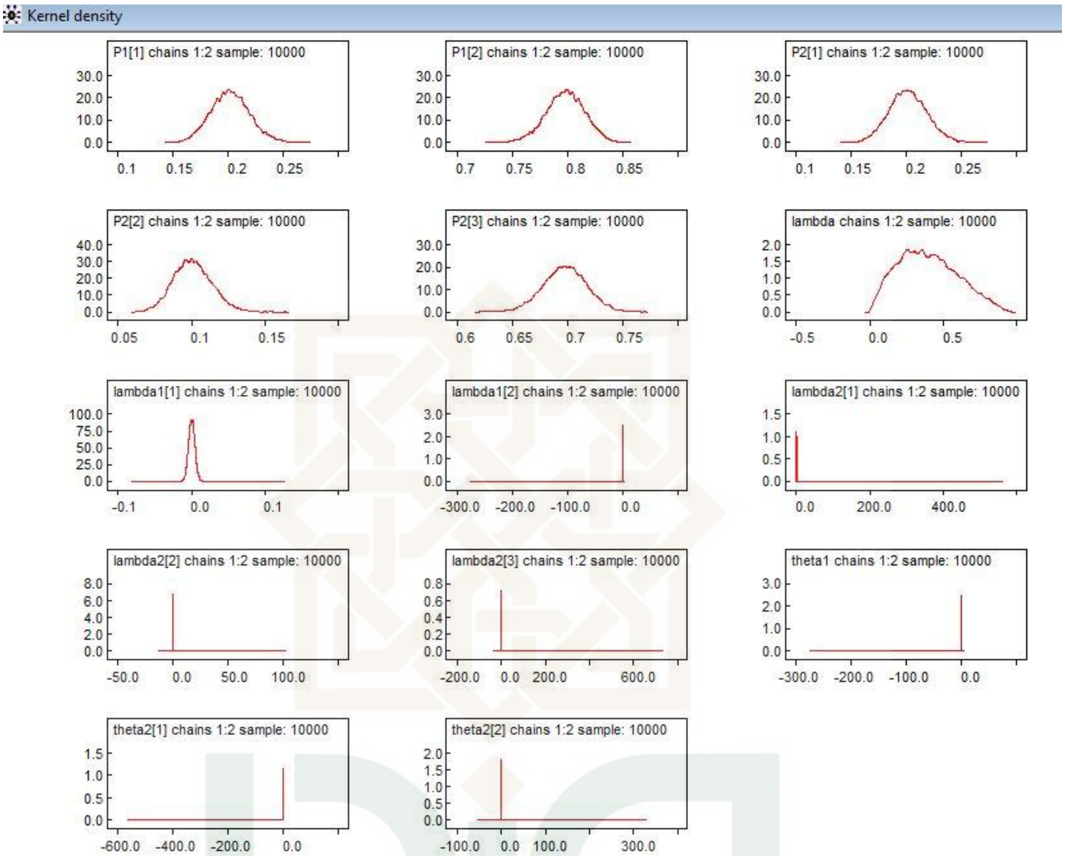
3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3))

OUTPUT

Plot Time series



Kernel Density



Statistik

Node statistics

node	mean	sd	MC error	2.5%	median	97.5%	start	sample
P1[1]	0.2018	0.01741	1.692E-4	0.1686	0.2015	0.2375	1	10000
P1[2]	0.7982	0.01741	1.692E-4	0.7625	0.7985	0.8314	1	10000
P2[1]	0.2013	0.01707	1.737E-4	0.169	0.2009	0.236	1	10000
P2[2]	0.1009	0.01291	1.411E-4	0.07692	0.1004	0.1276	1	10000
P2[3]	0.6978	0.01964	2.007E-4	0.6588	0.698	0.7363	1	10000
lambda	0.3983	0.2001	0.002055	0.06963	0.3817	0.8099	1	10000
lambda1[1]	2.767E-4	0.004493	4.336E-5	-0.007911	2.818E-4	0.008659	1	10000
lambda1[2]	-0.02668	2.76	0.02721	-7.997E-4	3.448E-4	0.001474	1	10000
lambda2[1]	0.08829	6.26	0.06611	-0.002751	2.907E-4	0.003306	1	10000
lambda2[2]	0.009725	1.034	0.009208	-0.005215	6.178E-4	0.006227	1	10000
lambda2[3]	0.132	9.528	0.09431	-9.617E-4	2.946E-4	0.001581	1	10000
theta1	-0.02695	2.761	0.02722	-0.008376	8.599E-5	0.008342	1	10000
theta2[1]	-0.07856	5.895	0.06269	-0.006279	3.234E-4	0.006804	1	10000
theta2[2]	0.04367	3.782	0.03212	-0.003306	5.511E-5	0.003256	1	10000

3. Program, Initial, Data Pemilihan Model Terbaik *Return* TLKM Menggunakan WinBugs 1.4

PROGRAM

```
Model {
   for (i in 1 : N) {
y [i] <-lambda*log(y1[i]+0.24) + (1-lambda)*log(y2[i]+0.24)
         }
         for(i in 1 : N) {
         y1 [ i ] ~ dnorm (mu1 [i], to1[i])
         }
         for(i in 1 : N) {
         y2 [ i ] ~ dnorm (mu2 [i], to2[i])
         }
         for(i in 1 : N) {
         mu1 [i] <- lambda1 [T1[i]]
         }
         for(i in 1 : N) {
         to1[i] <- tau1 [T1 [i]]
         }
         for(i in 1 : N) {
         T1 [i] ~ dcat (P1 [1:2])
         }
         for(i in 1 : N) {
         mu2 [i] <- lambda2 [T2[i]]
         }
         for(i in 1 : N) {
         to2 [i] <-tau2 [T2 [i]]
         }
         for(i in 1 : N) {
         T2 [i]~dcat(P2 [1:3])
         }
         P1[1:2]~ ddirch (alpha1[]);
         P2[1:3]~ ddirch (alpha2[]);
         lambda1[2] <- lambda1 [1] + theta1;
         lambda1[1] ~ dnorm (0.0,1.0E-6);
         theta1 ~ dnorm(0.0,1.0E-6) ;
         tau1 [1] ~ dgamma (0.1,0.1);
         tau1[2] ~ dgamma (0.01,0.01);
         sigma1 [1] <- 1/tau1 [1];
         sigma1[2] <- 1/tau1 [2];
         lambda2[3] <- lambda2 [1] + theta2 [2];
         lambda2[2] <- lambda2 [1] + theta2 [1];
         lambda2[1] ~ dnorm (0.0,1.0E-6) ;
```

```
theta2 [1] ~ dnorm (0.0,1.0E-6) ;
theta2 [2] ~ dnorm (0.0,1.0E-6) ;
tau2[1] ~ dgamma (0.01, 0.01);
tau2[2] ~ dgamma (0.01, 0.01);
tau2[3] ~ dgamma (0.01, 0.01);
sigma2[1] <- 1/tau2 [1];
sigma2[2] <- 1/tau2 [2];
sigma2[3] <- 1/tau2 [3];
lambda ~ dbeta(2,3);
}
```

