



**The Baltic Dry Index an Economic Indicator in Shipping:
A Quantitative Analysis**

2011

© 2010 Pearson Education, Inc. All rights reserved. This publication is protected by copyright. Any unauthorized use or distribution of this work is strictly prohibited. For more information, contact Pearson Education, Inc., 501 Boylston Street, Boston, MA 02116.

copyright,

copyright

ø . í í í í .

:
()

ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΡΡΑΙΑ

, S&P Manager,

РАНЕЦКО ТЕПЛА

	.....	2
ABSTRACT	.....	3
	.....	4
1.	.....	6
1.2.	.....	8
1.2.1.	.....	8
1.2.2.	.....	10
1.2.3.	.....	12
1.2.4.	.....	12
1.3.	.....	13
	.....	13
1.4.	.....	15
1.5.	.....	17
1.6.	.....	18
1.7.	.....	20
1.7.1	.....	21
1.7.2	Baltic Dry Index (BDI).....	22
1.7.3	Baltic Handy Index (BHI).....	23
1.7.4	Baltic Panamax Index (BPI).....	23
1.7.5	Baltic Capesize Index (BCI).....	24
1.7.6	.....	24
2.	-	25
2.1	.....	25
2.2	.....	26
2.2.1	BDI	28
2.2.2	BDI	35
2.2.3	BDI , -	42
2.2.4	BDI	50
3.	-	57
	.....	59

Baltic Dry Index (BDI)

: BDI,

НАВЕЛІТНІ ПЕРПА

ABSTRACT

Although, Baltic Dry Index (BDI) is considered as a leading indicator in Shipping, few economists claim that this may not be the case. The main aim of this paper is to investigate this relationship by using regression analysis, examining the correlation of the dependent variable 'Index' with set of economic measurements.

The Index shows the everyday weighted average of main routes of all type of Bulker vessels, as a result of fixtures, supply/demand by shipowners and charterers, mirroring owner's final decision, the rate that vessel was chartered. Even though, Index may not be an accurate measurement, it sets the bottom line of what freight a ship-owner should ask for. Therefore, it is crucial to identify and check the factors that affect presently the index, developing also new variables that could probably support more or less this study. Several models will be created in order to find the relation between these factors and the index.

However, even if we fail to get a clear high correlated outcome, we will automatically prove the great volatility of the Shipping industry. It is extremely difficult to find all these factors influencing the shipping market, a fact that may be considered as a limitation of the study.

Key words: BDI, shipping industry, economic indicators

90%

BDI

BDI

BDI

BDI

BDI

BDI

BDI

BDI

BDI

BDI

BDI

BDI

LIBOR.

BDI

ó

BDI

BDI

DI

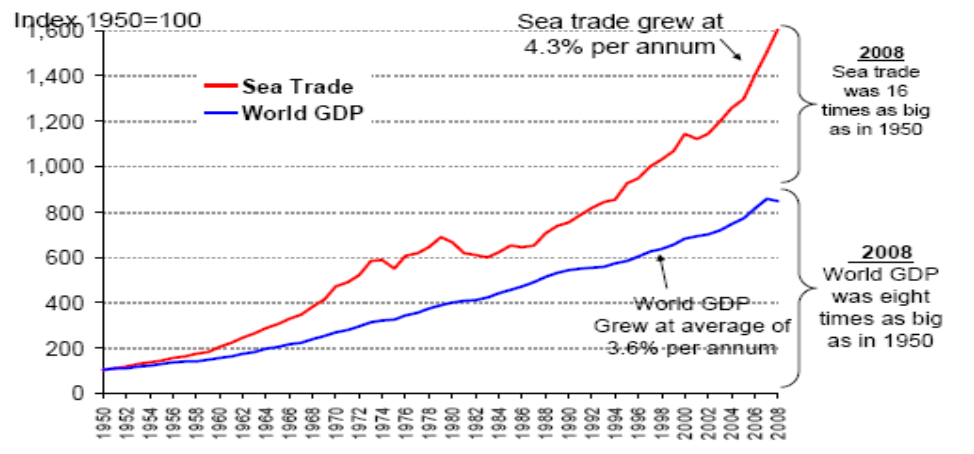
ПАНЕЛЪТЪМО ПЕРПАА

1. 6

1.1.

1970

90%



: Clarksons

(1950-2008)

ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΡΠΑ

1.2.

:

- o
- o
- o
- o

1.2.1.

(freight).

(Charter party)

/

(Owner)

(Charterer),

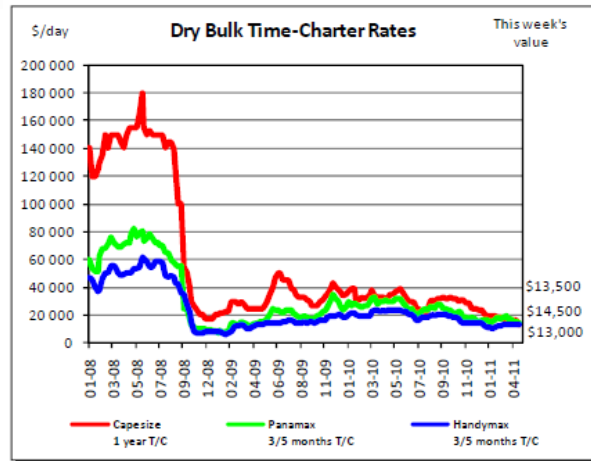
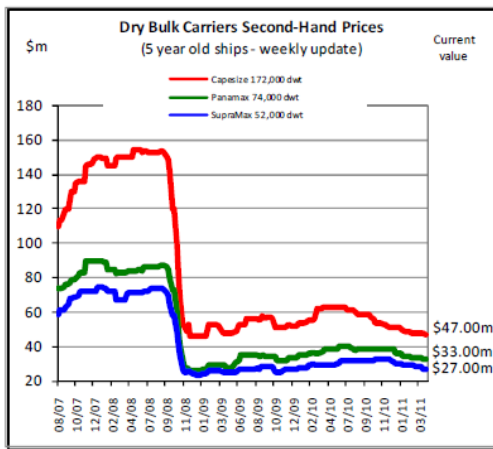
¹ (*secondhand*).

(*new building*).

(*layup*).

1.2.2.

(mortgages).



: B.R.S no 730, :2011

6 %

5 %

Martin Stopford

35,000 dwt 10

49%.

РАНЕЕЗНАКО ПЕРПАА

1.2.3. _____

1.2.4. _____

2

3

4

500-550 \$/wt.

100\$/wt 1980 200\$/wt 1990 2010-2011

1.3.

5
6
7
8
() ,

()

5 Martin Stopford ö

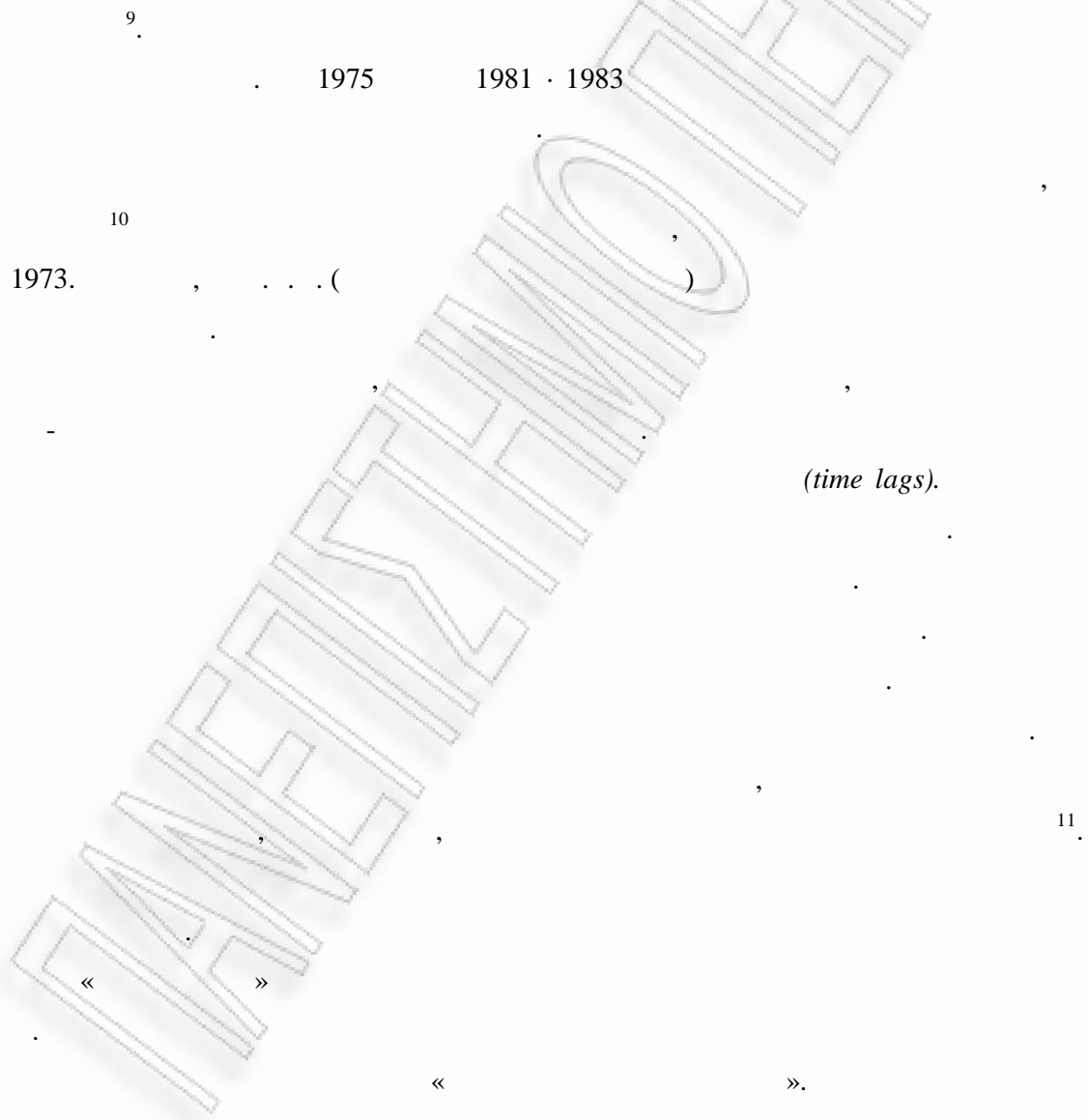
6 2010 Costamare ,

7 : www.capital.gr & www.Naftemporiki.gr
Costamare

8 « »

КОНСТИТУЦИЯ РЕСПУБЛИКИ

14.



9
10 (business cycle)

(2011)

11 : 1929 Wall Street.

()

(bulk carriers)

average haulö¹².

1956.

РАВЕЛТНМО РЕРАА

1.5.

(shippers),

(I.M.O)¹³.

(time charter).



¹³ International Maritime Organization:

1.6.

14

1886-1919:

1920 ó 1942:

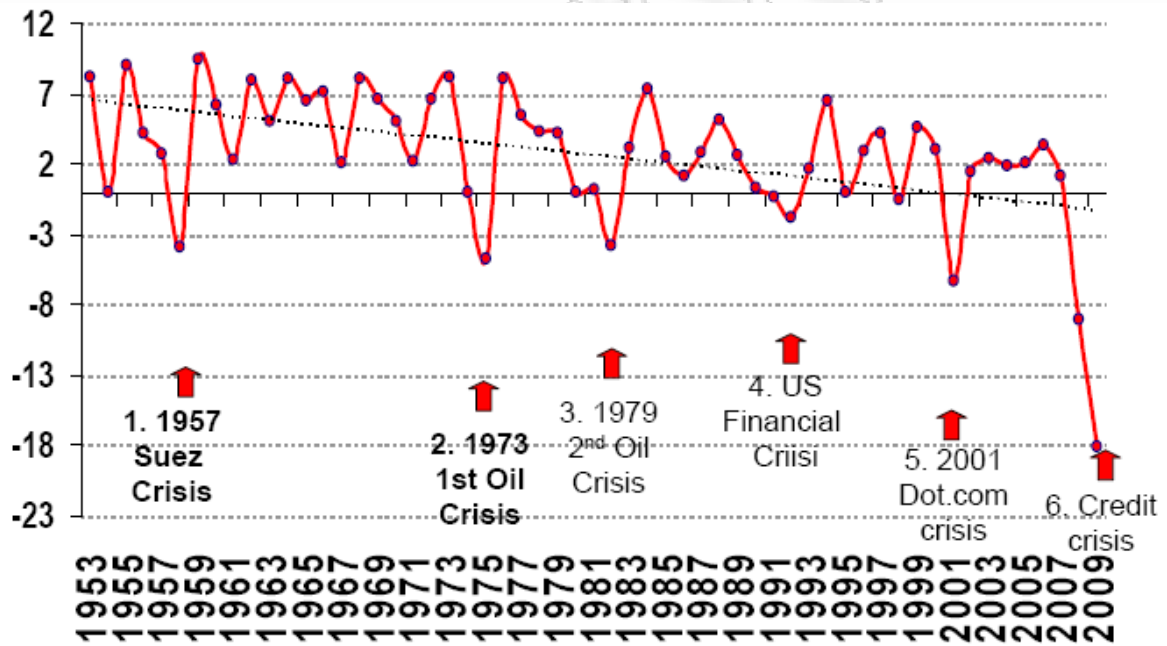
(1913).

