

## Appendices

### Appendix 1. Time series stability test

#### 1. Augmented Dickey - Fuller Unit Root Test on natural logarithm of CPI

ADF Test Statistic	-4.057251	1% Critical Value*	-3.5478
		5% Critical Value	-2.9127
		10% Critical Value	-2.5937

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(LCPI)<sup>1</sup>

Date: 03/01/98 Time: 14:56

Sample(adjusted): 1993:04 1997:12

Included observations: 57 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCPI(-1)	-0.038377	0.009459	-4.057251	0.0002
D(LCPI(-1))	0.415392	0.110924	3.744834	0.0004
C	0.467977	0.108763	4.302714	0.0001
R-squared	0.615259	Mean dependent var	0.117671	
Adjusted R-squared	0.601009	S.D. dependent var	0.164225	
S.E. of regression	0.103734	Akaike info criterion	-4.480661	
Sum squared resid	0.581076	Schwarz criterion	-4.373132	
Log likelihood	49.81935	F-statistic	43.17703	
Durbin-Watson stat	2.089031	Prob(F-statistic)	0.000000	

#### 2. Augmented Dickey - Fuller Unit Root Test on natural logarithm of M2.

ADF Test Statistic	-5.651930	1% Critical Value*	-3.5478
		5% Critical Value	-2.9127
		10% Critical Value	-2.5937

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(LM2)

Date: 03/01/98 Time: 14:58

Sample(adjusted): 1993:03 1997:11

Included observations: 57 after adjusting endpoints

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<sup>1</sup> D stands for difference.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LM2(-1)	-0.047795	0.008456	-5.651930	0.0000
D(LM2(-1))	0.121319	0.121983	0.994554	0.3244
C	0.789075	0.133504	5.910485	0.0000
R-squared	0.595536	Mean dependent var		0.100181
Adjusted R-squared	0.580555	S.D. dependent var		0.113339
S.E. of regression	0.073403	Akaike info criterion		-5.172379
Sum squared resid	0.290954	Schwarz criterion		-5.064850
Log likelihood	69.53330	F-statistic		39.75494
Durbin-Watson stat	1.670932	Prob(F-statistic)		0.000000

### 3. Augmented Dickey - Fuller Unit Root Test on ln of M2 without foreign deposits.

ADF Test Statistic	-3.114885	1% Critical Value*	-3.5501
		5% Critical Value	-2.9137
		10% Critical Value	-2.5942

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(LNMM,2)

Date: 03/01/98 Time: 14:59

Sample(adjusted): 1993:04 1997:11

Included observations: 56 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNMM(-1))	-0.374418	0.120203	-3.114885	0.0030
D(LNMM(-1),2)	-0.104323	0.128817	-0.809855	0.4216
C	0.031416	0.017378	1.807770	0.0763
R-squared	0.238535	Mean dependent var		-0.006657
Adjusted R-squared	0.209800	S.D. dependent var		0.102210
S.E. of regression	0.090857	Akaike info criterion		-4.744847
Sum squared resid	0.437518	Schwarz criterion		-4.636346
Log likelihood	56.39515	F-statistic		8.301322
Durbin-Watson stat	1.774764	Prob(F-statistic)		0.000731

### 4. Augmented Dickey - Fuller Unit Root Test on real GDP.

ADF Test Statistic	-3.429735	1% Critical Value*	-3.5572
		5% Critical Value	-2.9167
		10% Critical Value	-2.5958

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(LNY)

Date: 04/01/98 Time: 11:07

Sample(adjusted): 1993:05 1997:09

Included observations: 53 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNY(-1)	-0.185646	0.054129	-3.429735	0.0013
D(LNY(-1))	-0.013681	0.131445	-0.104079	0.9175
D(LNY(-2))	-0.137007	0.128339	-1.067535	0.2911
D(LNY(-3))	0.083180	0.130460	0.637594	0.5268
C	0.284143	0.088495	3.210840	0.0024
R-squared	0.223063	Mean dependent var		-0.014420
Adjusted R-squared	0.158318	S.D. dependent var		0.102500
S.E. of regression	0.094037	Akaike info criterion		-4.638549
Sum squared resid	0.424460	Schwarz criterion		-4.452673
Log likelihood	52.71781	F-statistic		3.445269
Durbin-Watson stat	1.968924	Prob(F-statistic)		0.014869

## 5. Augmented Dickey - Fuller Unit Root Test on natural logarithm of GDP deflator.

ADF Test Statistic	-4.306983	1% Critical Value*	-3.5478
		5% Critical Value	-2.9127
		10% Critical Value	-2.5937

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(LP)

Date: 03/01/98 Time: 15:00

Sample(adjusted): 1993:04 1997:12

Included observations: 57 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LP(-1)	-0.040985	0.009516	-4.306983	0.0001
D(LP(-1))	0.389241	0.110899	3.509877	0.0009
C	0.311150	0.066702	4.664796	0.0000
R-squared	0.616308	Mean dependent var		0.117121
Adjusted R-squared	0.602098	S.D. dependent var		0.164833
S.E. of regression	0.103976	Akaike info criterion		-4.476000
Sum squared resid	0.583791	Schwarz criterion		-4.368471
Log likelihood	49.68650	F-statistic		43.36901
Durbin-Watson stat	2.094086	Prob(F-statistic)		0.000000

## 6. Augmented Dickey - Fuller Unit Root Test on natural logarithm of M0.

ADF Test Statistic	-6.011853	1% Critical Value*	-3.5457
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5%	Critical Value	-2.9118
10%	Critical Value	-2.5932

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(LM0)