INITIAL

```
list(lambda1= c(0.5, NA),
theta1= 2,
lambda2=c( 0.5, NA, NA),
theta2=c(2, 2),
lambda= 0.5)
```

DATA

list(N = 669, alpha1 = c(1, 1), alpha2 = c(1, 1, 1), y1 = c(-0.0027808, 0.0150943, 0.0074350, 0.0165442, 0.0055970, 0.0180832, 0.0185185, 0.0194691, 0.0097029, -0.0017762, 0.0070797, 0.0037880, 0.0000000, 0.0037176, 0.0053004, -0.0106572, 0.0131827, 0.0035088, -0.0143627, 0.0072595, 0.0055351, 0.0074488, -0.0109488, -0.0099998, 0.0069931, -0.0069204, -0.0050553, 0.0052264, -0.0123239, 0.0143113, 0.0114942, 0.0018316, -0.0052910, -0.0017543, -0.0017453, 0.0202019, 0.0035523, -0.0026481, 0.0080644, -0.0072860, 0.0087719, 0.0108694, -0.0107721, 0.0142603, 0.0017574, -0.0166976, 0.0052633, -0.0141592, 0.0053380, 0.0053571, 0.0017636, 0.0196779, -0.0087412, -0.0035274, -0.0035461, -0.0086957, -0.0202952, 0.0088183, 0.0018349, 0.0017700, 0.0130353, -0.0175132, 0.0036498, 0.0135922, 0.0036364, -0.0017362, -0.0089287, 0.0172413, -0.0087412, -0.0091742, -0.0054847, 0.0000000, 0.0018280, -0.0057914, 0.0168855, 0.0084616, 0.0017182, 0.0000000, -0.0072466, 0.0000000, -0.0171526, 0.0000000, 0.0088290, -0.0163339, -0.0034722, 0.0055248, 0.0023194, 0.0109090, -0.0017762, -0.0017330, 0.0147061, 0.0057693, -0.0017890, 0.0000000, -0.0150944, 0.0000000, 0.0110907, 0.0017574, 0.0072073, 0.0043479, 0.0088968, -0.0110498, -0.0036696, -0.0054669, 0.0069686, 0.0104166, 0.0057361, -0.0209790, -0.0052817, -0.0018868, -0.0036899, -0.0095603, -0.0053381, -0.0018831, -0.0202204, -0.0066492, 0.0000000, 0.0092592, 0.0017986, -0.0017576, -0.0036232, -0.0198198, -0.0053764, 0.0197134, 0.0107720, 0.0132325, 0.0052723, 0.0092592, 0.0000000, -0.0070547, 0.0018180, 0.0000000, -0.0035651, 0.0075230, 0.0035149, 0.0157618, 0.0051723, -0.0120068, 0.0034722,

-0.0042215, 0.0035461, 0.0053004, 0.0052723, -0.0104894, -0.0088339, 0.0071300, 0.0070797, -0.0105448, 0.0053286, 0.0106006, -0.0052447, 0.0052723, 0.0122378, 0.0093611, -0.0302014, 0.0017300, 0.0000000, -0.0017270, 0.0069203, -0.0017182, 0.0223752, 0.0016835, -0.0134453, 0.0051106, -0.0016948, -0.0118847, 0.0000000, 0.0057732, -0.0134003, 0.0000000, -0.0016979, -0.0051020, 0.0102563, 0.0067682, -0.0067227, -0.0016920, 0.0000000, -0.0101695, 0.0000000, 0.0000000, -0.0136986, -0.0043056, 0.0000000, 0.0195730, 0.0087260, -0.0190312, -0.0035274, 0.0035399, 0.0070547, 0.0017512, -0.0069930, -0.0052817, -0.0106194, 0.0000000, 0.0035778, 0.0017825, -0.0017794, 0.0106952, 0.0000000, -0.0017637, 0.0088339, 0.0175131, -0.0072250, -0.0071175, -0.0022580, -0.0014815, 0.0073614, -0.0054249, 0.0072727, 0.0216607, 0.0106007, -0.0052447, -0.0158173, 0.0125001, 0.0017636, -0.0035211, 0.0000000, 0.0017668, -0.0017637, 0.0141342, -0.0139372, 0.0088339, -0.0035026, 0.0000000, 0.0105448, -0.0173913, 0.0106194, 0.0000000, -0.0087565, 0.0106007, 0.0034965, -0.0069686, -0.0140351, 0.0213523, 0.0017422, 0.0017392, 0.0034722, -0.0190311, 0.0052910, 0.0105263, 0.0086805, 0.0103270, -0.0102214, 0.0086059, -0.0034130, 0.0034247, 0.0000000, 0.0000000, -0.0204778, 0.0104530, -0.0086207, 0.0000000, 0.0052174, -0.0034602, -0.0190972, 0.0141593, -0.0069808, 0.0035149, -0.0105079, 0.0070797, 0.0035149, 0.0052539, 0.0043902, -0.0068027, -0.0154109, 0.0226087, -0.0034013, 0.0085324, 0.0033841, -0.0084317, -0.0076190, 0.0089286, 0.0176991, 0.0000000, 0.0017392, -0.0034723, -0.0087805, -0.0056409, 0.0169172, -0.0055453, 0.0020446, 0.0123675, 0.0017451, -0.0139372, -0.0194347, 0.0090090, 0.0035715, -0.0091459, 0.0111111, 0.0000000, 0.0128205, -0.0018083, 0.0090580, -0.0069300, 0.0036901, -0.0147059, 0.0037314, 0.0148698, -0.0109890, -0.0166666, 0.0000000, -0.0207157, 0.0019231, 0.0153550, -0.0056711, -0.0038022, 0.0381680, 0.0057352, -0.0179210, -0.0109490, -0.0036900, -0.0018519, -0.0204082, 0.0170455, -0.0018622, 0.0149254, -0.0036765, 0.0073801, 0.0036631, 0.0072992, 0.0163043, -0.0035650, 0.0000000, -0.0032558, -0.0183150, 0.0223881, 0.0000000, -0.0036497, -0.0091575, 0.0110905, -0.0018282, -0.0128205, -0.0111317, 0.0187617, 0.0147330, -0.0127042, 0.0049265, 0.0124334, -0.0122807, 0.0155239, -0.0094511, 0.0150000, 0.0104530, 0.0172413, 0.0033900, -0.0101352, 0.0034129, 0.0102041, 0.0218855, -0.0115321, 0.0100000, -0.0049505, 0.0000000, -0.0016583, -0.0199337, -0.0067796, 0.0034129, 0.0140137, 0.0079606, -0.0208001, 0.0163400, 0.0080386, -0.0079745, 0.0032155, -0.0080129, 0.0032311, 0.0112721, 0.0175159, 0.0172144, -0.0123077, -0.0202492, -0.0070272, 0.0077779, 0.0143084, -0.0172413, -0.0159490, 0.0000000, 0.0081038, -0.0064309, 0.0016181, 0.0090792, 0.0062794, 0.0062403, 0.0139535, -0.0030581, 0.0145399, -0.0029940, -0.0085285, 0.0123648, 0.0229007, 0.0047761, -0.0157143, 0.0029629, 0.0132940, -0.0022741, 0.0121766, 0.0030075, 0.0000000, -0.0059969, -0.0061991, -0.0046948, 0.0125786, 0.0031056, 0.0216718, 0.0030303, -0.0181269, 0.0138462, 0.0136570, 0.0069461, -0.0043732, -0.0058565, -0.0014728, -0.0021238, 0.0196077, 0.0177516, 0.0043605, 0.0014471, 0.0028902, -0.0144092, -

