

APPENDIX

APPENDIX 1

Variable FDR, NPF and BOPO Construct to Risks of Islamic Banking

YEAR	FDR (%)	NPF (%)	BOPO (%)
2010M01	88.67	4.36	84.87
2010M02	90.96	4.75	79.73
2010M03	95.07	4.53	76.27
2010M04	95.57	4.47	77.15
2010M05	96.65	4.77	85.79
2010M06	96.08	3.89	79.99
2010M07	95.32	4.14	79.77
2010M08	98.86	4.10	80.36
2010M09	95.40	3.95	79.10
2010M10	94.76	3.95	78.94
2010M11	95.45	3.99	77.70
2010M12	89.67	3.02	80.54
2011M01	91.97	3.28	75.75
2011M02	95.16	3.66	79.56
2011M03	93.22	3.60	77.63
2011M04	95.17	3.79	78.78
2011M05	94.88	3.76	79.05
2011M06	94.93	3.55	78.13
2011M07	94.18	3.75	77.13
2011M08	98.39	3.53	77.65
2011M09	94.97	3.50	77.54
2011M10	95.24	3.11	78.03
2011M11	94.40	2.74	77.92
2011M12	88.94	2.52	78.41
2012M01	87.27	2.68	86.22
2012M02	90.49	2.82	78.39
2012M03	87.13	2.76	77.77
2012M04	95.39	2.85	77.77
2012M05	97.95	2.93	76.24
2012M06	98.59	2.88	75.74
2012M07	99.91	2.92	75.87
2012M08	101.03	2.78	75.89

2012M09	102.10	2.74	75.44
2012M10	100.84	2.58	75.04
2012M11	101.19	2.50	75.29
2012M12	100.00	2.22	74.75
2013M01	100.63	2.49	70.43
2013M02	102.17	2.72	72.06
2013M03	102.62	2.75	72.95
2013M04	103.08	2.85	73.95
2013M05	102.08	2.92	76.87
2013M06	104.43	2.64	76.18
2013M07	104.83	2.75	76.13
2013M08	102.53	3.01	77.87
2013M09	103.27	2.80	77.98
2013M10	103.03	2.96	79.06
2013M11	102.58	3.08	78.59
2013M12	100.32	2.62	78.21
2014M01	100.07	3.01	80.05
2014M02	102.03	3.53	83.77
2014M03	102.22	3.22	91.90
2014M04	95.50	3.48	84.50
2014M05	99.43	4.02	76.49
2014M06	100.80	3.90	71.76
2014M07	99.89	4.31	79.80
2014M08	98.99	4.58	81.20
2014M09	99.71	4.67	82.39
2014M10	98.99	4.58	97.37
2014M11	94.62	4.86	96.34
2014M12	91.50	4.33	96.97
2015M01	88.85	5.56	94.80
2015M02	89.37	5.83	94.23
2015M03	89.15	5.49	95.98
2015M04	89.57	5.20	96.69
2015M05	90.05	5.44	96.51
2015M06	92.56	5.09	96.98
2015M07	90.13	5.30	97.08
2015M08	90.72	5.30	97.30

2015M09	90.82	5.14	96.94
2015M10	90.67	5.16	96.71
2015M11	90.26	5.13	96.75
2015M12	88.03	4.84	97.01
2016M01	87.86	5.46	95.28
2016M02	87.30	5.59	94.49
2016M03	87.52	5.35	94.40
2016M04	88.11	5.48	94.71
2016M05	89.31	6.17	99.04
2016M06	89.32	5.68	95.61
2016M07	87.58	5.32	96.15
2016M08	87.53	5.55	96.96
2016M09	86.43	4.67	96.27
2016M10	86.88	4.80	97.21
2016M11	86.27	4.68	95.91
2016M12	85.99	4.42	96.23
2017M01	84.74	4.72	95.09
2017M02	83.78	4.78	93.35
2017M03	83.53	4.61	92.34
2017M04	81.36	4.82	92.31
2017M05	81.96	4.75	92.26
2017M06	82.69	4.47	90.98
2017M07	80.51	4.50	91.56
2017M08	81.78	4.49	92.03
2017M09	80.12	4.41	91.68
2017M10	80.94	4.91	94.16
2017M11	80.07	5.27	94.05
2017M12	79.65	4.77	94.91
2018M01	77.93	5.21	97.01
2018M02	78.35	5.21	93.81
2018M03	77.63	4.56	89.90
2018M04	78.05	4.84	89.75
2018M05	79.65	4.86	88.90
2018M06	78.68	3.83	88.75
2018M07	79.45	3.92	88.69
2018M08	80.45	3.95	88.64