ø

1943 - 1973:

1958-1961

1975



: Clarksons (%)

1953

1973

1981-1987

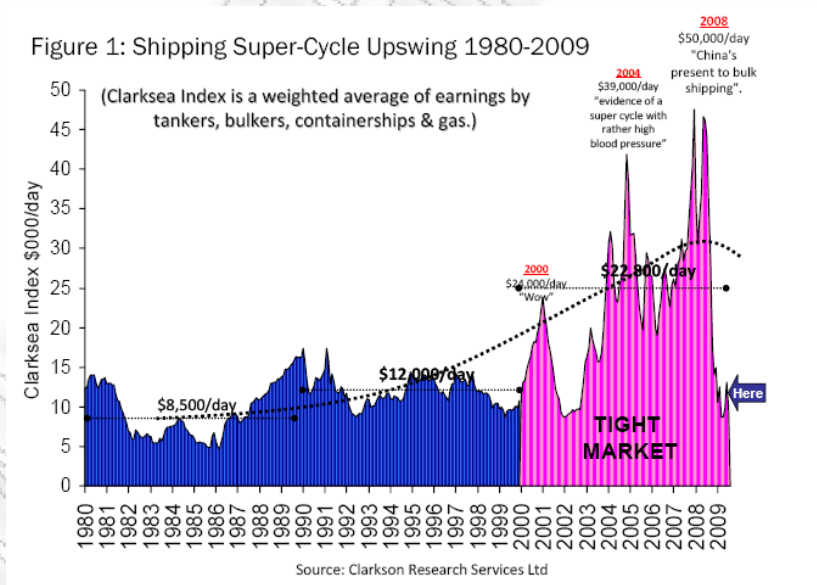
1988-1997

1970.

2008:

Martin Stopford

14



: Clarksea index

¹⁴ Martin Stopford %Forecasting - an impossible job?+Tradewinds Norshipping Conference, 10 June 2009

1.7.

: Baltic Dry Index (*BDI*), Baltic Handy Index (*BHI*) , Baltic Handymax Index (*BHMI*), Baltic Supramax Index (*BSI*), Baltic Capesize Index (*BCI*), Baltic Panamax Index (*BPI*).

Ship Classification	Dead Weight Tons	% of World Fleet	% of Dry Bulk Traffic
Capesize	172,000	10%	25%
Panamax	74,000	19%	25%
Supramax	52,454	37%	25% w/ Handysize
Handysize	28,000	34%	25% w/ Supramax

1.7.1 _____

BFI (*Baltic Freight Index*). BFI 29 1999,
4 1985
/ 4 1985 BFI,
1000 14,000 120,000 13
(dwt).

1.7.2 Baltic Dry Index (BDI)

Baltic International Freight Futures Exchange.

(, ,)¹⁵

T

O BDI

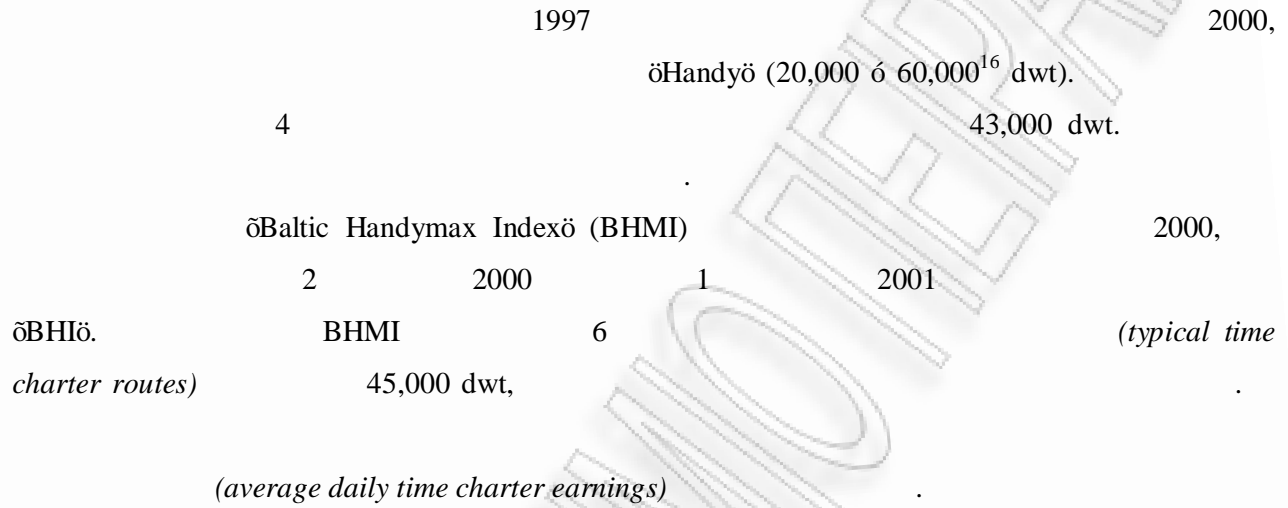
13:00

BDI

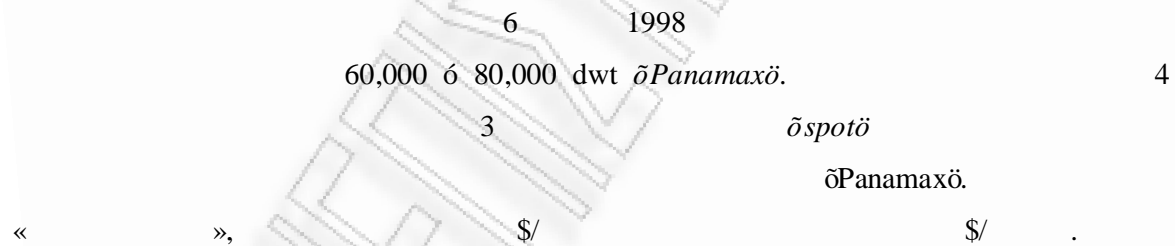
BDI

BDI

1.7.3 Baltic Handy Index (BHI)



1.7.4 Baltic Panamax Index (BPI)



¹⁶

50,000 - 60,000 dwt
öHandymaxö (35,000-50,000 dwt)

öUltra Handymaxö öSupramaxö
öPanamaxö (60,000-80,000 dwt)

1.7.5 Baltic Capesize Index (BCI)

1/3/1999.

öCapesizeö (80,000 ó 200,000 dwt),

6

4

« »,

\$/

öCapesizeö.

\$/

1.7.6 _____

Exchange),

(altic

ö

ö

250

17

öBalticö

1985,

öBaltic International

Freight Futures Exchange (BIFFEX)ö.

To

600

2000

(

2010)¹⁸.

400

¹⁷

Word to Bondö (),

öOur

¹⁸ : The Baltic Exchange

2. _____

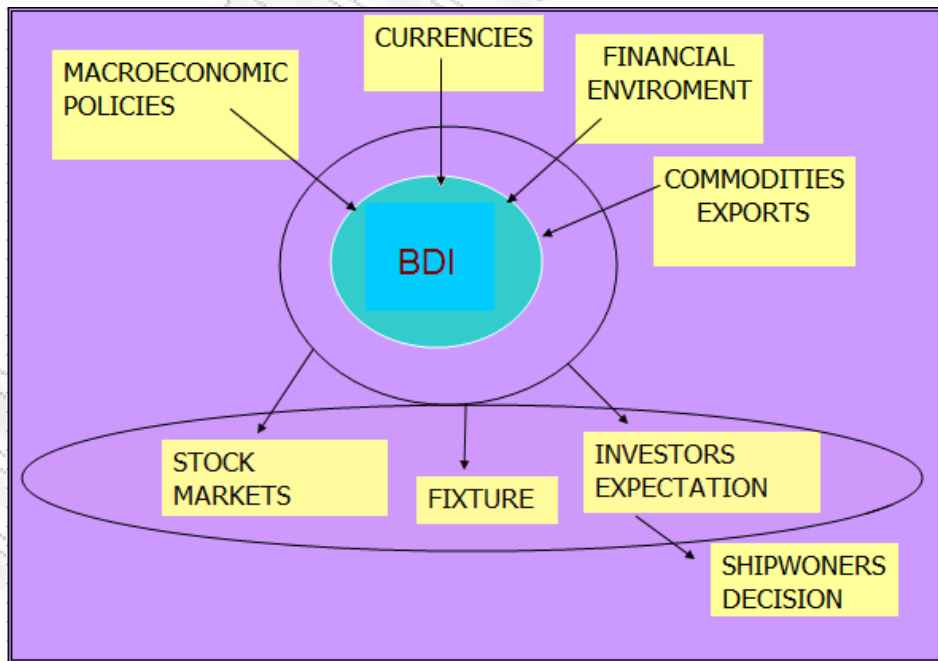
2.1

BDI

BDI

BDI

BDI



2.2

()

2001 2010,

(*OLS: Ordinary Least Square Method*)

Chow

(2001 ó 2008)

(2009 ó 2010).

BDI

BDI

Finance, Primary Commodity Prices

Bloomberg.

Minitab

PC GIVE.

Clarksons,

ahoo

ANALYTICAL REPORT

2.2.1

BDI

BDI

S&P500, Nasdaq, HangSeng, FTSE100, XetraxDax.

(dCRASH-1) (dummy variable),

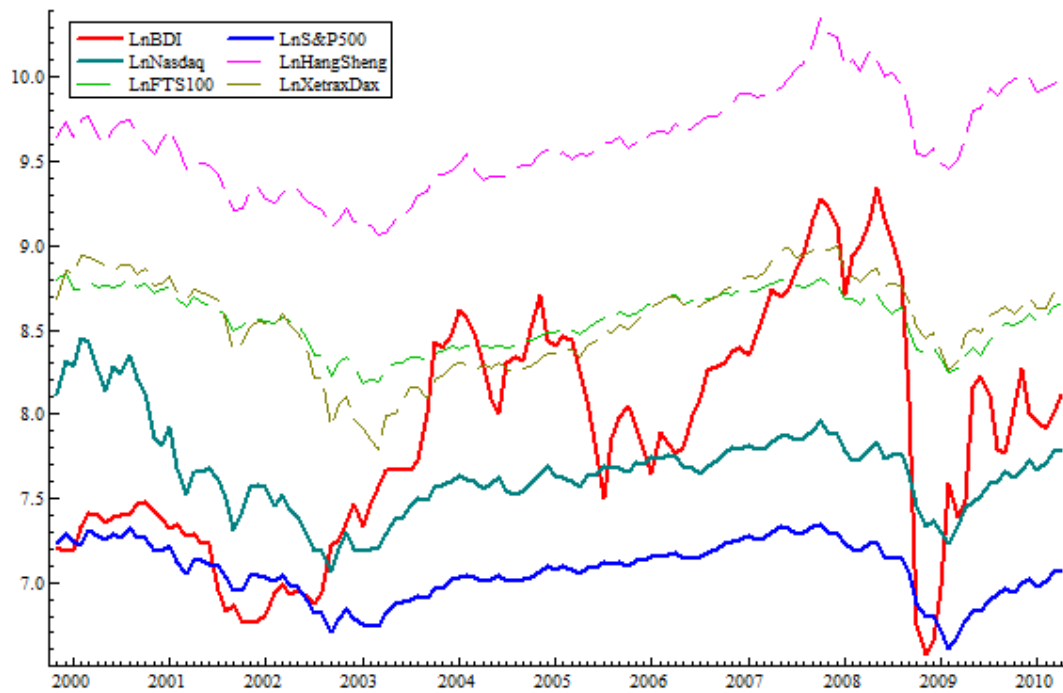
δ -1 δ

2008

2009,

1999

2010.