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y2 = c(-0.0027808, 0.0150943, 0.0074350, 0.0165442, 0.0055970, 0.0180832, 0.0185185, 0.0194691, 0.0097029, -0.0017762, 0.0070797, 0.0037880, 0.0000000, 0.0037176, 0.0053004, -0.0106572, 0.0131827, 0.0035088, -0.0143627, 0.0072595, 0.0055351, 0.0074488, -0.0109488, -0.0099998, 0.0069931, -0.0069204, -0.0050553, 0.0052264, -0.0123239, 0.0143113, 0.0114942,

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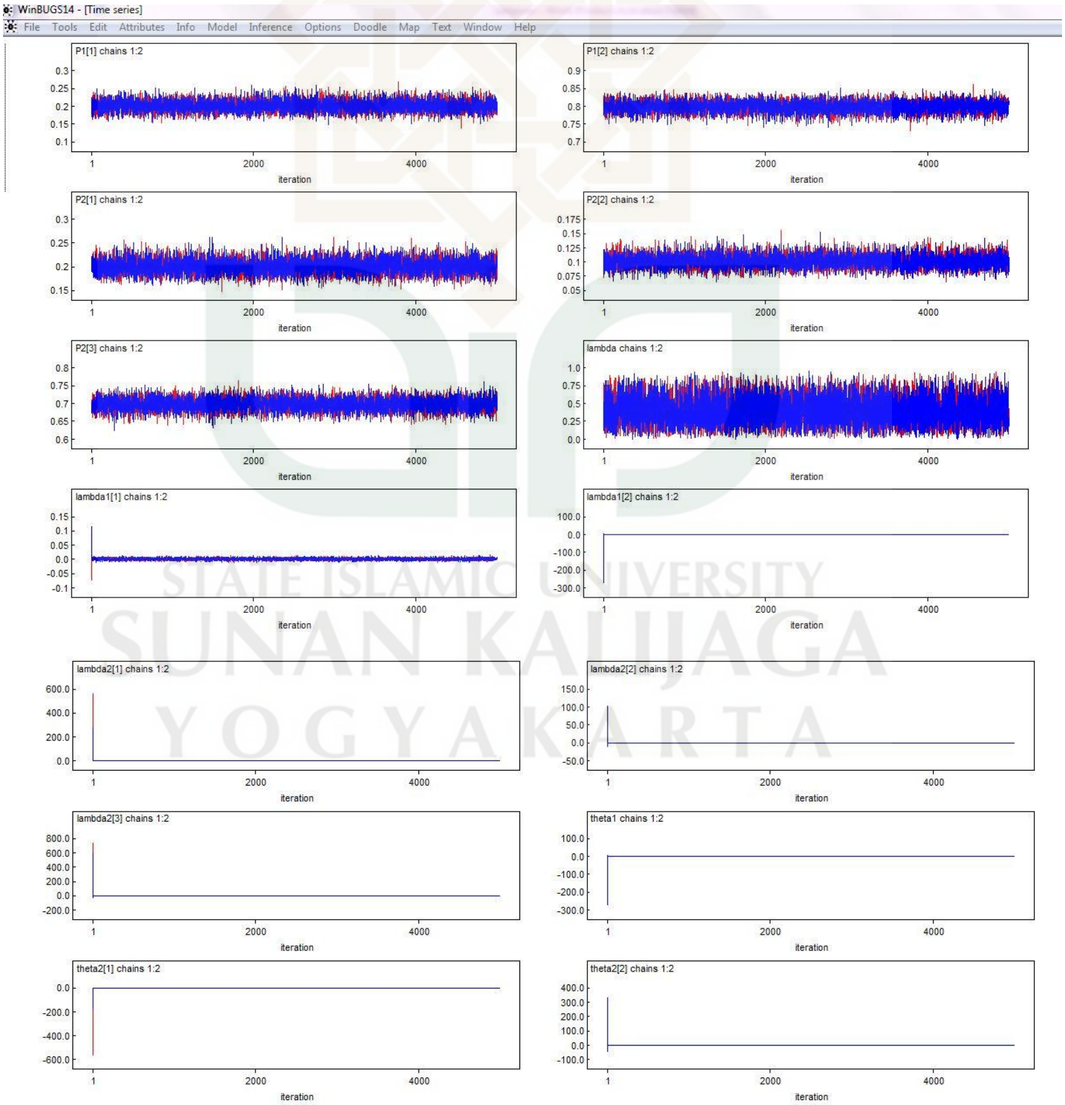
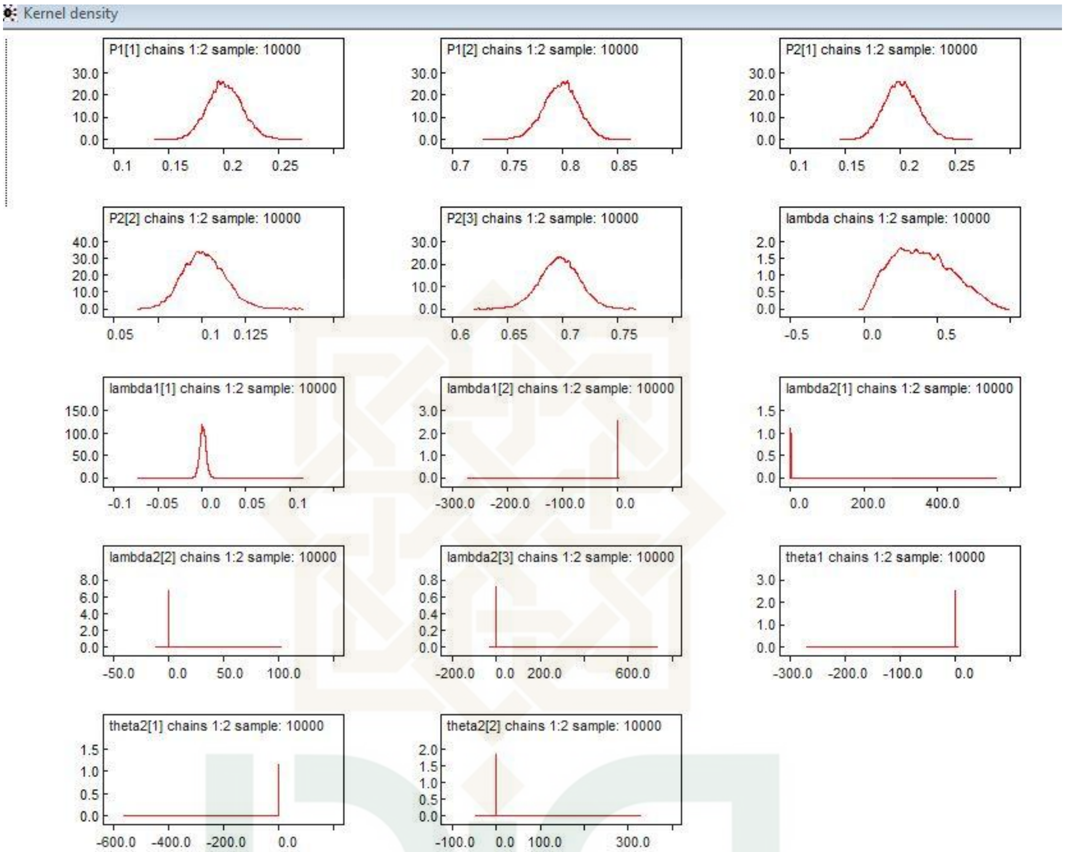
OUTPUT