APPENDIX 2

Unit Root Test - Level

FDR

Null Hypothesis: FDR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.019890	0.7440
Test critical values:		
1% level	-3.495021	
5% level	-2.889753	
10% level	-2.581890	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDR)
Method: Least Squares
Date: 11/18/18 Time: 21:55
Sample (adjusted): 2010M02 2018M08
Included observations: 103 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDR(-1)	-0.028242	0.027691	-1.019890	0.3102
C	2.525621	2.563029	0.985405	0.3268
R-squared	0.010194	Mean dependent var		-0.079806
Adjusted R-squared	0.000394	S.D. dependent var		2.106331
S.E. of regression	2.105916	Akaike info criterion		4.346605
Sum squared resid	447.9231	Schwarz criterion		4.397764
Log likelihood	-221.8501	Hannan-Quinn criter.		4.367326
F-statistic	1.040175	Durbin-Watson stat		2.221028
Prob(F-statistic)	0.310217			

NPF

Null Hypothesis: NPF has a unit root
 Exogenous: Constant
 Lag Length: 3 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.556620	0.5009
Test critical values:		
1% level	-3.497029	
5% level	-2.890623	
10% level	-2.582353	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(NPF)
 Method: Least Squares
 Date: 11/18/18 Time: 21:57
 Sample (adjusted): 2010M05 2018M08
 Included observations: 100 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NPF(-1)	-0.049387	0.031727	-1.556620	0.1229
D(NPF(-1))	-0.173629	0.098146	-1.769085	0.0801
D(NPF(-2))	-0.106337	0.098401	-1.080648	0.2826
D(NPF(-3))	0.356555	0.100344	3.553313	0.0006
C	0.192177	0.133219	1.442571	0.1524
R-squared	0.216828	Mean dependent var		-0.005200
Adjusted R-squared	0.183853	S.D. dependent var		0.347247
S.E. of regression	0.313706	Akaike info criterion		0.567988
Sum squared resid	9.349110	Schwarz criterion		0.698247
Log likelihood	-23.39940	Hannan-Quinn criter.		0.620706
F-statistic	6.575402	Durbin-Watson stat		1.980317
Prob(F-statistic)	0.000103			

BOPO

Null Hypothesis: BOPO has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.786319	0.3854
Test critical values:		
1% level	-3.495021	
5% level	-2.889753	
10% level	-2.581890	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(BOPO)
 Method: Least Squares
 Date: 11/18/18 Time: 21:59
 Sample (adjusted): 2010M02 2018M08
 Included observations: 103 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOPO(-1)	-0.061807	0.034600	-1.786319	0.0770
C	5.325495	2.976128	1.789403	0.0765
R-squared	0.030626	Mean dependent var		0.036602
Adjusted R-squared	0.021028	S.D. dependent var		3.096654
S.E. of regression	3.063922	Akaike info criterion		5.096495
Sum squared resid	948.1496	Schwarz criterion		5.147655
Log likelihood	-260.4695	Hannan-Quinn criter.		5.117217
F-statistic	3.190937	Durbin-Watson stat		2.073873
Prob(F-statistic)	0.077048			

Unit Root Test - First Different

FDR

Null Hypothesis: D(FDR) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-11.55782	0.0000
Test critical values: 1% level	-3.495677	
5% level	-2.890037	
10% level	-2.582041	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(FDR,2)
 Method: Least Squares
 Date: 11/18/18 Time: 22:02
 Sample (adjusted): 2010M03 2018M08
 Included observations: 102 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDR(-1))	-1.138775	0.098528	-11.55782	0.0000
C	-0.115583	0.207455	-0.557150	0.5787
R-squared	0.571887	Mean dependent var		-0.012647
Adjusted R-squared	0.567606	S.D. dependent var		3.183339
S.E. of regression	2.093258	Akaike info criterion		4.334733
Sum squared resid	438.1727	Schwarz criterion		4.386203
Log likelihood	-219.0714	Hannan-Quinn criter.		4.355575
F-statistic	133.5833	Durbin-Watson stat		2.005885
Prob(F-statistic)	0.000000			

NPF

Null Hypothesis: D(NPF) has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.724193	0.0002
Test critical values:		
1% level	-3.497029	
5% level	-2.890623	
10% level	-2.582353	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(NPF,2)