BDI

2004,

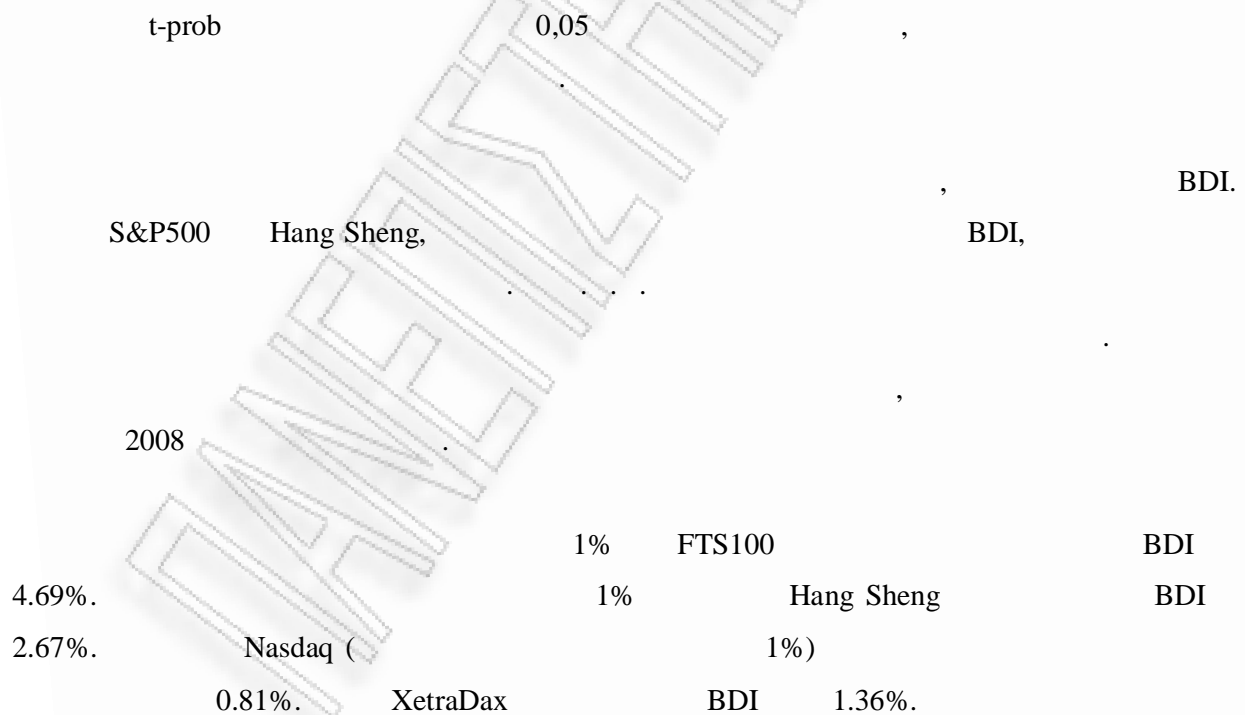
2005

2007

(OLS : Ordinary least square) :

$$\text{LnBDI} = - 2.42 + 6.03 \text{ LnS\&P500} - 0.811 \text{ LnNasdaq} + 2.67 \text{ LnHangSeng} - 4.69 \text{ LnFTSE100} - 1.36 \text{ LnXetraxDax} + 0.245 \text{ dCRASH-1}$$

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Constant	-2.42496	2.356	-1.03	0.3054	0.0091
LnS&P500	6.02861	0.4428	13.6	0.0000	0.6150
LnNasdaq	-0.810761	0.1668	-4.86	0.0000	0.1692
LnHangSheng	2.67032	0.1346	19.8	0.0000	0.7724
LnFTS100	-4.68750	0.7454	-6.29	0.0000	0.2542
LnXetraxDax	-1.36271	0.3777	-3.61	0.0005	0.1009
dCRASH-1	0.245233	0.1047	2.34	0.0209	0.0451



S = 0.223081 R-Sq = 89.9% R-Sq(adj) = 89.4%

Sigma	0.223081	RSS	5.77275505
R ²	0.898863	F(6,116) =	171.8 [0.000]**
log-likelihood	13.6012	DW	1.1
no. of observations	123	no. of parameters	7
mean(LnBDI)	7.89253	var(LnBDI)	0.464053

¹⁹ R² adj (0.894)

BDI 89.4 %.

AR 1-2 test: F(2,114) = 19.054 [0.0000]**

ARCH 1-1 test: F(1,114) = 0.90696 [0.3429]

Normality test: Chi²(2) = 34.780 [0.0000]**

Hetero test: F(11,104) = 7.9869 [0.0000]**

Hetero-X test: F(26,89) = 6.4168 [0.0000]**

Durbin-Watson statistic = 1.09565

(unit root test).

Variable	F-test		Value	[Prob]	Unit-root t-test
Constant	F(1,116)	=	1.059	[0.3054]	
LnS&P500	F(1,116)	=	185.32	[0.0000]**	13.613
LnNasdaq	F(1,116)	=	23.619	[0.0000]**	-4.8599
LnHangSheng	F(1,116)	=	393.65	[0.0000]**	19.841
LnFTS100	F(1,116)	=	39.546	[0.0000]**	-6.2886
LnXetraxDax	F(1,116)	=	13.015	[0.0005]**	-3.6076
dCRASH-1	F(1,116)	=	5.4835	[0.0209]*	2.3417

t-prob

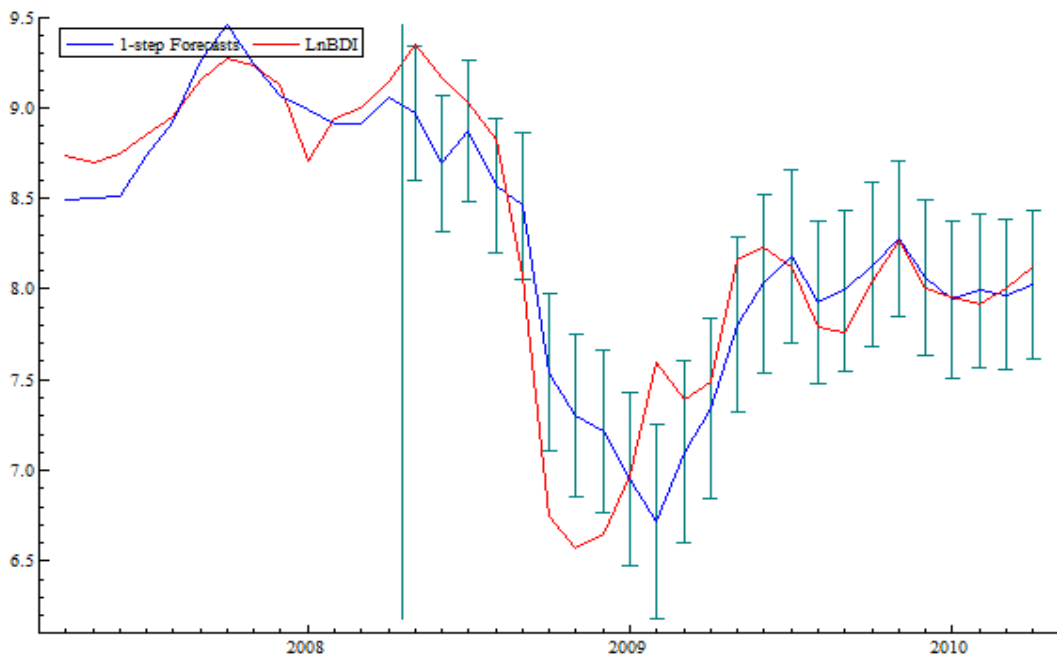
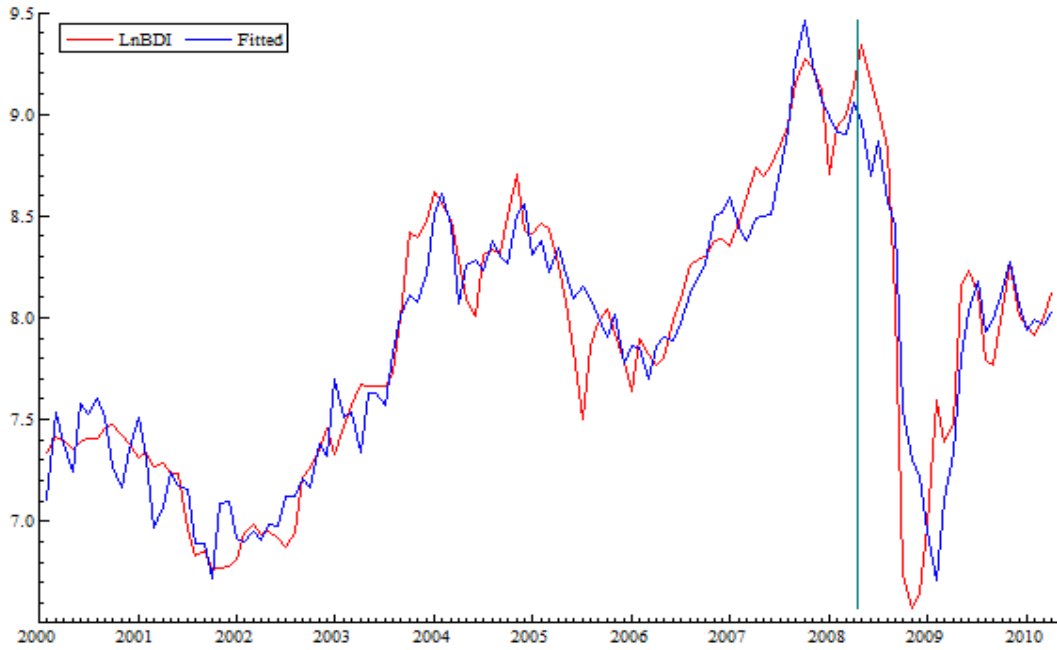
0.05.

1999

2008,

CHOW

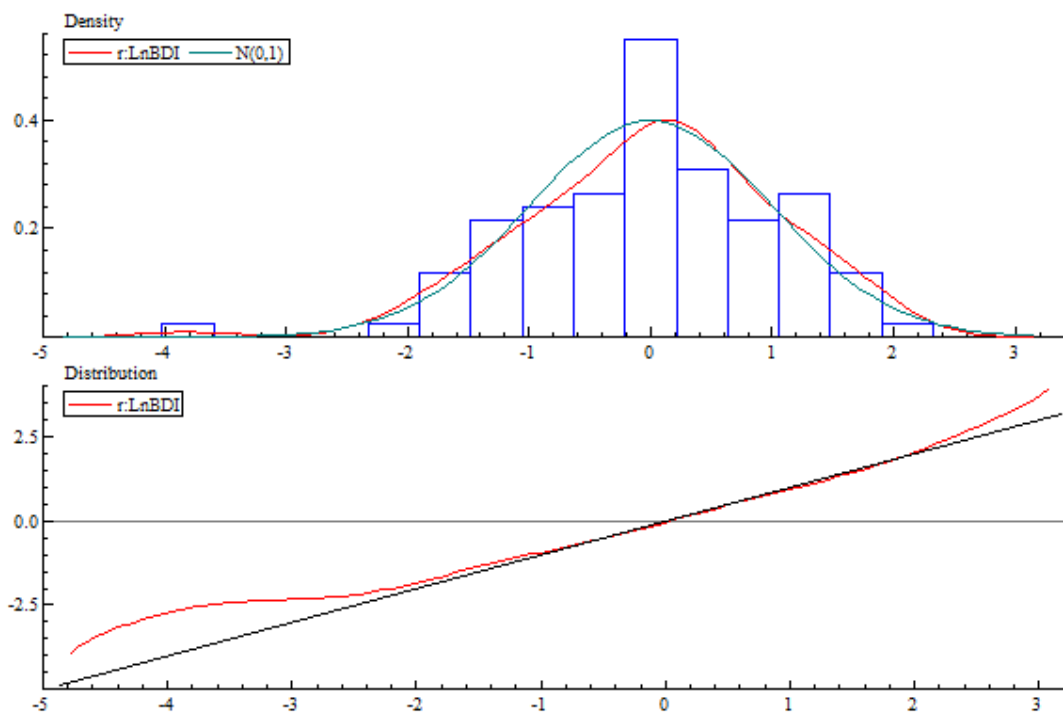
2010.