Plot Time series



Kernel Density



Statistik

Node statistics

node	mean	sd	MC error	2.5%	median	97.5%	start	sample
P1[1]	0.2012	0.01578	1.573E-4	0.1711	0.2007	0.233	1	10000
P1[2]	0.7988	0.01578	1.573E-4	0.767	0.7993	0.829	1	10000
P2[1]	0.2008	0.0154	1.583E-4	0.1718	0.2004	0.2319	1	10000
P2[2]	0.1014	0.01169	1.173E-4	0.07994	0.1009	0.1254	1	10000
P2[3]	0.6978	0.01756	1.831E-4	0.6628	0.6979	0.7318	1	10000
lambda	0.3993	0.2014	0.002048	0.06727	0.3846	0.8083	1	10000
lambda1[1]	0.001138	0.003707	3.696E-5	-0.005619	0.001108	0.007928	1	10000
lambda1[2]	-0.02564	2.71	0.02678	-1.177E-4	9.52E-4	0.001991	1	10000
lambda2[1]	0.08869	6.254	0.06576	-0.001555	0.001155	0.003792	1	10000
lambda2[2]	0.009393	1.033	0.009323	-0.004773	1.664E-4	0.004849	1	10000
lambda2[3]	0.1327	9.507	0.0942	-1.23E-4	0.001064	0.002239	1	10000
theta1	-0.02678	2.712	0.02679	-0.007078	-1.474E-4	0.006603	1	10000
theta2[1]	-0.07929	5.888	0.0623	-0.006605	-9.633E-4	0.004383	1	10000
theta2[2]	0.04399	3.765	0.03251	-0.002964	-5.413E-5	0.002835	1	10000

4. Program, Initial, Data, OUTPUT Pemilihan Model Terbaik *Return* UNVR Menggunakan WinBugs 1.4

PROGRAM

```
Model {
   for (i in 1 : N) {
y [i] <-lambda*log(y1[i]+0.3) + (1-lambda)*log(y2[i]+0.3)
         }
         for(i in 1 : N) {
         y1 [ i ] ~ dnorm (mu1 [i], to1[i])
         }
         for(i in 1 : N) {
         y2 [ i ] ~ dnorm (mu2 [i], to2[i])
         }
         for(i in 1 : N) {
         mu1 [i] <- lambda1 [T1[i]]
         }
         for(i in 1 : N) {
         to1[i] <- tau1 [T1 [i]]
         }
         for(i in 1 : N) {
         T1 [i] ~ dcat (P1 [1:2])
         }
         for(i in 1 : N) {
         mu2 [i] <- lambda2 [T2[i]]
         }
         for(i in 1 : N) {
         to2 [i] <-tau2 [T2 [i]]
         }
         for(i in 1 : N) {
         T2 [i]~dcat(P2 [1:3])
         }
         P1[1:2]~ ddirch (alpha1[]);
         P2[1:3]~ ddirch (alpha2[]);
         lambda1[2] <- lambda1 [1] + theta1;
         lambda1[1] ~ dnorm (0.0,1.0E-6);
         theta1 ~ dnorm(0.0,1.0E-6) ;
         tau1 [1] ~ dgamma (0.1,0.1);
         tau1[2] ~ dgamma (0.01,0.01);
         sigma1 [1] <- 1/tau1 [1];
         sigma1[2] <- 1/tau1 [2];
         lambda2[3] <- lambda2 [1] + theta2 [2];
         lambda2[2] <- lambda2 [1] + theta2 [1];
         lambda2[1] ~ dnorm (0.0,1.0E-6) ;
         theta2 [1] ~ dnorm (0.0,1.0E-6) ;
```

```
theta2 [2] ~ dnorm (0.0,1.0E-6) ;
tau2[1] ~ dgamma (0.01, 0.01);
tau2[2] ~ dgamma (0.01, 0.01);
tau2[3] ~ dgamma (0.01, 0.01);
sigma2[1] <- 1/tau2 [1];
sigma2[2] <- 1/tau2 [2];
sigma2[3] <- 1/tau2 [3];
lambda ~ dbeta(2,3);
}
```

INITIAL

```
list(lambda1= c(0.5, NA),
theta1= 2,
lambda2=c( 0.5, NA, NA),
theta2=c(2, 2),
lambda= 0.5)
```

DATA

list(N = 670, alpha1 = c(1, 1), alpha2 = c(1, 1, 1), y1 = c(0.0054586, 0.0030148, 0.0076255, -0.0091731, 0.0034911, -0.0007155, 0.0020342, 0.0000000, 0.0058158, 0.0013732, 0.0018179, 0.0139209, -0.0019562, 0.0101652, -0.0013864, -0.0020534, -0.0010640, 0.0105502, 0.0083138, 0.0000000, -0.0030668, 0.0141611, 0.0007137, 0.0041460, 0.0054628, 0.0014193, -0.0054801, 0.0086215, 0.0041036, -0.0028019, 0.0000000, -0.0075651, -0.0003530, -0.0043502, -0.0068394, 0.0017719, -0.0013765, -0.0010199, 0.0000000, 0.0084743, -0.0072586, 0.0017379, -0.0078769, 0.0045440, 0.0000000, -0.0044333, 0.0024272, 0.0060099, -0.0056129, 0.0174525, 0.0006910, 0.0086067, 0.0047317, -0.0121756, 0.0137102, -0.0021134, 0.0027487, 0.0134382, -0.0013721, -0.0006899, -0.0038982, -0.0027228, -0.0048915, 0.0030669, 0.0032654, 0.0085158, -0.0106644, -0.0140561, 0.0020517, 0.0003467, 0.0010528, 0.0003530, 0.0024060, 0.0013941, 0.0013875, 0.0009965, 0.0120089, 0.0062241, -0.0027228, 0.0010486, 0.0037542, 0.0061701, 0.0046911, 0.0006899, -0.0080073, 0.0101206, 0.0000000, 0.0014123, -0.0041036, -0.0069267, 0.0037961, -0.0065000, 0.0000000, 0.0024507, -0.0028432, -0.0024195, -0.0058434, 0.0003411, -0.0149599, -0.0024507, -0.0017337, 0.0068828, -0.0113345, -0.0025366, 0.0003445, 0.0003512, -0.0007137, -0.0147932, -0.0017462, 0.0000000, -0.0010710, -0.0032343, -0.0084332, -0.0003479, -0.0003467, 0.0027228, -0.0046308, 0.0024507, 0.0014357, -0.0070162, 0.0003484, 0.0010199, -0.0042509, 0.0003555, -0.0014147, -0.0020864, 0.0040907, -0.0017939, -0.0010444, 0.0003479, 0.0089124, -0.0003394, -0.0006681, 0.0041692, 0.0000000, 0.0000000, -0.0021461, 0.0078416, -