Method: Least Squares

Date: 11/18/18 Time: 22:03

Sample (adjusted): 2010M05 2018M08

Included observations: 100 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NPF(-1))	-0.996342	0.210902	-4.724193	0.0000
D(NPF(-1),2)	-0.209737	0.159135	-1.317980	0.1906
D(NPF(-2),2)	-0.339900	0.100509	-3.381786	0.0010
C	-0.009354	0.031623	-0.295800	0.7680
R-squared	0.673650	Mean dependent var		0.000900
Adjusted R-squared	0.663452	S.D. dependent var		0.544747
S.E. of regression	0.316023	Akaike info criterion		0.573174
Sum squared resid	9.587568	Schwarz criterion		0.677381
Log likelihood	-24.65871	Hannan-Quinn criter.		0.615349
F-statistic	66.05437	Durbin-Watson stat		1.965527
Prob(F-statistic)	0.000000			

BOPO

Null Hypothesis: D(BOPO) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=12)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-11.03276	0.0000
Test critical values:		
1% level	-3.495677	
5% level	-2.890037	
10% level	-2.582041	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(BOPO,2)

Method: Least Squares

Date: 11/18/18 Time: 22:03

Sample (adjusted): 2010M03 2018M08

Included observations: 102 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BOPO(-1))	-1.083961	0.098249	-11.03276	0.0000
C	0.090497	0.304265	0.297429	0.7668
R-squared	0.548984	Mean dependent var		0.049902
Adjusted R-squared	0.544474	S.D. dependent var		4.552647
S.E. of regression	3.072702	Akaike info criterion		5.102405
Sum squared resid	944.1500	Schwarz criterion		5.153875
Log likelihood	-258.2227	Hannan-Quinn criter.		5.123247
F-statistic	121.7218	Durbin-Watson stat		2.047923
Prob(F-statistic)	0.000000			

APPENDIX 3

Lag Length Criteria

FDR

VAR Lag Order Selection Criteria
Endogenous variables: D(FDR) D(NPF) D(BOPO)
Exogenous variables: C
Date: 11/19/18 Time: 09:49
Sample: 2010M01 2018M08
Included observations: 100

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-502.5902	NA	4.943996	10.11180	10.18996*	10.14343*
1	-491.1235	22.01603	4.706602	10.06247	10.37509	10.18899
2	-479.1256	22.31603	4.435183	10.00251	10.54960	10.22393
3	-465.3591	24.77971*	4.037246*	9.907182*	10.68873	10.22349

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

NPF

VAR Lag Order Selection Criteria
Endogenous variables: D(NPF) D(BOPO) D(FDR)
Exogenous variables: C
Date: 11/19/18 Time: 09:53
Sample: 2010M01 2018M08
Included observations: 100

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-502.5902	NA	4.943996	10.11180	10.18996*	10.14343*
1	-491.1235	22.01603	4.706602	10.06247	10.37509	10.18899
2	-479.1256	22.31603	4.435183	10.00251	10.54960	10.22393
3	-465.3591	24.77971*	4.037246*	9.907182*	10.68873	10.22349

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

BOPO

VAR Lag Order Selection Criteria

Endogenous variables: D(BOPO) D(FDR) D(NPF)

Exogenous variables: C

Date: 11/19/18 Time: 09:56

Sample: 2010M01 2018M08

Included observations: 100

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-502.5902	NA	4.943996	10.11180	10.18996*	10.14343*
1	-491.1235	22.01603	4.706602	10.06247	10.37509	10.18899
2	-479.1256	22.31603	4.435183	10.00251	10.54960	10.22393
3	-465.3591	24.77971*	4.037246*	9.907182*	10.68873	10.22349

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

APPENDIX 4

VAR Stability Test

FDR, NPF & BOPO

Roots of Characteristic Polynomial

Endogenous variables: D(FDR) D(NPF) D(BOPO)

Exogenous variables: C

Lag specification: 1 2

Date: 11/19/18 Time: 09:58

Root	Modulus
0.165181 - 0.446285i	0.475873
0.165181 + 0.446285i	0.475873
-0.239743 - 0.404530i	0.470235
-0.239743 + 0.404530i	0.470235
-0.239164 - 0.036076i	0.241869
-0.239164 + 0.036076i	0.241869

No root lies outside the unit circle.

VAR satisfies the stability condition.

APPENDIX 5

Co – Integration Test

FDR

Date: 11/19/18 Time: 09:59
 Sample (adjusted): 2010M06 2018M08
 Included observations: 99 after adjustments
 Trend assumption: Linear deterministic trend
 Series: D(FDR) D(NPF) D(BOPO)
 Lags interval (in first differences): 1 to 3

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.359156	80.84738	29.79707	0.0000
At most 1 *	0.220678	36.79544	15.49471	0.0000
At most 2 *	0.115152	12.11161	3.841466	0.0005

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.359156	44.05194	21.13162	0.0000
At most 1 *	0.220678	24.68383	14.26460	0.0008
At most 2 *	0.115152	12.11161	3.841466	0.0005

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b*S11*b=I):