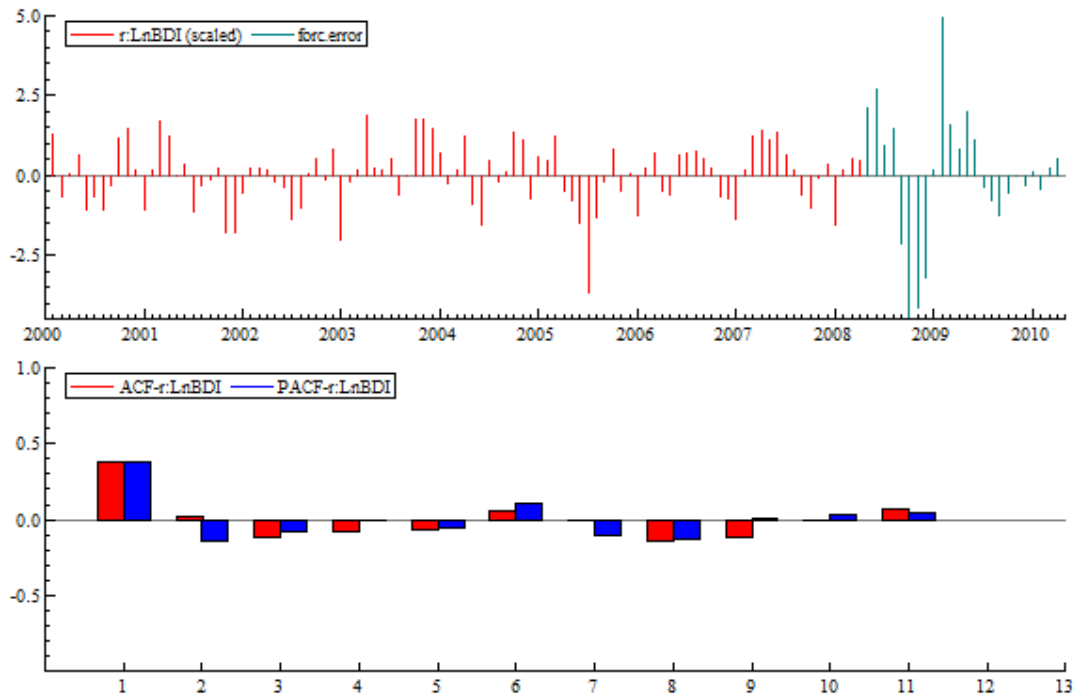


2008 ó 2010

BDI,

95%.





ö ö 2006,

mean(Error) = 0.0068606 RMSE = 0.36762

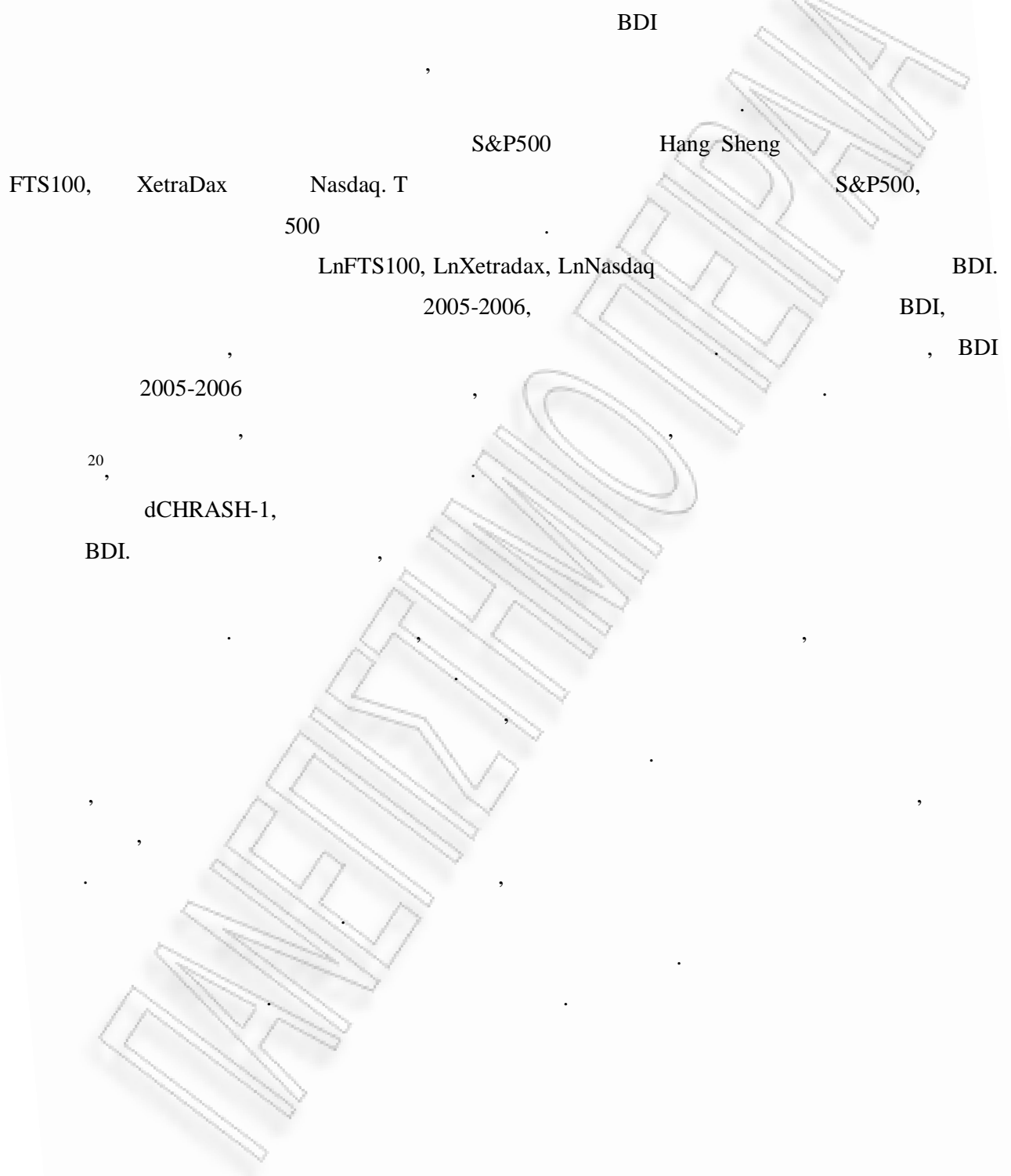
SD(Error) = 0.36756 MAPE = 2.8759

Forecast $\chi^2(24) = 101.87 [0.0000]**$

Chow $F(24,92) = 4.0783 [0.0000]**$

(p óvalue ,

0.05) CHOW test



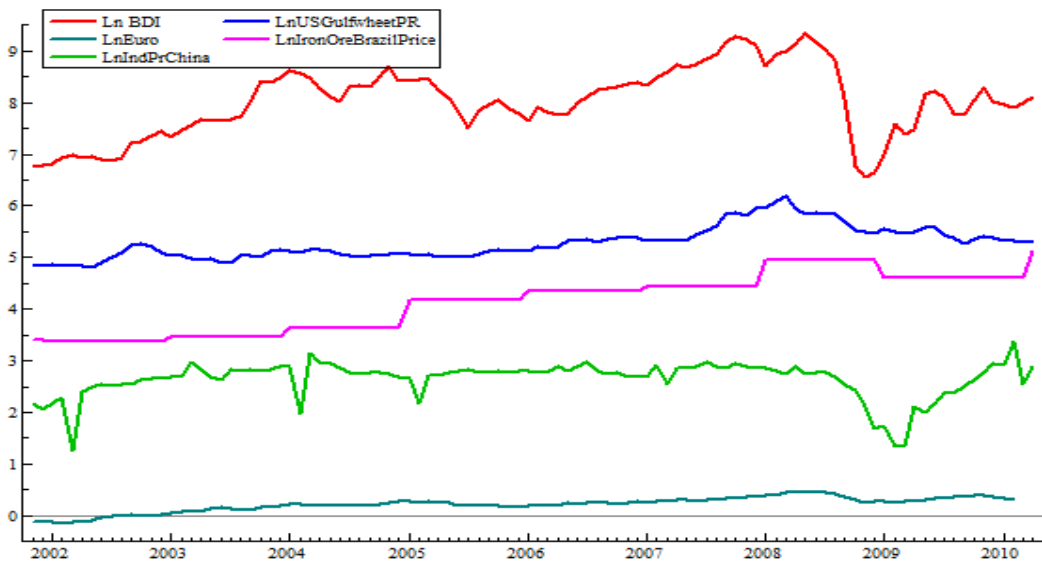
BDI
2001
2010. BDI

USGulfwheatPR: Wheat Price US gulf (\$/tonne)

IronOreBrazilPrice: Iron Ore Brazil Price (\$/tonne)

IndPrChina: Industrial Production China (% Yr/Yr)

Eur : /



BDI

$$\text{LnBDI} = 5.299 + 0.813 \text{ LnUSGulfwheatPR} - 0.902 \text{ LnIronOreBrazilPrice} + 0.433 \text{ LnIndPrChina} + 4.659 \text{ LnEuro}$$

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Constant	5.29975	0.9674	5.48	0.0000	0.2401
LnUSGulfwheatPR	0.813418	0.1972	4.12	0.0001	0.1518
LnIronOreBrazilPrice	-0.902249	0.1448	-6.23	0.0000	0.2901
LnIndPrChina	0.433173	0.1073	4.04	0.0001	0.1463
LnEuro	4.65946	0.5195	8.97	0.0000	0.4585

10%

(46%) BDI.

BDI.

BDI,

sigma	0.346887	RSS	11.4314191
R ²	0.751844	F(4,95) =	71.96 [0.000]**
log-likelihood	-33.4536	DW	0.54
no. of observations	100	no. of parameters	5
mean(Ln BDI)	8.02147	var(Ln BDI)	0.460654

ARCH 1-6 test: F(6,83) = 4.9772 [0.0002]**

AR 1-6 test: F(6,89) = 21.207 [0.0000]**

ARCH 1-6 test: F(6,83) = 4.9772 [0.0002]**

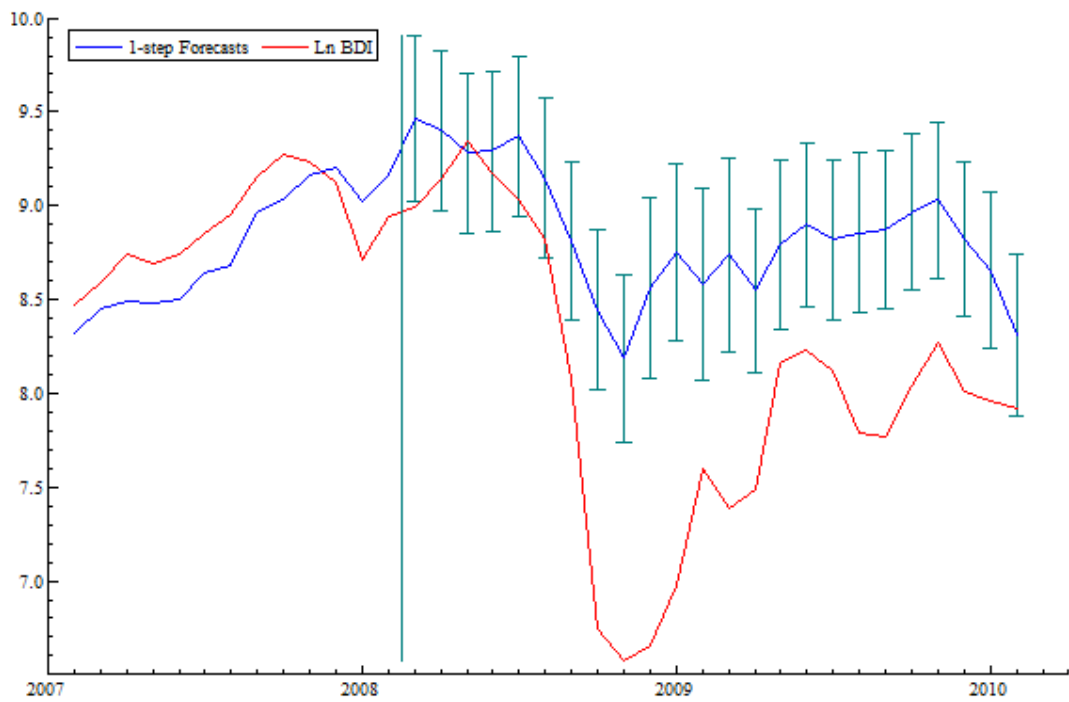
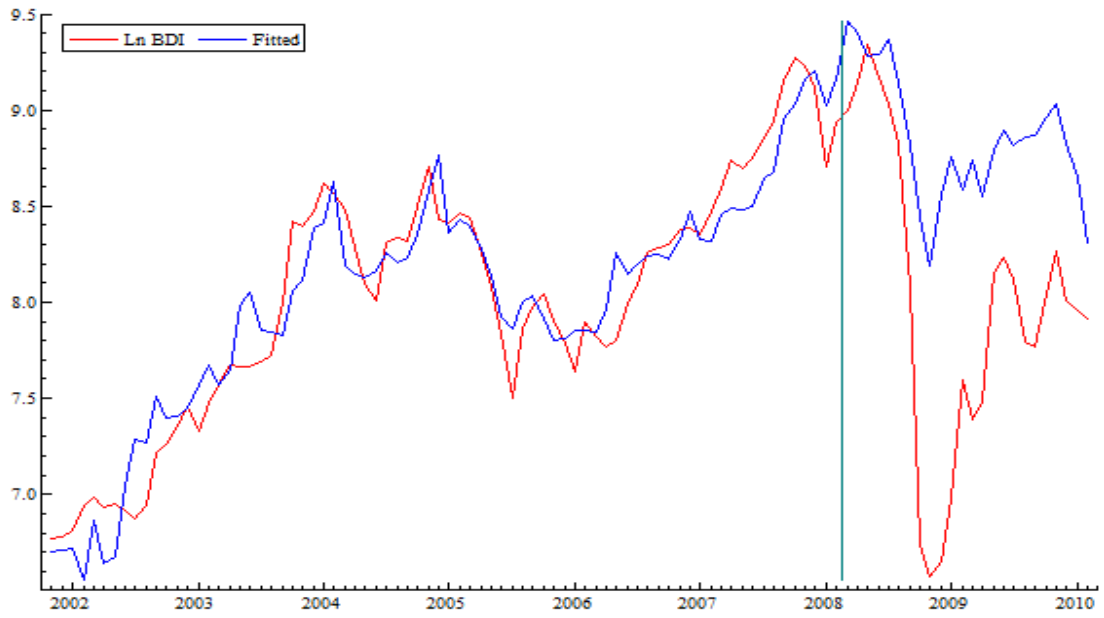
Normality test: Chi²(2) = 3.4945 [0.1743]