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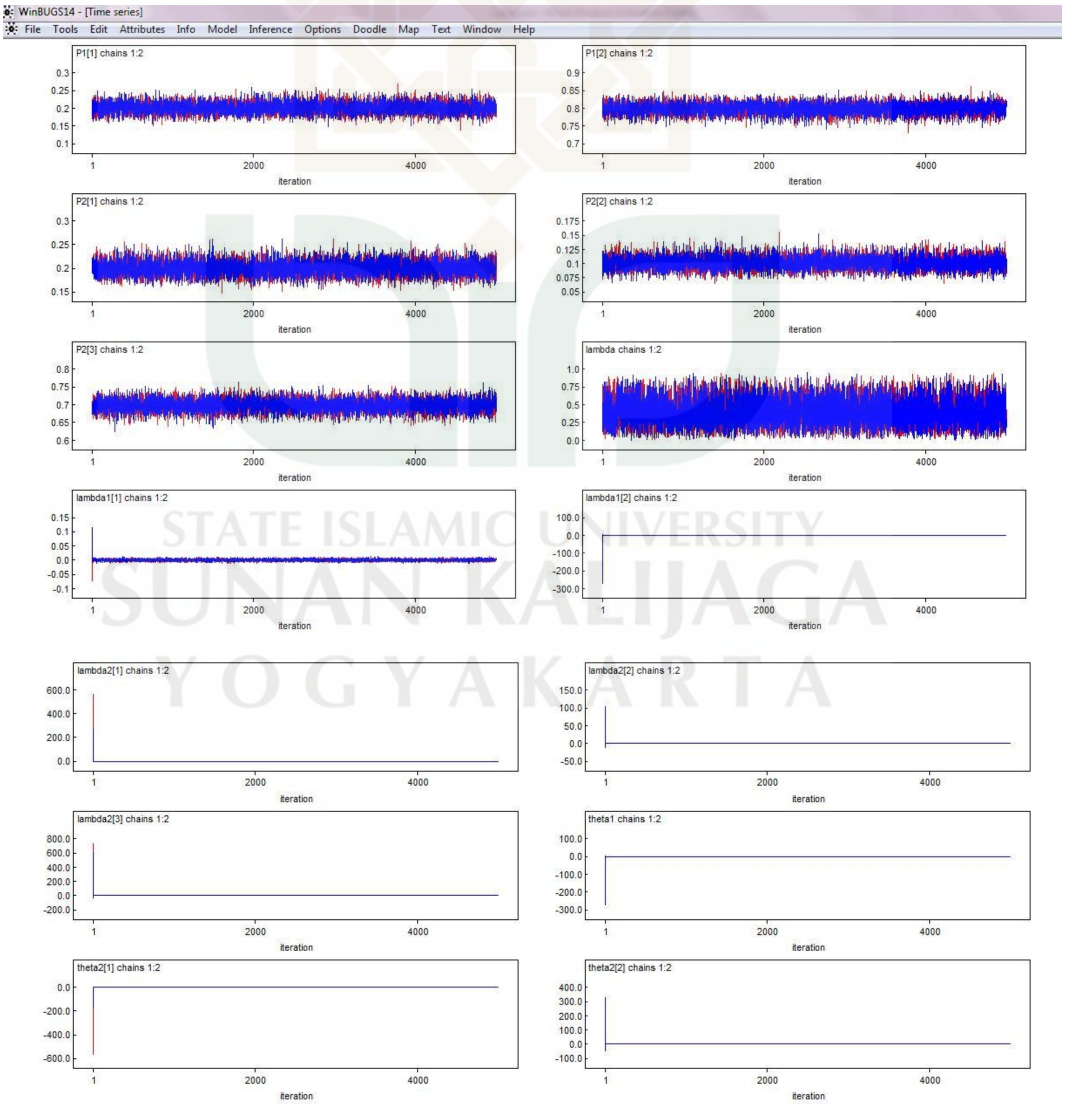
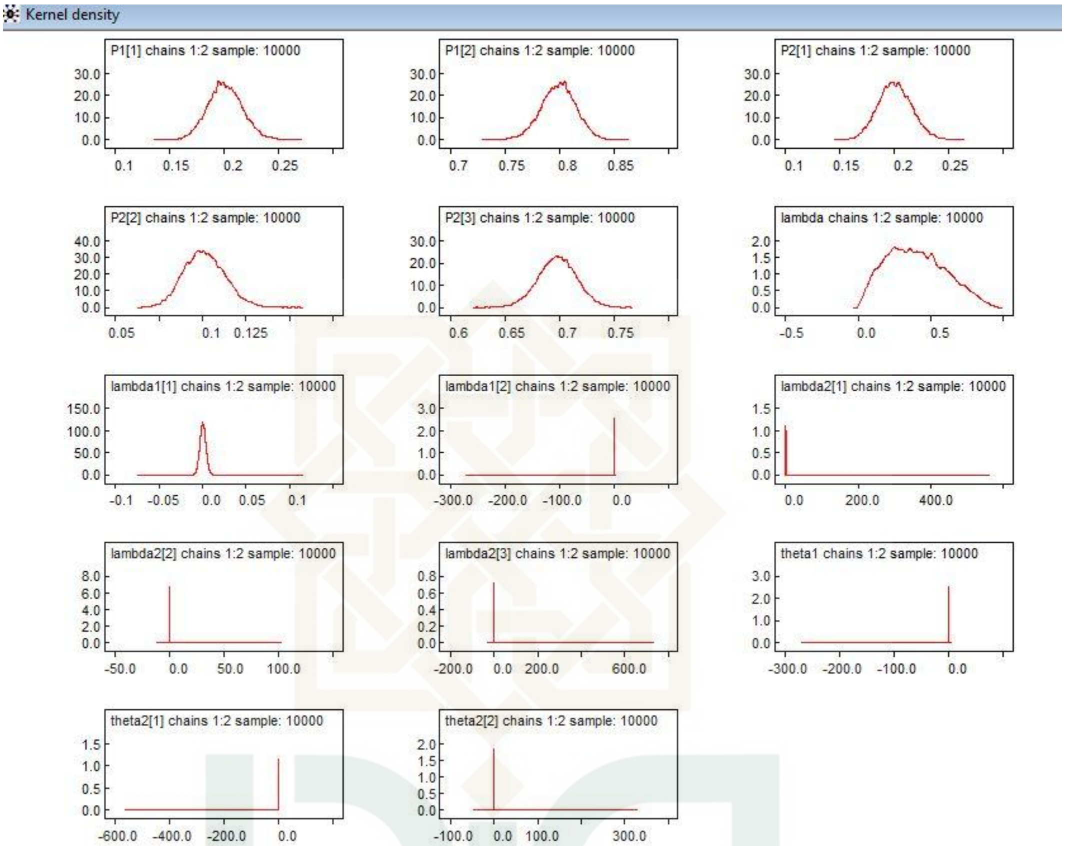
OUTPUT