D(FDR)	D(NPF)	D(BOPO)
0.473651	-3.309476	0.811746
-0.881343	-4.703504	-0.041605
-0.596670	5.229351	0.251827

Unrestricted Adjustment Coefficients (alpha):

D(FDR,2)	-0.710554	0.574020	0.351440
----------	-----------	----------	----------

D(NPF,2)	0.051480	0.130446	-0.051183
D(BOPO,2)	-1.508956	-0.219002	-0.685783

1 Cointegrating Equation(s):	Log likelihood	-473.2061
------------------------------	----------------	-----------

Normalized cointegrating coefficients (standard error in parentheses)

D(FDR)	D(NPF)	D(BOPO)
1.000000	-6.987167	1.713807
	(2.33266)	(0.24608)

Adjustment coefficients (standard error in parentheses)

D(FDR,2)	-0.336554
	(0.09401)
D(NPF,2)	0.024383
	(0.01633)
D(BOPO,2)	-0.714718
	(0.14603)

2 Cointegrating Equation(s):	Log likelihood	-460.8641
------------------------------	----------------	-----------

Normalized cointegrating coefficients (standard error in parentheses)

D(FDR)	D(NPF)	D(BOPO)
1.000000	0.000000	0.768911
		(0.14782)
0.000000	1.000000	-0.135233
		(0.02468)

Adjustment coefficients (standard error in parentheses)

D(FDR,2)	-0.842463	-0.348342
	(0.18891)	(1.08586)
D(NPF,2)	-0.090585	-0.783926
	(0.03156)	(0.18142)
D(BOPO,2)	-0.521702	6.023931
	(0.30758)	(1.76798)

NPF

Date: 11/19/18 Time: 10:16
Sample (adjusted): 2010M06 2018M08
Included observations: 99 after adjustments
Trend assumption: Linear deterministic trend
Series: D(NPF) D(BOPO) D(FDR)
Lags interval (in first differences): 1 to 3

Unrestricted Cointegration Rank Test (Trace)

Hypothesized	Trace	0.05
--------------	-------	------

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.359156	80.84738	29.79707	0.0000
At most 1 *	0.220678	36.79544	15.49471	0.0000
At most 2 *	0.115152	12.11161	3.841466	0.0005

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.359156	44.05194	21.13162	0.0000
At most 1 *	0.220678	24.68383	14.26460	0.0008
At most 2 *	0.115152	12.11161	3.841466	0.0005

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b*S11*b=l):

D(NPF)	D(BOPO)	D(FDR)
-3.309476	0.811746	0.473651
-4.703504	-0.041605	-0.881343
-5.229351	-0.251827	0.596670

Unrestricted Adjustment Coefficients (alpha):

D(NPF,2)	D(BOPO,2)	D(FDR,2)
0.051480	0.130446	0.051183
-1.508956	-0.219002	0.685783
-0.710554	0.574020	-0.351440

1 Cointegrating Equation(s): Log likelihood -473.2061

Normalized cointegrating coefficients (standard error in parentheses)

D(NPF)	D(BOPO)	D(FDR)
1.000000	-0.245279	-0.143120
	(0.03603)	(0.05003)

Adjustment coefficients (standard error in parentheses)

D(NPF,2)	-0.170371
	(0.11409)
D(BOPO,2)	4.993854
	(1.02031)
D(FDR,2)	2.351562
	(0.65685)

2 Cointegrating Equation(s):	Log likelihood	-460.8641
------------------------------	----------------	-----------

Normalized cointegrating coefficients (standard error in parentheses)

D(NPF)	D(BOPO)	D(FDR)
1.000000	0.000000	0.175876 (0.04609)
0.000000	1.000000	1.300541 (0.26695)

Adjustment coefficients (standard error in parentheses)

D(NPF,2)	-0.783926 (0.18142)	0.036361 (0.02564)
D(BOPO,2)	6.023931 (1.76798)	-1.215777 (0.24987)
D(FDR,2)	-0.348342 (1.08586)	-0.600671 (0.15347)

BOPO

Date: 11/19/18 Time: 10:22
Sample (adjusted): 2010M06 2018M08
Included observations: 99 after adjustments
Trend assumption: Linear deterministic trend
Series: D(BOPO) D(FDR) D(NPF)
Lags interval (in first differences): 1 to 3

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.359156	80.84738	29.79707	0.0000
At most 1 *	0.220678	36.79544	15.49471	0.0000
At most 2 *	0.115152	12.11161	3.841466	0.0005

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.359156	44.05194	21.13162	0.0000
At most 1 *	0.220678	24.68383	14.26460	0.0008
At most 2 *	0.115152	12.11161	3.841466	0.0005