Hetero test: F(8,86) = 5.4330 [0.0000]**

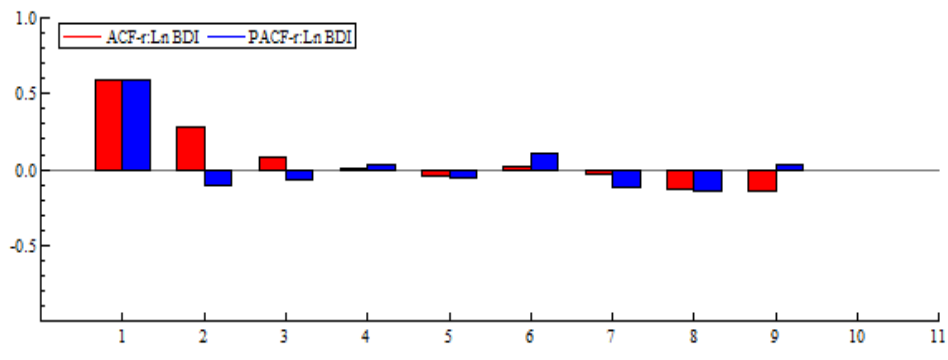
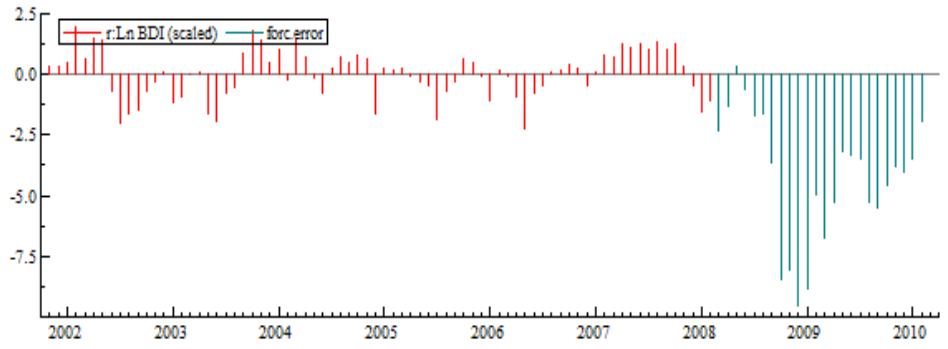
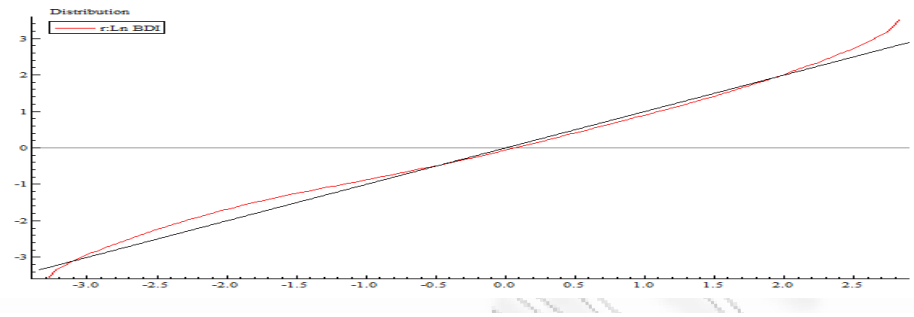
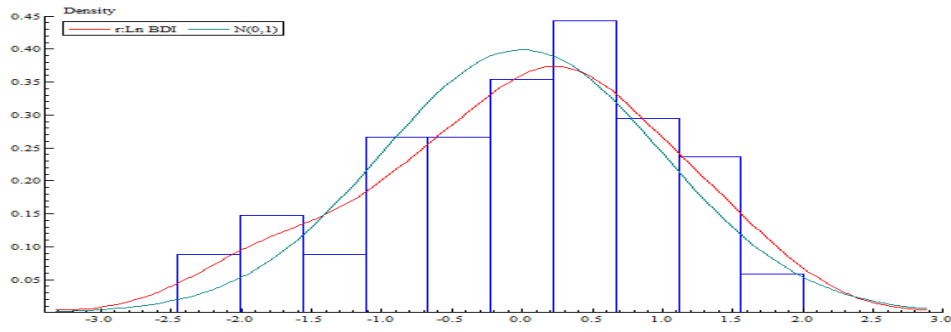
Hetero-X test: F(14,80) = 6.6556 [0.0000]**

RESET test: F(1,94) = 15.679 [0.0001]**

Variable	F-test	Value	[Prob]	Unit-root t-test
Constant	F(1,95) =	30.011	[0.0000]**	
LnUSGulfwheatPR	F(1,95) =	17.007	[0.0001]**	4.124
LnIronOreBrazilPrice	F(1,95) =	38.826	[0.0000]**	-6.2311
LnIndPrChina	F(1,95) =	16.285	[0.0001]**	4.0355
LnEuro	F(1,95) =	80.453	[0.0000]**	8.9696



95% δ δ
 ()



CHOW :

mean(Error) = -0.84797 RMSE = 0.99453

SD(Error) = 0.51964 MAPE = 9.4859

Forecast $\text{Chi}^2(24) = 587.96 [0.0000]**$

Chow $F(24,71) = 8.8392 [0.0000]**$

To p- value CHOW- 0.05 (. .),



BDI

()

BDI,

ПАВЕЛЪ ТИМО ТЕПАН

2.2.3

BDI

BDI

LIBOR

GrainUS: Grain Export US (M tonnes)

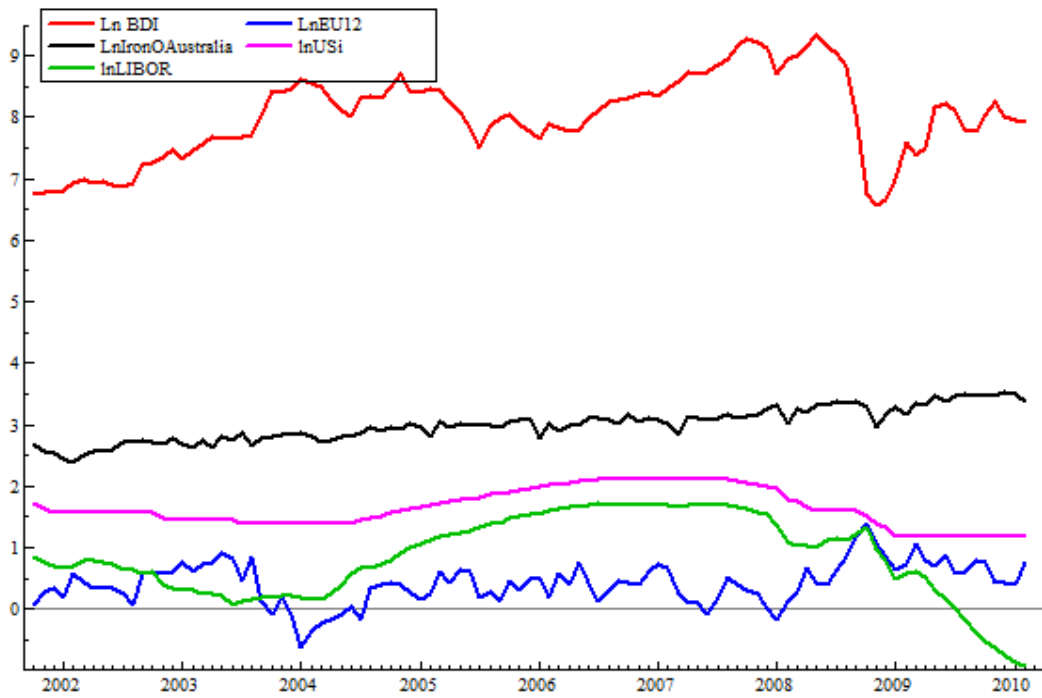
EU12: Grain Exports EU12 (M tonnes)

IronOAUstralia: Australia Iron Ore Exports (Millions tonnes)

Ln Euro: /

LnUSi: USA interest rates (%)

LIBOR: LIBOR interest rates (%)



BDI

$$\ln \text{BDI} = 7.81 + 0.91 \ln \text{GrainUS} - 0.4 \ln \text{EU12} - 1.22 \ln \text{IronOAustralia} + 5.25 \ln \text{Euro} - 0.33 \ln \text{LIBOR} + 0.86 \ln \text{USi}$$

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Constant	7.81320	0.7850	9.95	0.0000	0.5131
LnGrainUS	0.912622	0.2247	4.06	0.0001	0.1493
LnEU12	-0.400082	0.1040	-3.85	0.0002	0.1360
LnIronOAustralia	-1.21306	0.2411	-5.03	0.0000	0.2122
LnEuro	5.25456	0.4370	12.0	0.0000	0.6060
lnLIBOR	-0.330903	0.1138	-2.91	0.0045	0.0825
lnUSi	0.861316	0.2497	3.45	0.0008	0.1123

BDI.

o LIBOR

BDI.