Plot Time series



Kernel Density



Statistik

Node statistics

node	mean	sd	MC error	2.5%	median	97.5%	start	sample
P1[1]	0.2009	0.01576	1.573E-4	0.1708	0.2004	0.2326	1	10000
P1[2]	0.7991	0.01576	1.573E-4	0.7674	0.7996	0.8292	1	10000
P2[1]	0.2005	0.01538	1.577E-4	0.1716	0.2001	0.2315	1	10000
P2[2]	0.1012	0.01168	1.171E-4	0.07983	0.1008	0.1252	1	10000
P2[3]	0.6982	0.01753	1.822E-4	0.6633	0.6983	0.7322	1	10000
lambda	0.3994	0.2014	0.00205	0.06727	0.3847	0.8083	1	10000
lambda1[1]	4.494E-4	0.00365	3.625E-5	-0.006174	4.205E-4	0.00711	1	10000
lambda1[2]	-0.02646	2.71	0.02677	-6.409E-4	1.324E-4	8.916E-4	1	10000
lambda2[1]	0.08799	6.254	0.06576	-0.001898	4.63E-4	0.002766	1	10000
lambda2[2]	0.01052	1.033	0.009323	-0.003471	0.001291	0.005833	1	10000
lambda2[3]	0.1316	9.506	0.0942	-8.722E-4	-3.115E-5	8.009E-4	1	10000
theta1	-0.0269	2.711	0.02678	-0.007042	-2.783E-4	0.006314	1	10000
theta2[1]	-0.07747	5.888	0.0623	-0.00447	8.544E-4	0.005903	1	10000
theta2[2]	0.04359	3.765	0.03251	-0.002926	-4.612E-4	0.001979	1	10000

Lampiran 6

Bobot Portofolio Menggunakan *Software*

```
clear;
disp('nilai matriks varian kovarian (vcv)')
V=[0.01257 0 0 0; 0 0.00955 0 0; 0 0 0.01068 0; 0 0 0 0.00648]
C=[1 0.055 -0.017 0.051; 0.055 1 0.50 0.081; -0.017 0.050 1 0.073; 0.051 0.081 0.073 1]
VCV=V*C*V
S=inv(VCV)
Si=S/1000
I=[1; 1; 1; 1]
re=[0.000055; 0.00328; 0.00098; 0.000192]
a=I'*Si*I
b=I'*Si*re
c=re'*Si*re
r=input('masukkan nilai R =')
W=Si*((b*re)-(r*a*re)+(r*b*I)-(c*I))/((b^2)-(a*c))
Ret=W'*re
Var=W'*VCV*W
SD=sqrt(Var)
```

Lampiran 7

Tabel Chi-Square

Tabel Chi-Kuadrat								
db	**0.25**	**0.2**	**0.15**	**0.1**	**0.05**	**0.025**	**0.02**	**0.01**
1	1.3233	1.6424	2.0723	2.7055	3.8415	5.0239	5.4119	6.6349
2	2.7726	3.2189	3.7942	4.6052	5.9915	7.3778	7.824	9.2103
3	4.1083	4.6416	5.317	6.2514	7.8147	9.3484	9.8374	11.345
4	5.3853	5.9886	6.7449	7.7794	9.4877	11.143	11.668	13.277
5	6.6257	7.2893	8.1152	9.2364	11.07	12.833	13.388	15.086
6	7.8408	8.5581	9.4461	10.645	12.592	14.449	15.033	16.812
7	9.0371	9.8032	10.748	12.017	14.067	16.013	16.622	18.475
8	10.219	11.03	12.027	13.362	15.507	17.535	18.168	20.09
9	11.389	12.242	13.288	14.648	16.919	19.023	19.679	21.666
10	12.549	13.442	14.543	15.987	18.307	20.482	21.161	23.209
11	13.701	14.631	15.767	17.275	19.675	21.92	22.618	24.725
12	14.845	15.812	16.989	18.549	21.026	23.337	24.054	26.217
13	15.984	16.985	18.202	19.812	22.362	24.736	25.472	27.688
14	17.117	18.151	19.406	21.064	23.685	26.119	26.873	29.141

15	18.245	19.311	20.603	22.307	24.996	27.488	28.259	30.578
16	19.369	20.465	21.793	23.542	26.296	28.845	29.633	32
17	20.489	21.615	22.977	24.769	27.587	30.191	30.995	33.409
18	21.605	22.76	24.155	25.989	28.869	31.526	32.346	34.805
19	22.718	23.9	25.329	27.204	30.144	32.852	33.687	36.191
20	23.828	25.038	26.498	28.412	31.41	34.17	35.02	37.566
21	24.241	29.171	27.662	29.615	32.671	35.479	36.343	38.932
22	26.039	27.301	28.822	30.813	33.924	36.781	37.659	40.289
23	27.141	28.429	29.979	32.007	35.172	38.076	38.968	41.638
24	28.241	29.553	31.132	33.196	36.415	39.364	40.27	42.98
25	29.339	30.675	32.282	34.382	37.652	40.646	41.566	44.314
26	30.435	31.795	33.429	35.563	38.885	41.923	42.856	45.642
27	31.528	32.912	34.547	36.741	40.113	43.195	44.14	46.963
28	32.62	34.027	35.715	37.916	41.337	44.461	45.419	48.278
29	33.711	35.359	36.854	39.087	42.557	45.722	46.693	49.588
30	34.8	36.25	37.99	40.256	43.773	46.979	47.962	50.892
31	35.887	37.359	39.124	41.422	44.985	48.232	49.226	52.191
32	36.973	38.466	40.256	42.585	46.194	49.48	50.487	53.486
33	38.058	39.572	41.386	43.745	47.4	50.725	51.743	54.776
34	39.141	40.676	42.514	44.903	48.602	51.966	52.995	56.061
35	40.223	41.778	43.64	46.059	49.802	53.203	54.224	57.342
36	41.304	42.479	44.764	47.212	50.998	54.437	55.489	58.619
37	42.383	43.978	45.886	48.363	52.192	55.668	56.73	59.893
38	43.462	45.076	47.007	49.513	53.384	56.896	57.969	61.162
39	44.539	46.173	48.126	50.66	54.572	58.12	59.204	62.248
db	**0.25**	**0.2**	**0.15**	**0.1**	**0.05**	**0.025**	**0.02**	**0.01**
40	45.616	47.269	49.244	51.805	59.342	60.436	63.436	63.691
41	46.692	48.363	50.36	52.949	56.942	60.561	61.665	64.95
42	47.766	49.456	51.457	54.09	58.124	61.777	62.892	66.206
43	48.84	50.548	52.588	55.23	59.304	62.99	64.116	67.459
44	49.913	51.639	53.7	56.369	60.481	64.201	65.337	68.71
45	50.985	52.729	54.81	57.505	61.656	65.41	66.555	69.957
46	52.056	53.818	55.92	58.641	62.83	66.617	67.771	71.201
47	53.127	54.906	57.028	59.774	64.001	67.821	68.985	72.443
48	54.196	55.993	58.135	60.907	65.171	69.023	70.197	73.683
49	55.265	57.079	59.241	62.038	66.339	70.222	71.406	74.919
50	56.334	58.164	60.346	63.167	67.505	71.42	72.613	76.154
51	57.401	59.248	61.45	64.295	68.669	72.616	73.818	77.386
52	58.468	60.332	62.553	65.422	69.832	73.81	75.021	78.616