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b*S11*b=I):

D(BOPO)	D(FDR)	D(NPF)
-0.811746	-0.473651	3.309476
0.041605	0.881343	4.703504
0.251827	-0.596670	5.229351

Unrestricted Adjustment Coefficients (alpha):

D(BOPO,2)	1.508956	0.219002	-0.685783
D(FDR,2)	0.710554	-0.574020	0.351440
D(NPF,2)	-0.051480	-0.130446	-0.051183

1 Cointegrating Equation(s): Log likelihood -473.2061

Normalized cointegrating coefficients (standard error in parentheses)

D(BOPO)	D(FDR)	D(NPF)
1.000000	0.583496	-4.076987
	(0.19658)	(1.34190)

Adjustment coefficients (standard error in parentheses)

D(BOPO,2)	-1.224888
	(0.25026)
D(FDR,2)	-0.576789
	(0.16111)
D(NPF,2)	0.041788
	(0.02798)

2 Cointegrating Equation(s): Log likelihood -460.8641

Normalized cointegrating coefficients (standard error in parentheses)

D(BOPO)	D(FDR)	D(NPF)
1.000000	0.000000	-7.394640
		(1.72979)
0.000000	1.000000	5.685817
		(1.78906)

Adjustment coefficients (standard error in parentheses)

D(BOPO,2)	-1.215777	-0.521702
	(0.24987)	(0.30758)
D(FDR,2)	-0.600671	-0.842463
	(0.15347)	(0.18891)
D(NPF,2)	0.036361	-0.090585
	(0.02564)	(0.03156)

APPENDIX 6

VECM Estimation Process

FDR

Vector Error Correction Estimates

Date: 11/19/18 Time: 10:04

Sample (adjusted): 2010M05 2018M08

Included observations: 100 after adjustments

Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1		
FDR(-1)	1.000000		
NPF(-1)	-72.58885 (16.2061) [-4.47911]		
BOPO(-1)	9.029681 (1.94476) [4.64308]		
C	-570.6633		

Error Correction:	D(FDR)	D(NPF)	D(BOPO)
CointEq1	0.001081 (0.00617) [0.17523]	0.002721 (0.00101) [2.69286]	-0.031318 (0.00979) [-3.19815]
D(FDR(-1))	-0.255421 (0.10195) [-2.50543]	-0.010509 (0.01670) [-0.62922]	0.122321 (0.16188) [0.75564]
D(FDR(-2))	0.038103 (0.10041) [0.37947]	-0.015999 (0.01645) [-0.97261]	0.119351 (0.15944) [0.74857]
D(FDR(-3))	0.271292 (0.09478) [2.86236]	-0.005072 (0.01553) [-0.32666]	-0.224285 (0.15050) [-1.49029]
D(NPF(-1))	1.360963 (0.64429) [2.11235]	-0.081274 (0.10555) [-0.77003]	-0.953621 (1.02305) [-0.93213]
D(NPF(-2))	-0.376620 (0.63031) [-0.59751]	-0.015491 (0.10326) [-0.15002]	-0.600455 (1.00086) [-0.59994]

D(NPF(-3))	0.344605 (0.61914) [0.55659]	0.404753 (0.10143) [3.99059]	1.006292 (0.98311) [1.02358]
D(BOPO(-1))	-0.207859 (0.07079) [-2.93623]	-0.015403 (0.01160) [-1.32823]	0.042771 (0.11241) [0.38050]
D(BOPO(-2))	-0.223429 (0.06825) [-3.27360]	-0.023770 (0.01118) [-2.12593]	0.034201 (0.10838) [0.31558]
D(BOPO(-3))	-0.019640 (0.06837) [-0.28727]	0.005957 (0.01120) [0.53189]	0.052325 (0.10856) [0.48200]
C	-0.112072 (0.18670) [-0.60029]	-0.008109 (0.03058) [-0.26512]	0.101554 (0.29645) [0.34256]
R-squared	0.294231	0.320090	0.186843
Adj. R-squared	0.214931	0.243696	0.095477
Sum sq. resids	302.4360	8.116420	762.5442
S.E. equation	1.843409	0.301986	2.927100
F-statistic	3.710359	4.189972	2.044990
Log likelihood	-197.2288	-16.32980	-243.4684
Akaike AIC	4.164577	0.546596	5.089367
Schwarz SC	4.451145	0.833165	5.375936
Mean dependent	-0.151200	-0.005200	0.114900
S.D. dependent	2.080501	0.347247	3.077709
Determinant resid covariance (dof adj.)		2.541420	
Determinant resid covariance		1.791622	
Log likelihood		-454.8376	
Akaike information criterion		9.816753	
Schwarz criterion		10.75461	