R-sq: 83 %

sigma	0.294	RSS	8.12500216
R ²	0.82947	F(6,94) =	76.2 [0.000]**
log-likelihood	-16.044	DW	0.87
no. of observations	101	no. of parameters	7
mean(Ln BDI)	8.00896	var(Ln BDI)	0.47174

AR 1-6 test: F(6,88) = 10.343 [0.0000]**

ARCH 1-6 test: F(6,82) = 9.2786 [0.0000]**

Normality test: Chi²(2) = 9.3823 [0.0092]**

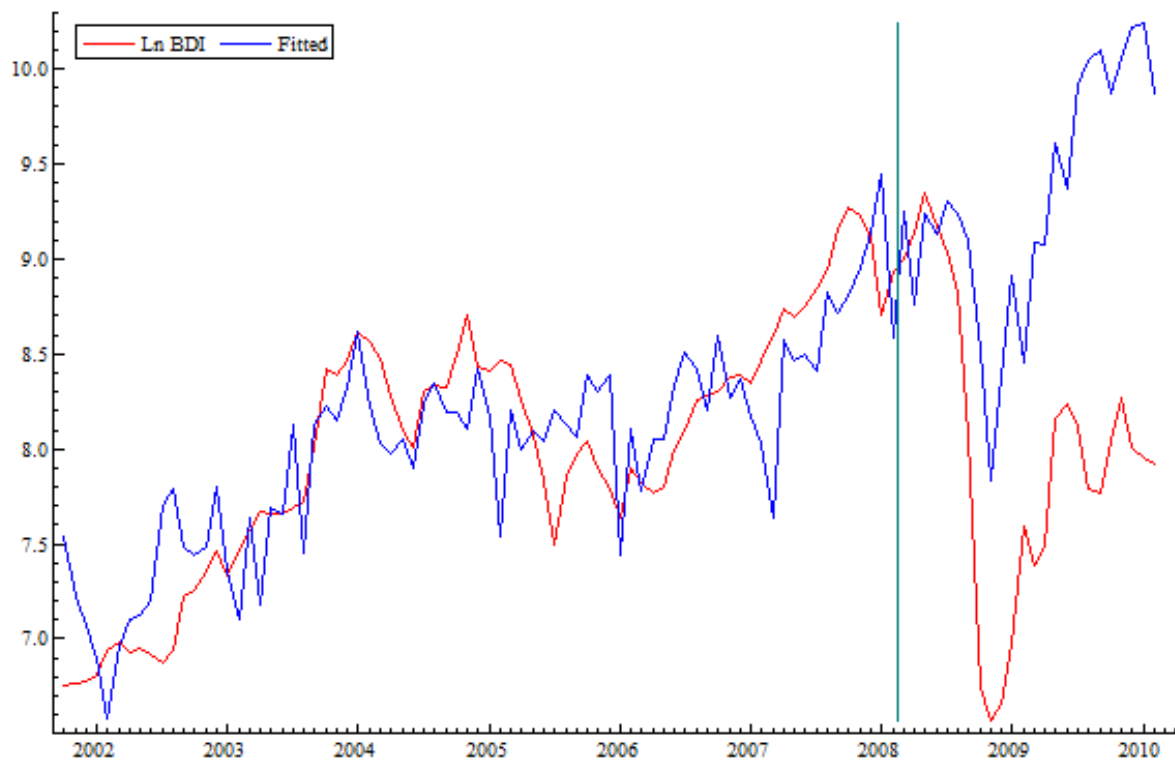
Hetero test: F(12,81) = 2.9959 [0.0016]**

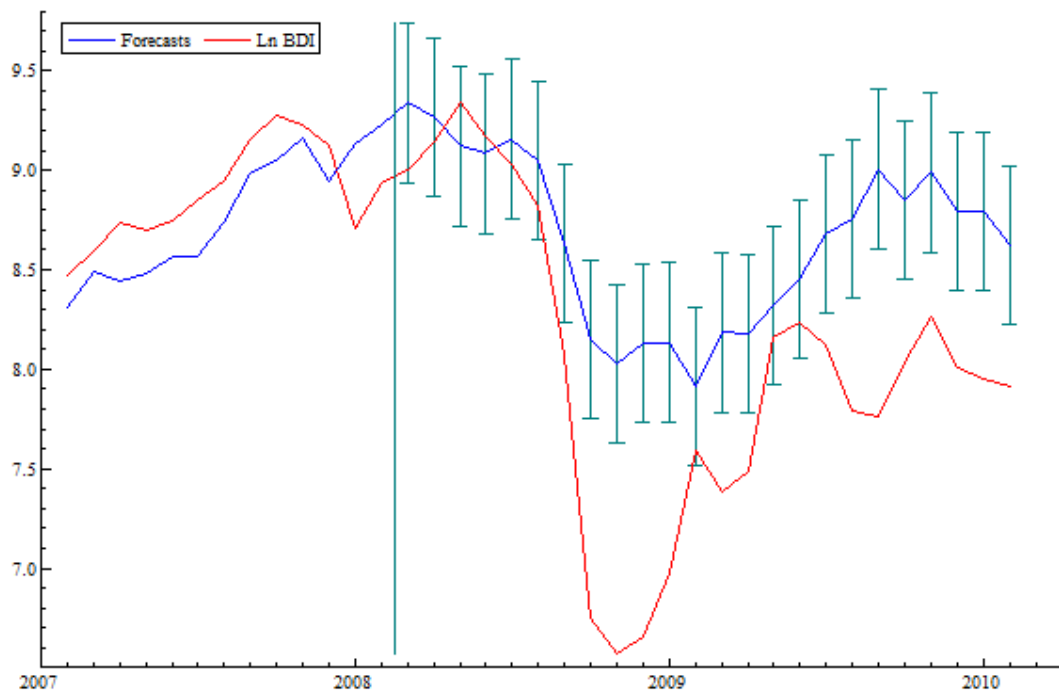
Hetero-X test: F(27,66) = 3.8918 [0.0000]**

Unit Root test,

:

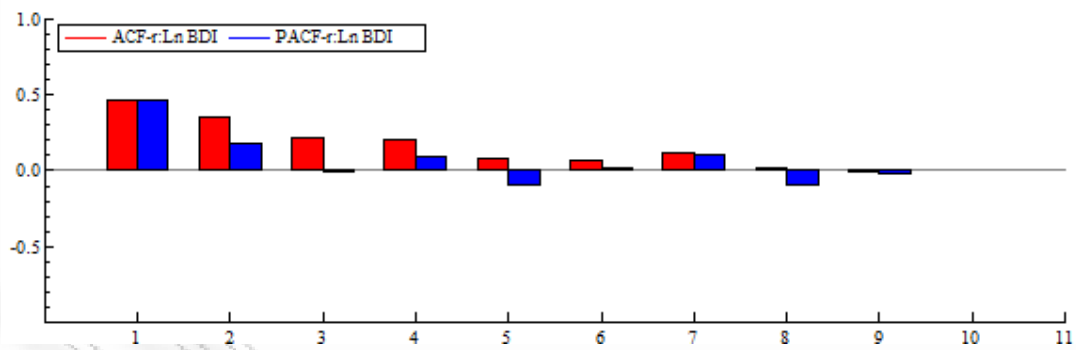
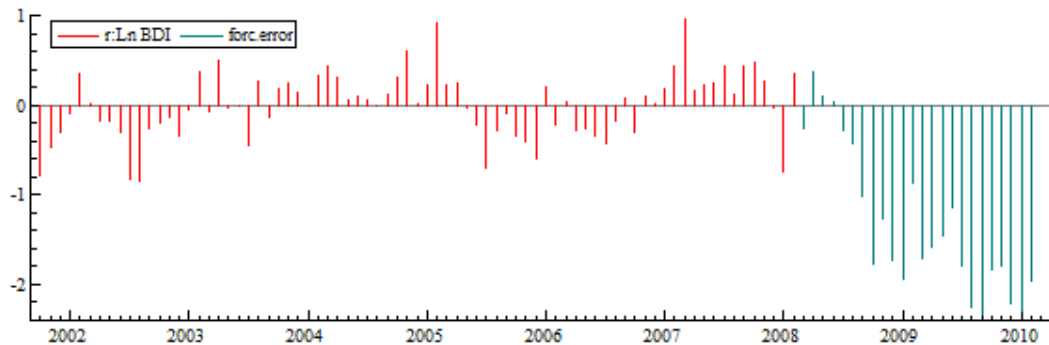
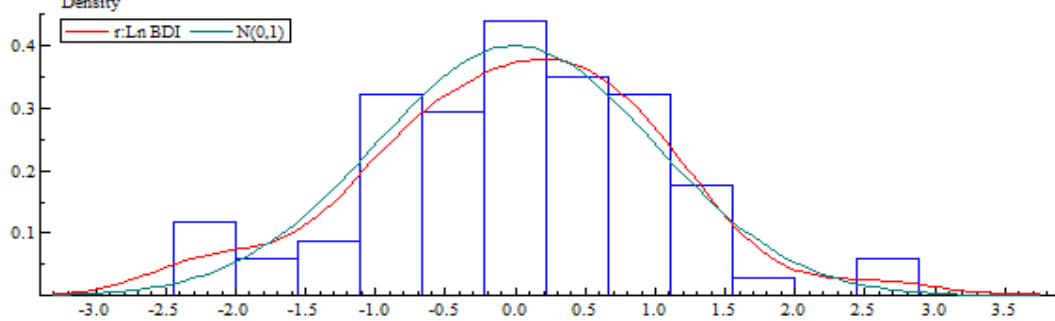
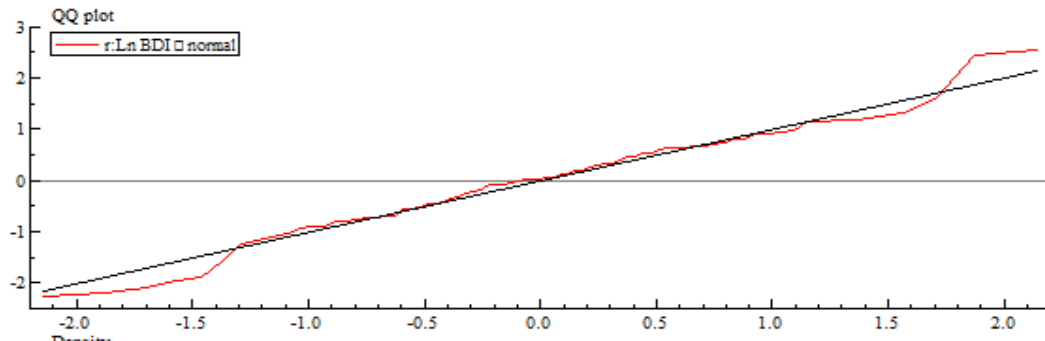
Variable	F-test	Value	[Prob]	Unit-root t-test
Constant	F(1,94)	= 99.067	[0.0000]**	
LnGrainUS	F(1,94)	= 16.493	[0.0001]**	4.0612
LnEU12	F(1,94)	= 14.795	[0.0002]**	-3.8464
LnIronOAUstralia	F(1,94)	= 25.318	[0.0000]**	-5.0317
LnUSDdollar	F(1,94)	= 144.57	[0.0000]**	12.024
LnLIBOR	F(1,94)	= 8.4566	[0.0045]**	-2.908
LnUSi	F(1,94)	= 11.896	[0.0008]**	3.4491





95%

PAWELCZAK



mean(Error) = -1.3054 RMSE = 1.5386

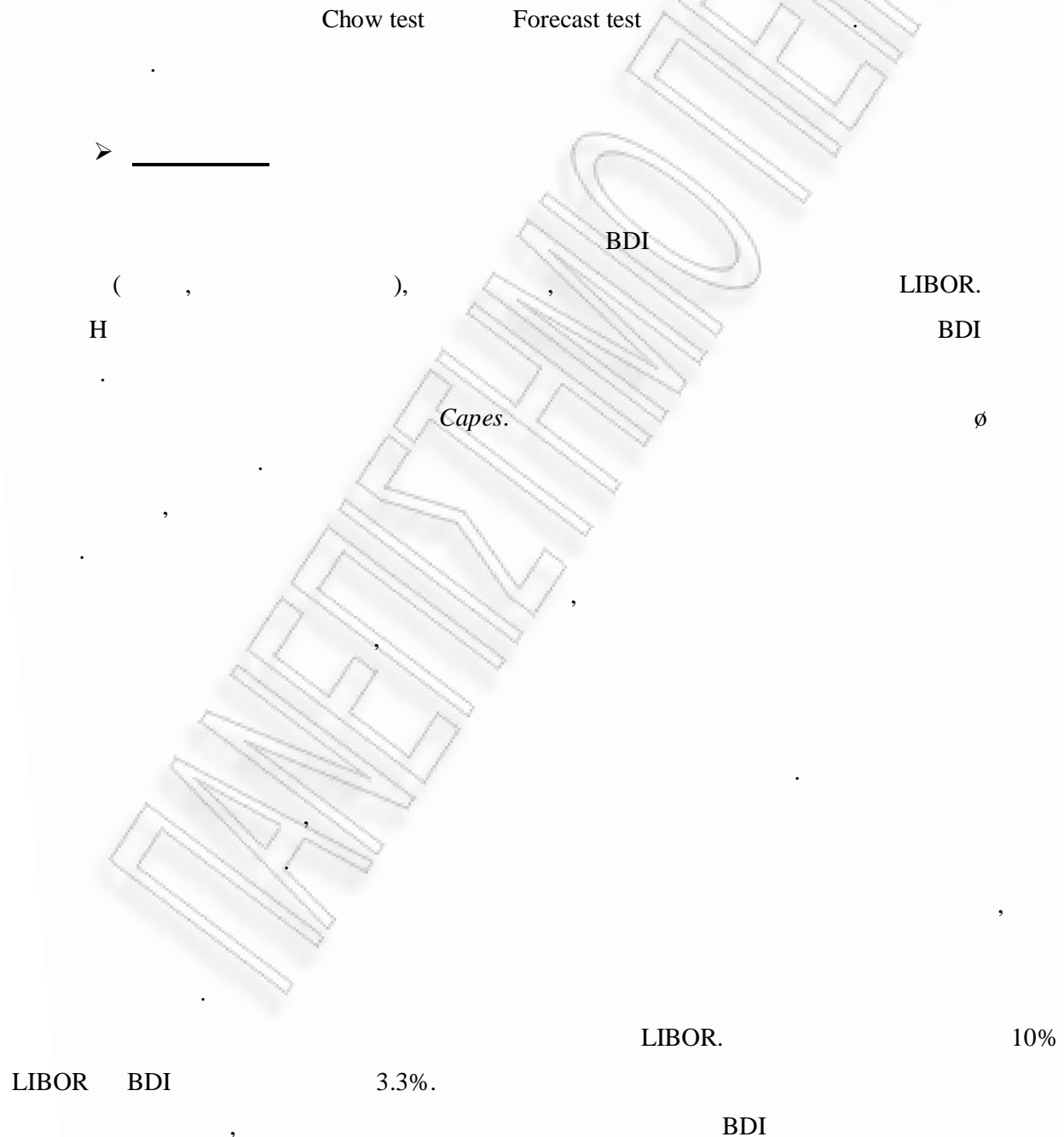
SD(Error) = 0.81422 MAPE = 15.000

1-step (ex post) forecast analysis 2008(3) - 2010(2)