53	59.534	61.414	63.654	66.548	70.993	75.002	76.223	79.843
54	60.6	62.496	64.755	67.673	72.153	76.192	77.442	81.069
55	61.665	63.577	65.855	68.796	73.311	77.38	78.619	82.292
56	62.729	64.658	66.954	69.919	74.468	74.567	79.815	83.513
57	63.793	65.737	68.052	71.04	75.624	79.752	81.009	84.733
58	64.857	66.816	69.149	72.16	76.778	80.936	82.201	85.95
59	65.919	67.894	70.246	73.279	77.931	82.117	83.391	87.166
60	66.981	68.972	71.341	74.397	79.082	82.298	84.58	88.379
61	68.043	70.049	72.436	75.514	80.232	84.476	85.767	89.591
62	69.104	71.125	73.53	76.63	81.381	85.654	86.953	90.802
63	70.165	72.201	74.623	77.745	82.529	86.83	88.137	91.01
64	71.225	73.276	75.715	78.86	83.675	88.004	89.32	93.217
65	72.285	74.351	76.807	79.973	84.821	89.177	90.501	94.422
66	73.344	75.424	77.898	81.085	85.965	90.349	91.681	95.626
67	74.403	76.498	78.988	82.197	87.108	91.519	92.86	96.828
68	75.461	77.571	80.087	83.308	88.25	92.689	94.037	98.028
69	76.519	78.643	81.167	84.418	89.391	93.856	95.213	99.228
70	77.577	79.715	82.255	85.527	90.531	95.023	96.388	100.43
71	78.634	80.786	83.343	86.635	91.67	96.189	97.561	101.62
72	79.69	81.857	84.43	87.743	92.808	97.353	98.733	102.82
73	80.747	82.927	85.517	88.85	93.945	98.516	99.904	104.01
74	81.803	83.997	86.602	89.956	95.081	99.678	101.07	105.2
75	82.858	85.066	87.688	91.061	96.217	100.84	102.24	106.39
76	83.913	86.135	88.772	92.166	97.351	102	103.41	107.58
77	84.968	87.203	89.857	93.27	98.484	103.16	104.58	108.77
78	86.022	88.271	90.94	94.374	99.617	104.32	105.74	109.96
79	87.077	89.338	92.023	95.476	100.75	105.47	106.91	111.14
80	88.13	90.405	93.106	96.578	101.88	106.63	108.07	112.33
81	89.184	91.472	94.188	97.68	103.01	107.78	109.23	113.51
db	**0.25**	**0.2**	**0.15**	**0.1**	**0.05**	**0.025**	**0.02**	**0.01**
82	90.237	92.538	95.269	98.78	104.14	108.94	110.39	114.69
83	91.289	93.604	96.35	99.88	105.27	110.09	111.55	115.88
84	92.342	94.669	97.431	100.98	106.39	111.24	112.71	117.06
85	93.394	95.734	98.511	102.08	107.52	112.39	113.87	118.24
86	94.446	96.799	99.59	103.18	108.65	113.54	115.03	119.41
87	95.497	97.863	100.67	104.28	109.77	114.69	116.18	120.59
88	96.548	98.927	101.75	105.37	110.9	115.84	117.34	121.77
89	97.599	99.991	102.83	106.47	112.02	116.99	118.49	122.94
90	98.65	101.05	103.9	107.57	113.15	118.14	119.65	124.12

91	99.7	102.12	104.98	108.66	114.27	119.28	120.8	125.29
92	100.75	103.18	106.06	109.76	115.39	120.43	121.95	126.46
93	101.8	104.24	107.13	110.85	116.51	121.57	123.1	127.63
94	102.85	105.3	108.21	111.94	117.63	122.72	124.26	128.8
95	103.9	106.36	109.29	113.04	118.75	123.86	125.4	129.97
96	104.95	107.43	110.36	114.13	119.87	125	126.55	131.14
97	106	108.49	111.44	115.22	120.99	126.14	127.7	132.31
98	107.05	109.55	112.51	116.32	122.11	127.28	128.85	133.48
99	108.09	110.61	113.59	117.41	123.23	128.42	130	134.64
100	109.14	111.67	114.66	118.5	124.34	129.56	131.14	135.81
101	110.19	112.73	115.73	119.59	125.46	130.7	132.29	136.97
102	111.24	113.79	116.81	120.68	126.57	131.84	133.43	138.13
103	112.28	114.84	117.88	121.77	127.69	132.97	134.57	139.3
104	113.33	115.9	118.95	122.86	128.8	134.11	135.72	140.46
105	114.38	116.96	120.02	123.95	129.92	135.25	136.86	141.62
106	115.42	118.02	121.09	125.04	131.03	136.38	138	142.78
107	116.47	119.08	122.16	126.12	132.14	137.52	139.14	143.94
108	117.52	120.14	123.24	127.21	133.26	138.65	140.28	145.1
109	118.56	121.19	124.31	128.3	134.37	139.78	141.42	146.26
110	119.61	122.25	125.38	129.39	135.48	140.92	142.56	147.41
111	120.65	123.31	126.45	130.47	136.59	142.05	143.7	148.57
112	121.7	124.36	127.52	131.56	137.7	143.18	144.84	149.73
113	122.74	125.42	128.59	132.64	138.81	144.31	145.97	150.88
114	123.79	126.48	129.65	133.73	139.92	145.44	147.11	152.04
115	124.83	127.53	130.72	134.81	141.03	146.57	148.25	153.19
116	125.88	128.59	131.79	135.9	142.14	147.7	149.38	154.34
117	126.92	129.64	132.86	136.98	143.25	148.83	150.52	155.5
118	127.97	130.7	133.93	138.07	144.35	149.96	151.65	156.65
119	129.01	131.75	134.99	139.15	145.46	151.08	152.79	157.8
120	130.05	132.81	136.06	140.23	146.57	152.21	153.92	158.95
121	131.1	133.86	137.13	141.32	147.67	153.34	155.05	160.1
122	132.14	134.91	138.2	142.2	148.78	154.46	156.18	161.25
123	133.18	135.97	139.26	143.48	149.88	155.59	157.31	161.4
db	**0.25**	**0.2**	**0.15**	**0.1**	**0.05**	**0.025**	**0.02**	**0.01**
124	134.23	137.02	140.33	144.56	150.99	156.71	158.44	163.55
125	135.27	138.08	141.39	145.64	152.09	157.84	159.58	164.69
126	136.31	139.13	142.46	146.72	153.2	158.96	160.71	165.84
127	137.36	140.18	143.52	147.8	154.3	160.09	161.83	166.99
128	138.4	141.24	144.59	148.89	155.4	161.21	162.96	168.13