NPF

Vector Error Correction Estimates
Date: 11/21/18 Time: 13:20
Sample (adjusted): 2010M05 2018M08
Included observations: 100 after adjustments
Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1
NPF(-1)	1.000000

BOPO(-1)	-0.124395 (0.01740) [-7.14765]
FDR(-1)	-0.013776 (0.02032) [-0.67799]
C	7.861583

Error Correction:	D(NPF)	D(BOPO)	D(FDR)
CointEq1	-0.197484 (0.07334) [-2.69286]	2.273350 (0.71083) [3.19815]	-0.078443 (0.44766) [-0.17523]
D(NPF(-1))	-0.081274 (0.10555) [-0.77003]	-0.953621 (1.02305) [-0.93213]	1.360963 (0.64429) [2.11235]
D(NPF(-2))	-0.015491 (0.10326) [-0.15002]	-0.600455 (1.00086) [-0.59994]	-0.376620 (0.63031) [-0.59751]
D(NPF(-3))	0.404753 (0.10143) [3.99059]	1.006292 (0.98311) [1.02358]	0.344605 (0.61914) [0.55659]
D(BOPO(-1))	-0.015403 (0.01160) [-1.32823]	0.042771 (0.11241) [0.38050]	-0.207859 (0.07079) [-2.93623]
D(BOPO(-2))	-0.023770 (0.01118) [-2.12593]	0.034201 (0.10838) [0.31558]	-0.223429 (0.06825) [-3.27360]
D(BOPO(-3))	0.005957 (0.01120) [0.53189]	0.052325 (0.10856) [0.48200]	-0.019640 (0.06837) [-0.28727]
D(FDR(-1))	-0.010509 (0.01670) [-0.62922]	0.122321 (0.16188) [0.75564]	-0.255421 (0.10195) [-2.50543]
D(FDR(-2))	-0.015999 (0.01645) [-0.97261]	0.119351 (0.15944) [0.74857]	0.038103 (0.10041) [0.37947]
D(FDR(-3))	-0.005072 (0.01553) [-0.32666]	-0.224285 (0.15050) [-1.49029]	0.271292 (0.09478) [2.86236]

C	-0.008109 (0.03058) [-0.26512]	0.101554 (0.29645) [0.34256]	-0.112072 (0.18670) [-0.60029]
R-squared	0.320090	0.186843	0.294231
Adj. R-squared	0.243696	0.095477	0.214931
Sum sq. resids	8.116420	762.5442	302.4360
S.E. equation	0.301986	2.927100	1.843409
F-statistic	4.189972	2.044990	3.710359
Log likelihood	-16.32980	-243.4684	-197.2288
Akaike AIC	0.546596	5.089367	4.164577
Schwarz SC	0.833165	5.375936	4.451145
Mean dependent	-0.005200	0.114900	-0.151200
S.D. dependent	0.347247	3.077709	2.080501
Determinant resid covariance (dof adj.)		2.541420	
Determinant resid covariance		1.791622	
Log likelihood		-454.8376	
Akaike information criterion		9.816753	
Schwarz criterion		10.75461	

BOPO

Vector Error Correction Estimates

Date: 11/21/18 Time: 13:23

Sample (adjusted): 2010M05 2018M08

Included observations: 100 after adjustments

Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1		
BOPO(-1)	1.000000		
FDR(-1)	0.110746 (0.14627) [0.75713]		
NPF(-1)	-8.038916 (1.04400) [-7.70009]		
C	-63.19861		
Error Correction:	D(BOPO)	D(FDR)	D(NPF)
CointEq1	-0.282793 (0.08842) [-3.19815]	0.009758 (0.05569) [0.17523]	0.024566 (0.00912) [2.69286]
D(BOPO(-1))	0.042771	-0.207859	-0.015403