Parameter constancy forecast tests:

Forecast $\chi^2(24) = 398.46 [0.0000]**$

Chow $F(24,71) = 3.0679 [0.0001]**$



LIBOR

BDI

ПАНЕЛЪТЪМО РЕПАА

2.2.4 BDI

T

2001

2010.

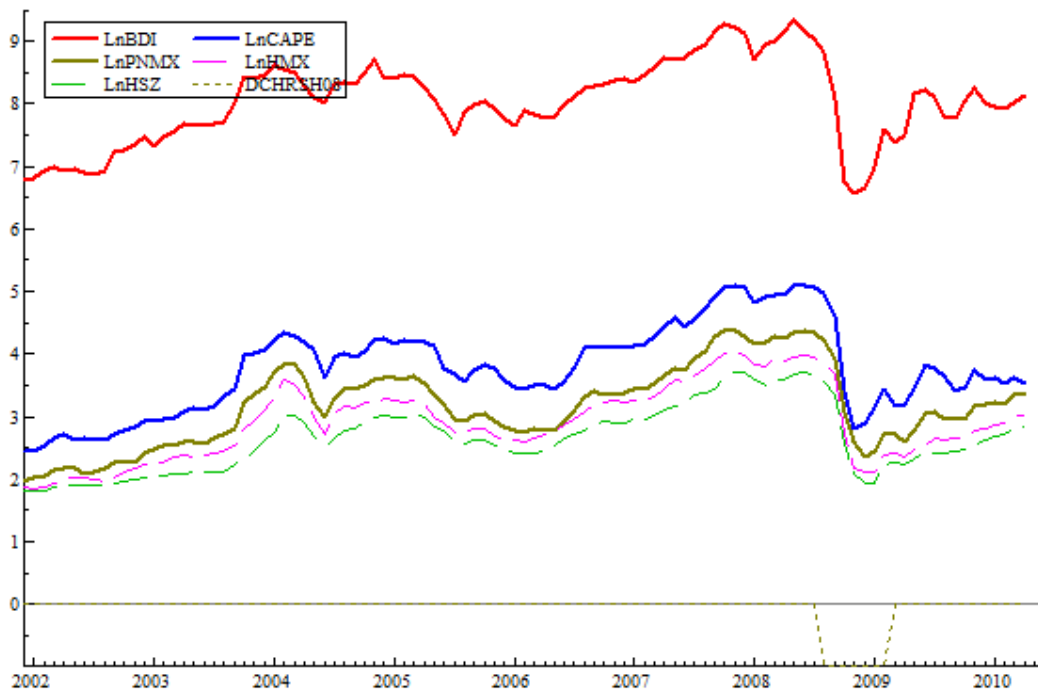
CAPE: 1-year Timecharter rates 170,000 dwt Bulkcarrier

HMX: 1- year Timecharter rates 45,000 dwt Bulkcarrier

HSZ: 1- year Timecharter rates 30,000 dwt Bulkcarrier

DCHRSH08: (ö-1ö ø8 öö

.)



$$\text{LnBDI} = 4.82 + 0.868 \text{ LnCAPE} + 0.556 \text{ LnHMX} - 0.616 \text{ LnHSZ} + 0.556 \text{ DCHRSH08}$$

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Constant	4.82238	0.08734	55.2	0.0000	0.9695
LnCAPE	0.868019	0.1133	7.66	0.0000	0.3794
LnHMX	0.555989	0.2007	2.77	0.0067	0.0740
LnHSZ	-0.616385	0.1746	-3.53	0.0006	0.1149
DCHRSH08	0.556392	0.05928	9.39	0.0000	0.4786

BDI,

öspotö

R-sq = 95%

Testing for heteroscedasticity using squares

Chi^2(7) = 20.998 [0.0038]**

and F-form F(7,88) = 3.2997 [0.0037]**

AR 1-2 test: F(2,94) = 6.1963 [0.0030]**

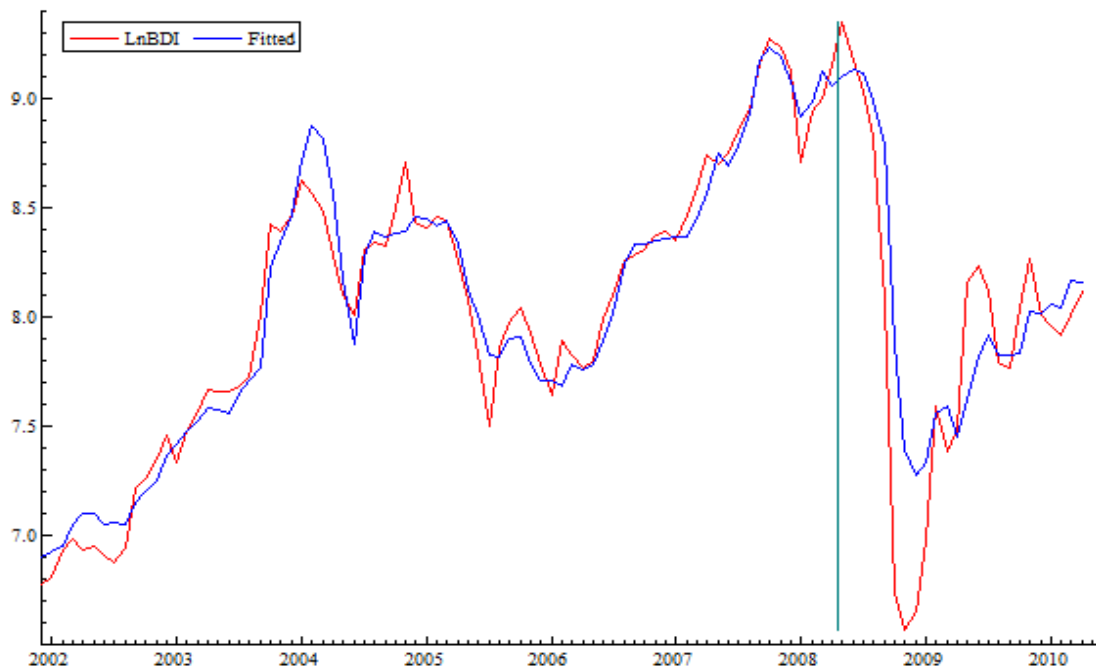
ARCH 1-1 test: F(1,94) = 0.03151 [0.8595]

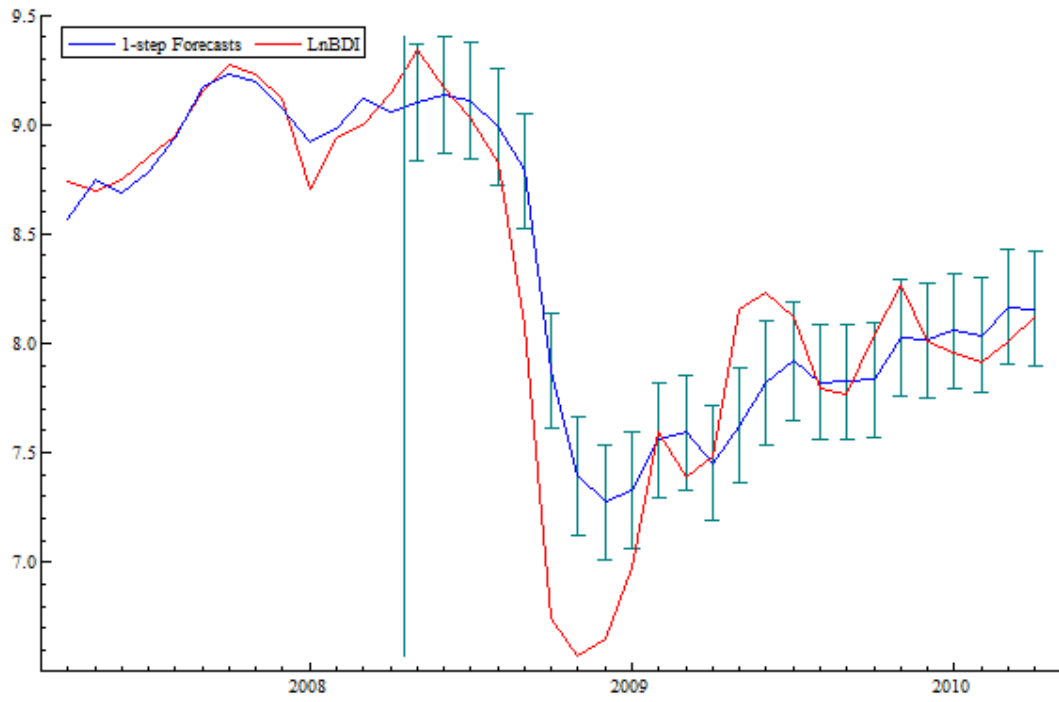
Normality test: Chi^2(2) = 7.5194 [0.0233]*

Hetero test: F(7,88) = 3.2997 [0.0037]**

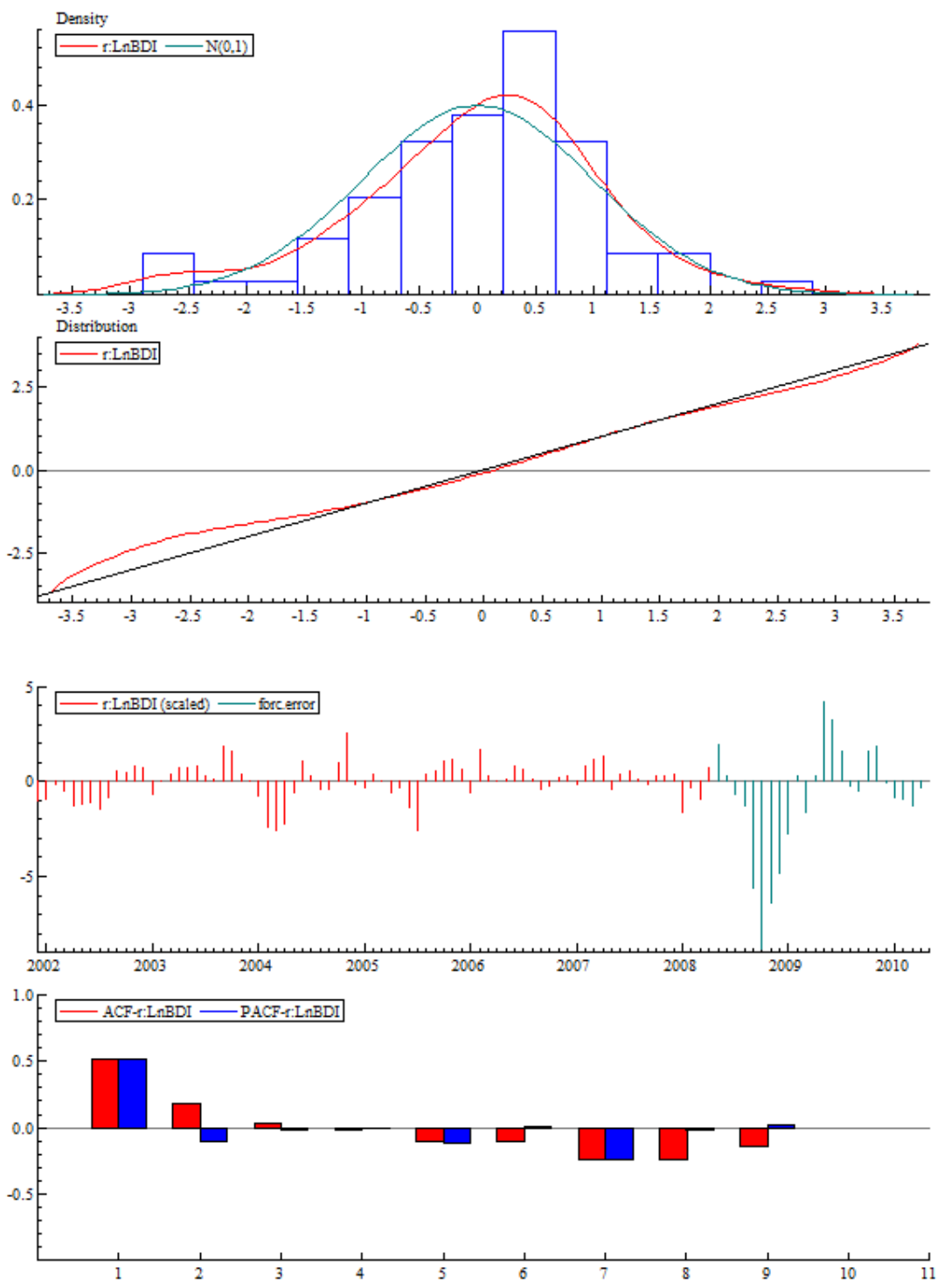
Hetero-X test: F(13,82) = 3.2190 [0.0006]**