129	139.44	142.29	145.65	149.97	156.51	162.33	164.09	169.28
130	140.48	143.34	146.72	151.05	157.61	163.45	165.22	170.42
131	141.52	144.39	147.78	152.12	158.71	164.57	166.35	171.57
132	142.57	145.55	148.85	153.2	159.81	165.7	167.47	172.71
133	143.61	146.5	149.91	154.28	160.91	166.82	168.6	173.85
134	144.65	147.55	150.98	155.36	162.02	167.94	169.73	175
135	145.69	148.6	152.04	156.44	163.12	169.06	170.85	176.14
136	146.73	149.65	153.1	157.52	164.22	170.18	171.98	177.28
137	147.77	150.7	154.16	158.6	165.32	171.29	173.1	178.42
138	148.81	151.75	155.23	159.67	166.42	171.41	174.22	179.56
139	149.85	153.8	156.29	160.75	167.51	173.53	176.35	180.7
140	150.89	153.85	157.35	161.83	168.61	174.65	176.47	181.84
141	151.93	154.9	158.41	162.9	169.71	175.76	177.59	182.98
142	152.97	155.95	159.48	163.98	170.81	176.88	178.72	184.12
143	154.01	157	160.54	165.06	171.91	178	179.84	185.26
144	155.05	158.05	161.6	166.13	173	179.11	180.96	186.39
145	156.09	159.1	162.66	167.21	174.1	180.23	182.08	187.53
146	157.13	160.15	163.72	168.28	175.2	181.34	183.2	188.67
147	185.17	161.2	164.78	169.36	176.29	182.46	184.32	189.8
148	159.21	162.25	165.84	170.43	177.39	183.57	185.44	190.94
149	160.25	163.3	166.9	171.49	178.49	184.69	186.56	192.07
150	161.29	165.35	167.96	172.58	179.58	185.8	187.68	193.21
151	162.33	165.4	169.02	173.66	180.68	186.91	188.8	194.34
152	163.37	166.45	170.08	174.73	181.77	188.03	189.92	195.48
153	164.41	167.49	171.14	175.8	182.86	189.14	191.03	196.61
154	165.45	168.54	172.2	176.88	183.96	190.25	192.15	197.74
155	166.48	169.59	173.26	177.95	185.05	191.36	193.27	198.87
156	167.52	170.64	174.32	179.02	186.15	192.47	194.38	200.01
157	168.56	171.38	175.38	180.09	187.24	193.58	195.5	201.14
158	169.6	172.73	176.44	181.17	188.33	194.7	196.62	202.27
159	170.64	173.78	177.49	182.24	189.42	195.81	197.73	203.4
160	171.68	174.83	178.55	183.31	190.52	196.92	198.85	204.53
161	172.71	175.88	179.61	184.38	191.61	198.02	199.96	204.53
162	173.75	176.92	180.67	185.45	192.7	199.13	201.08	206.79
163	174.79	177.97	181.73	186.52	193.79	200.24	202.19	207.92
164	175.83	179.02	182.78	187.6	194.88	201.35	203.3	209.05
165	176.86	180.06	183.84	188.67	195l97	202.46	204.42	210.18
db	**0.25**	**0.2**	**0.15**	**0.1**	**0.05**	**0.025**	**0.02**	**0.01**
166	177.9	181.11	184.9	189.74	197.06	203.57	205.53	211.3

167	178.94	182.15	185.95	190.81	198.15	204.67	206.64	22.43
168	179.97	183.2	187.01	191.88	199.24	205.78	207.75	213.56
169	181.01	184.25	188.07	192.95	200.33	206.89	208.87	214.69
170	182.05	185.29	189.12	194.02	201.42	208	209.98	215.81
171	183.08	186.34	190.18	195.09	202.51	209.1	211.09	216.94
172	184.12	187.38	191.24	196.16	203.6	210.21	212.2	218.06
173	185.16	188.43	192.29	197.23	204.69	211.31	213.31	219.19
174	186.19	189.47	193.35	198.29	205.78	212.42	214.42	220.31
175	187.23	190.52	194.4	199.36	206.87	213.52	215.53	221.44
176	188.27	191.56	195.46	200.43	207.95	214.63	216.64	222.56
177	189.3	192.61	196.61	201.5	209.04	215.73	217.75	223.69
178	190.34	193.65	197.57	202.57	210.13	216.84	218.86	224.81
179	191.37	194.7	198.62	203.64	211.22	217.94	219.97	225.93
180	192.41	195.74	199.68	204.7	212.3	219.04	221.08	227.06
181	193.44	196.79	200.73	205.77	213.39	220.15	222.19	228.18
182	194.48	197.83	201.79	206.86	214.48	221.25	223.29	229.3
183	195.52	198.88	202.84	207.91	215.56	222.35	224.4	230.42
184	196.55	199.92	203.9	208.97	216.65	223.46	225.51	231.54
185	197.59	200.96	204.95	210.04	217.73	224.56	226.62	231.67
186	198.62	202.01	206	211.11	218.82	225.66	227.72	233.79
187	199.66	203.05	207.06	212.91	219.91	226.76	198.15	234.91
188	200.69	204.1	208.11	213.24	220.99	227.86	229.93	236.03
189	201.73	205.14	209.17	214.31	222.08	228.96	231.04	237.15
190	202.76	206.18	210.22	215.37	223.16	230.06	232.15	238.27
191	203.79	207.23	211.27	216.44	224.24	231.16	233.25	239.39
192	204.83	208.27	212.32	217.5	225.33	232.27	234.36	240.5
193	205.86	209.31	213.38	218.57	226.41	233.37	235.46	241.62
194	206.9	210.35	214.43	219.63	227.5	234.46	236.57	242.74
195	207.93	211.4	215.48	220.7	228.58	235.56	237.67	243.86
196	208.97	212.44	216.54	221.76	229.66	236.66	238.77	244.98
197	210	213.48	217.59	222.83	230.75	237.76	239.88	246.09
198	211.03	214.52	218.64	223.89	231.83	238.86	240.98	247.21
199	212.07	215.57	219.69	224.96	232.91	239.96	242.08	248.33
200	213.1	216.61	220.74	226.02	233.99	241.06	243.19	249.45

CURICULUM VITAE

A. Biodata Pribadi

Nama Lengkap : Laely Uswatun Nur Khasanah

Jenis Kelamin : Perempuan

Tempat, Tanggal lahir : Banyumas, 01 Februari 1996

Alamat Asal : Pliken Ds. Beber 02/01 Kec. Kembaran, Banyumas, Jawa Tengah

Alamat Tinggal : Asrama Putri Barokah Jl. Timoho No. 61c Ngentak-Sapen, Yogyakarta

Email : Laelyuswatun@gmail.com

No. HP : 085643227903

B. Latar Belakang Pendidikan

Jenjang	Nama Sekolah	Tahun
TK	TK Pertiwi 1 Pliken, Kembaran, Banyumas	2000 - 2001
SD	SD Negeri 2 Pliken, Kembaran, Banyumas	2001 - 2007
SMP/MTs	SMP Negeri 2 Sokaraja, Banyumas	2007 - 2010
SMA/MA	SMA Negeri 1 Sokaraja, Banyumas	2010 - 2013
S1	UIN Sunan Kalijaga Yogyakarta	2013 - 2018