	(0.11241)	(0.07079)	(0.01160)
	[0.38050]	[-2.93623]	[-1.32823]
D(BOPO(-2))	0.034201	-0.223429	-0.023770
	(0.10838)	(0.06825)	(0.01118)
	[0.31558]	[-3.27360]	[-2.12593]
D(BOPO(-3))	0.052325	-0.019640	0.005957
	(0.10856)	(0.06837)	(0.01120)
	[0.48200]	[-0.28727]	[0.53189]
D(FDR(-1))	0.122321	-0.255421	-0.010509
	(0.16188)	(0.10195)	(0.01670)
	[0.75564]	[-2.50543]	[-0.62922]
D(FDR(-2))	0.119351	0.038103	-0.015999
	(0.15944)	(0.10041)	(0.01645)
	[0.74857]	[0.37947]	[-0.97261]
D(FDR(-3))	-0.224285	0.271292	-0.005072
	(0.15050)	(0.09478)	(0.01553)
	[-1.49029]	[2.86236]	[-0.32666]
D(NPF(-1))	-0.953621	1.360963	-0.081274
	(1.02305)	(0.64429)	(0.10555)
	[-0.93213]	[2.11235]	[-0.77003]
D(NPF(-2))	-0.600455	-0.376620	-0.015491
	(1.00086)	(0.63031)	(0.10326)
	[-0.59994]	[-0.59751]	[-0.15002]
D(NPF(-3))	1.006292	0.344605	0.404753
	(0.98311)	(0.61914)	(0.10143)
	[1.02358]	[0.55659]	[3.99059]
C	0.101554	-0.112072	-0.008109
	(0.29645)	(0.18670)	(0.03058)
	[0.34256]	[-0.60029]	[-0.26512]
R-squared	0.186843	0.294231	0.320090
Adj. R-squared	0.095477	0.214931	0.243696
Sum sq. resids	762.5442	302.4360	8.116420
S.E. equation	2.927100	1.843409	0.301986
F-statistic	2.044990	3.710359	4.189972
Log likelihood	-243.4684	-197.2288	-16.32980
Akaike AIC	5.089367	4.164577	0.546596
Schwarz SC	5.375936	4.451145	0.833165
Mean dependent	0.114900	-0.151200	-0.005200
S.D. dependent	3.077709	2.080501	0.347247
Determinant resid covariance (dof adj.)		2.541420	
Determinant resid covariance		1.791622	

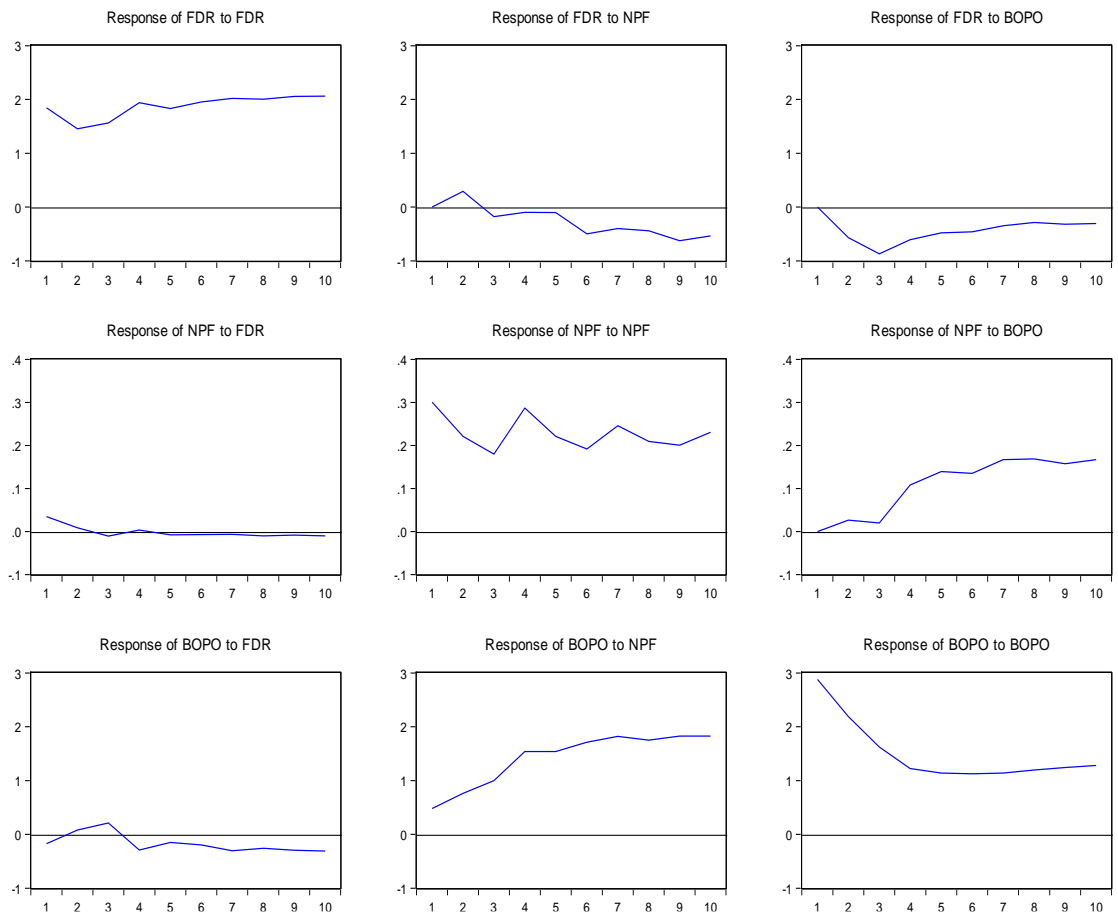
Log likelihood	-454.8376
Akaike information criterion	9.816753
Schwarz criterion	10.75461