Variable	F-test	Value	[Prob]	Unit-root t-test
Constant	F(1,96) =	3048.3	[0.0000]**	
LnCAPE	F(1,96) =	58.692	[0.0000]**	7.6611
LnHMX	F(1,96) =	7.6770	[0.0067]**	2.7707
LnHSZ	F(1,96) =	12.465	[0.0006]**	-3.5306
DCHRSH08	F(1,96) =	88.104	[0.0000]**	9.3864





PAWELCZAK



mean(Error) = -0.11154 RMSE = 0.39631

SD(Error) = 0.38029 MAPE = 2.9268

1-step (ex post) forecast analysis 2008(5) - 2010(4)

Parameter constancy forecast tests:

Forecast $\chi^2(24) = 229.02 [0.0000]**$

Chow $F(24,72) = 9.2646 [0.0000]**$

Chow test



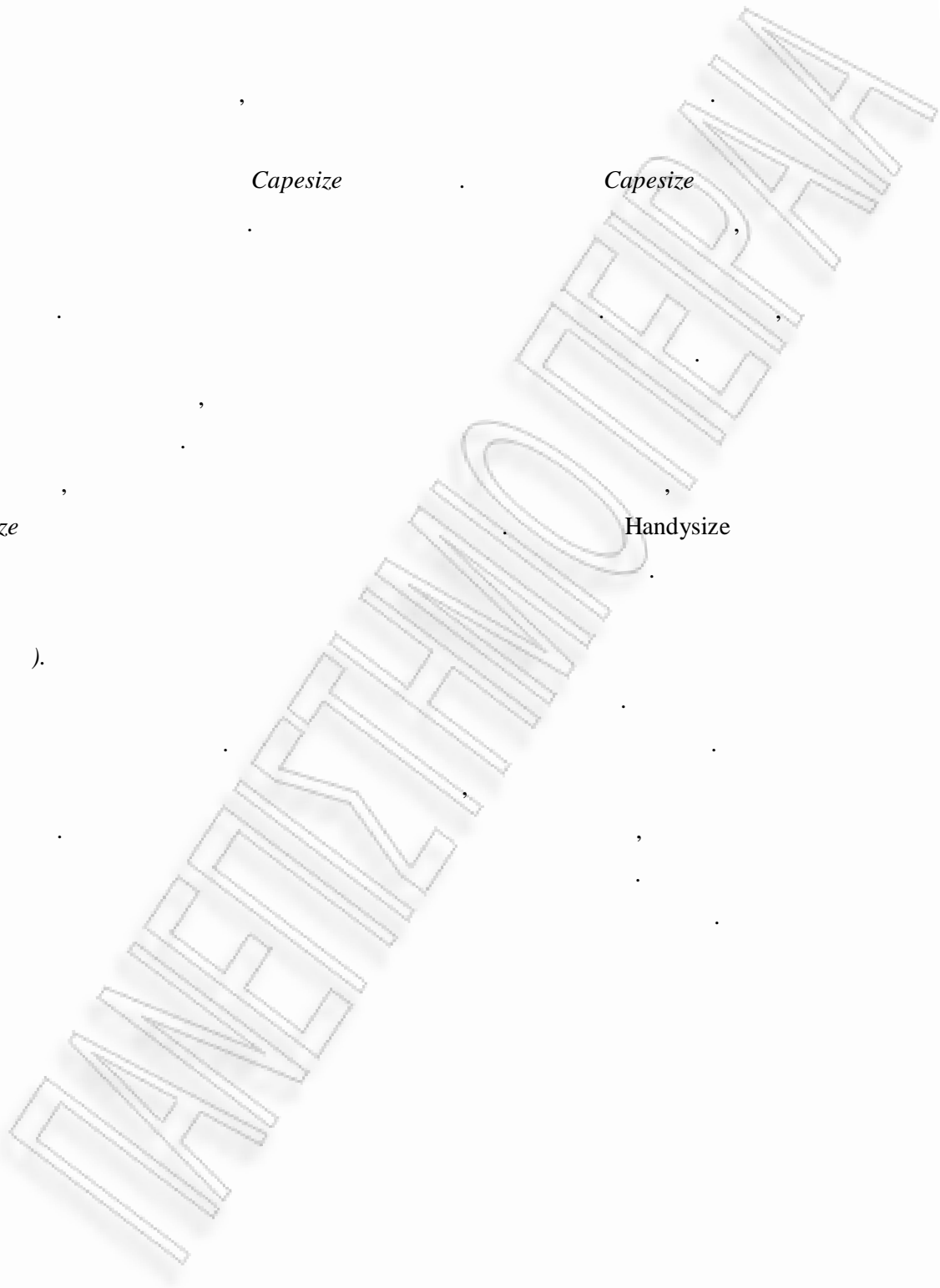
Capesize

Capesize

Handysize

Handysize

(spot)



3. _____

BDI
BDI

ACAIKE, SWARTZ

R-sq.

		R sq	AIC	SIC
MODEL 1	BDI vs Stock Markets	89%	-3,38	-3,20
MODEL 2	BDI vs Commodity Prices China Industrial Production	73%	-3,15	-2,99
MODEL 3	BDI vs Exports Euro/ Dollar Macroeconomic Policy	83%	-1,87	-1,69
MODEL 4	BDI vs Time Charter Rates	95%	-4,04	-3,89

δBDI vs Time Charter Ratesö (R-Adj,
AIC SIC).
(δBDI vs Stock Marketsö)

BDI.















МАКЕДОНСКО РЕПУБЛИКА

(õmajor indicatorö)

BDI

BDI

(õleading indicatorö)

-
-  . . . (2000). , ,
-  .. , , . . ., (2006). , .
-  . (1991). *Box- Jenkins,*
-  (2009). ,
-  (2002). & *Microsoft Excel,*
-  (2006). ,
-  ., (2010). *BFA ó Panamax* ,
-  (2005). ,
-  M (2004). *Volatility Clustering in Monthly Stock returns and Temporal Aggregation of stimulated data,*
-  E (2009). *(multipliers): Panamax 5-* ,
-  (2008). *Analystsø forecast dispersion and market uncertainty,*
-  (2007). *Index funds,*
-  (2009). *What drives the stock returns of maritime companies,*
-  Box and Jenkins, G.M. (1976). *Time series Analysis: Forecasting and Control,* Holden-Day.

- 📖 Francis X. Diebold (1998). *Elements of forecasting*, South- Western College Publishing
- 📖 James McConville , *Economics of Maritime transport*, Theory & practice, (1st Edition).
- 📖 Jeffrey M. Woolbridge (2006). *Shipping Economics*, Routledge
- 📖 Makridakis, S. G., S.C. Wheelwright, and R.J. Hyndman (1997), *Forecasting: Methods and applications*, John Wiley and Sons.
- 📖 Martin Stopford (1997). *Maritime Economics* 2nd edition, Routledge.
- 📖 Jan Tore Klovland (2002). *Business cycles, commodity prices and shipping freight rates: Some evidence from the pre- WWI period*, SNF report No48/02
- 📖 Martin Stopford (2007). *Will the next 50 years be as Chaotic in Shipping as the Last?*, 50th Anniversary Analysts' lunch, Conrad Hotel, 18th January, 2007.
- 📖 Martin Stopford (2009). *Forecasting - an impossible job? What will the global stimulus package do for shipping? Is it all about China? Are we heading for another dry bulk Bonanza?* Tradewinds Norshipping Conference, 10 June 2009.
- 📖 Ramasabramanian V. (2007). *Time Series Analysis* I.A.S.R.I. , Library Avenue New Delhi-110 012.
- 📖 Radmila Kocurkova. *Time series analysis and trends by using SPSS programme* , Lectures for Department of Mathematical Methods in Economics, Silesian University in Poava, Czech Republic.
- 📖 Robert Alan Yaffe (2007). *Stata 10. Time Series and Forecasting*, Journal of Statistical Software, December 2007, Vol.23, Software review 1.
- 📖 Tae Hyuo Rom (2006). *Forecasting the volatility of Stock Price Index*, 2nd International Conference data Mining & Applications, 424-435.
- 📖 G. Yin, Q. Zhang, and K. Yin (2003). *Constrained Stochastic Estimation Algorithms for a Class of Hybrid Stock Market Models*, Journal of Optimization Theory & Applications, Vol.118, No.1, pp.157-182.
- 📖 *Shipping Economics*, To *Shipping Economics*, Investment Research & Analysis Journal, http://www.iraj.gr/IRAJ/mass_psycology.pdf, 15/11/2010.
- 📖 *Shipping Economics*, *Costamare*, <http://www.naftemporiki.gr/news/pstory.asp?id=1885217>, 22/10/2010.

- 📖 Basenese Louis, The Baltic Dry Index: The only Economic Indicator Worth Tracking right now, <http://www.investimentu.com/2008/November/baltic-dry-index.html>, 28/5/2010.
- 📖 Daniel Gros (2003). The best economic indicator you've never heard of, <http://www.slate.com/id/2090303/> , 15/7/2010.
- 📖 Greg Atkinson (2011), The Global Economy, Baltic Dry Index, Gold and China, <http://www.shareswatch.com.au/blog/economy/the-global-economy-baltic-dry-index-gold-and-china/>, 25/7/2011.
- 📖 Primary Commodity Prices: <http://www.imf.org>, 16/7/2011.
- 📖 Rebel Trader (2009). *The Baltic Dry Index and the Markets: Forget the Correlation Myth*, <http://blog.rebeltraders.net/2009/08/30/the-baltic-dry-index-and-the-market-forget-the-correlation-myth/>, 28/5/2010
- 📖 Sean R. Avent, *Time Series Analysis an introduction*, <http://userwww.sfsu.edu/efc/classes/biol710/timeseries/TimeSeriesAnalysis/html>, 19/7/2010.
- 📖 Suzan Lee, BDI as a good tool to see global market, <http://www.marketoracle.co.uk/Article7290.html>, 28/5/2010
- 📖 The Baltic Exchange, <http://www.balticexchange.com/default.asp?action=article&ID=19>, 25/6/2011.
- 📖 United Nations Conference on Trade and Development (2010), Review of Maritime Transport 2010 , http://www.unctad.org/en/docs/rmt2010_en.pdf , 15/5/2011.
- 📖 <http://www.alphaliner.com/>
- 📖 <http://www.bloomberg.com/>
- 📖 <http://www.clarksons.com/>
- 📖 <http://finance.yahoo.com/>
- 📖 <http://www.naftemporiki.gr/>
- 📖 <http://researchreloaded.com/>
- 📖 <http://www.tradewinds.no/>
- 📖 .R.S. Brokers Quarterly review 2011