APPENDIX 7

IRF Analysis Test

Graph

Response to Cholesky One S.D. Innovations



IRF Table

Response of FDR:			
Period	FDR	NPF	BOPO
1	1.843409	0.000000	0.000000
2	1.453150	0.289870	-0.570985
3	1.563267	-0.180083	-0.870702
4	1.938831	-0.097749	-0.606014
5	1.828384	-0.102668	-0.481756
6	1.954883	-0.498613	-0.460772
7	2.018839	-0.398134	-0.347090
8	2.003660	-0.441854	-0.285937
9	2.055447	-0.627704	-0.318148
10	2.062736	-0.534832	-0.304337

Response of NPF:			
Period	FDR	NPF	BOPO
1	0.034230	0.300040	0.000000
2	0.008727	0.220793	0.026409
3	-0.010695	0.179681	0.019450
4	0.003308	0.287043	0.107906
5	-0.008013	0.220619	0.139051
6	-0.007080	0.191308	0.134946
7	-0.006625	0.245509	0.166652
8	-0.010397	0.209324	0.168340
9	-0.008518	0.200393	0.157574
10	-0.010175	0.230489	0.166537

Response of BOPO:			
Period	FDR	NPF	BOPO
1	-0.175130	0.479235	2.882286
2	0.079835	0.760180	2.190474
3	0.212546	0.997343	1.622903
4	-0.293878	1.540075	1.224292
5	-0.148495	1.537714	1.140767
6	-0.196678	1.710625	1.126656
7	-0.303907	1.821500	1.137196
8	-0.259573	1.752730	1.193042
9	-0.295178	1.824589	1.240883
10	-0.309949	1.824651	1.281681

Cholesky
Ordering: FDR
NPF BOPO

APPENDIX 8

**Variance Decomposition Test
Table**

Variance Decomposition of FDR:				
Period	S.E.	FDR	NPF	BOPO
1	1.843409	100.0000	0.000000	0.000000
2	2.433074	93.07333	1.419375	5.507292
3	3.025591	86.88472	1.272146	11.84314
4	3.645556	88.13094	0.948149	10.92091
5	4.108004	89.21504	0.809155	9.975805
6	4.599803	89.21948	1.820409	8.960113
7	5.051028	89.96607	2.130988	7.902945
8	5.459352	90.48151	2.479191	7.039295
9	5.875766	90.34842	3.281494	6.370083
10	6.257649	90.52347	3.623686	5.852848

Variance Decomposition of NPF:				
Period	S.E.	FDR	NPF	BOPO
1	0.301986	1.284774	98.71523	0.000000
2	0.375125	0.886743	98.61763	0.495627
3	0.416529	0.785144	98.59483	0.620030
4	0.517248	0.513238	94.73262	4.754143
5	0.579325	0.428273	90.02078	9.550951
6	0.624881	0.380940	86.74632	12.87274
7	0.691786	0.319991	83.37349	16.30652
8	0.742180	0.297634	80.39042	19.31195
9	0.784787	0.277975	78.41862	21.30341
10	0.834778	0.260536	76.93120	22.80826

Variance Decomposition of BOPO:				
Period	S.E.	FDR	NPF	BOPO
1	2.927100	0.357969	2.680542	96.96149
2	3.735015	0.265543	5.788679	93.94578
3	4.198097	0.466521	10.22600	89.30747
4	4.645547	0.781165	19.34129	79.87754
5	5.026835	0.754420	25.87602	73.36956
6	5.431698	0.777258	32.08065	67.14209
7	5.848656	0.940389	37.36899	61.69062
8	6.226521	1.003506	40.89494	58.10156
9	6.612534	1.089031	43.87340	55.03757
10	6.985251	1.172802	46.13966	52.68754

Cholesky
Ordering:
FDR NPF
BOPO

APPENDIX 9

Granger Causality Test

FDR, NPF & BOPO

Pairwise Granger Causality Tests
Date: 11/18/18 Time: 20:28
Sample: 2010M01 2018M08
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
NPF does not Granger Cause FDR	102	5.44792	0.0057
FDR does not Granger Cause NPF		1.67488	0.1927
BOPO does not Granger Cause FDR	102	7.97421	0.0006
FDR does not Granger Cause BOPO		0.16992	0.8440
BOPO does not Granger Cause NPF	102	2.40254	0.0959
NPF does not Granger Cause BOPO		4.91669	0.0092