Date: 03/01/98 Time: 15:10

Sample(adjusted): 1993:03 1997:12

Included observations: 58 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LM0(-1)	-0.052193	0.008682	-6.011853	0.0000
D(LM0(-1))	-0.155229	0.106205	-1.461603	0.1495
C	0.483195	0.068898	7.013200	0.0000

R-squared	0.465301	Mean dependent var	0.115299
Adjusted R-squared	0.445858	S.D. dependent var	0.127830
S.E. of regression	0.095158	Akaike info criterion	-4.654104
Sum squared resid	0.498023	Schwarz criterion	-4.547530
Log likelihood	55.67060	F-statistic	23.93085
Durbin-Watson stat	1.873658	Prob(F-statistic)	0.000000

## 7. Augmented Dickey - Fuller Unit Root Test on natural logarithm of street exchange rate (data From Ukraine in Numbers, 1997, #24)

ADF Test Statistic	-2.025702	1%	Critical Value*	-3.5653
		5%	Critical Value	-2.9202
		10%	Critical Value	-2.5977

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(LCASHEXRATE)

Date: 03/04/98 Time: 15:45

Sample(adjusted): 1993:03 1997:07

Included observations: 50

Excluded observations: 3 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCASHEXRATE(-1)	-0.024947	0.012315	-2.025702	0.0485
D(LCASHEXRATE(-1))	0.298448	0.109949	2.714420	0.0093
C	0.032116	0.016192	1.983443	0.0532

R-squared	0.335732	Mean dependent var	0.064031
Adjusted R-squared	0.307466	S.D. dependent var	0.119925
S.E. of regression	0.099800	Akaike info criterion	-4.551057

Sum squared resid	0.468119	Schwarz criterion	-4.436335
Log likelihood	45.82949	F-statistic	11.87731
Durbin-Watson stat	2.353797	Prob(F-statistic)	0.000067

## *Appendix 2. Regression outputs*

### **1) LS // Dependent Variable is LOG(CPI)**

Date: 02/27/97 Time: 11:42

Sample(adjusted): 1993:03 1997:09

Included observations: 55 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNY	-0.509219	0.162796	-3.127965	0.0029
LNMM	0.307154	0.066641	4.609110	0.0000
LOG(CPI(-1))	0.659161	0.068740	9.589203	0.0000

R-squared	0.996866	Mean dependent var	10.37840
Adjusted R-squared	0.996746	S.D. dependent var	1.932509
S.E. of regression	0.110240	Akaike info criterion	-4.357185
Sum squared resid	0.631952	Schwarz criterion	-4.247694
Log likelihood	44.78096	F-statistic	8271.098
Durbin-Watson stat	0.896997	Prob(F-statistic)	0.000000

### **2) LS // Dependent Variable is (LCPI-0.5515015\*LCPI(-1))**

Date: 02/27/97 Time: 11:21

Sample(adjusted): 1993:04 1997:09

Included observations: 54 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
(LNY-0.5515015*LNY(-1))	-0.581223	0.149186	-3.895964	0.0003
(LNMM-0.5515015*LNMM(-1))	0.357472	0.060813	5.878204	0.0000
(LCPI(-1)-0.5515015*LCPI(-2))	0.600346	0.064373	9.326056	0.0000

R-squared	0.986258	Mean dependent var	4.764537
Adjusted R-squared	0.985719	S.D. dependent var	0.759563
S.E. of regression	0.090770	Akaike info criterion	-4.744908
Sum squared resid	0.420196	Schwarz criterion	-4.634408
Log likelihood	54.48983	F-statistic	1830.135
Durbin-Watson stat	1.998583	Prob(F-statistic)	0.000000

### **3) LS // Dependent Variable is LOG(CPI)**

Date: 02/27/97 Time: 11:38

Sample(adjusted): 1993:03 1997:09  
 Included observations: 55 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNY	-0.634603	0.149712	-4.238826	0.0001
LM2	0.346706	0.059151	5.861383	0.0000
LOG(CPI(-1))	0.615130	0.061587	9.987992	0.0000
R-squared	0.997342	Mean dependent var	10.37840	
Adjusted R-squared	0.997240	S.D. dependent var	1.932509	
S.E. of regression	0.101527	Akaike info criterion	-4.521866	
Sum squared resid	0.535999	Schwarz criterion	-4.412375	
Log likelihood	49.30969	F-statistic	9756.421	
Durbin-Watson stat	0.917286	Prob(F-statistic)	0.000000	

#### 4) LS // Dependent Variable is (LCPI-0.541357\*LCPI(-1))

Date: 02/27/97 Time: 11:40  
 Sample(adjusted): 1993:04 1997:09  
 Included observations: 54 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
(LNY-0.541357*LNY(-1))	-0.651639	0.137030	-4.755463	0.0000
(LM2-0.541357*LM2(-1))	0.376132	0.054070	6.956428	0.0000
(LCPI(-1)-0.541357*LCPI(-2))	0.576592	0.057802	9.975245	0.0000
R-squared	0.988791	Mean dependent var	4.869509	
Adjusted R-squared	0.988352	S.D. dependent var	0.778983	
S.E. of regression	0.084074	Akaike info criterion	-4.898172	
Sum squared resid	0.360487	Schwarz criterion	-4.787673	
Log likelihood	58.62797	F-statistic	2249.506	
Durbin-Watson stat	2.033189	Prob(F-statistic)	0.000000	

#### 5) LS // Dependent Variable is LOG(P)

Date: 02/27/97 Time: 11:34  
 Sample(adjusted): 1993:03 1997:09  
 Included observations: 55 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNY	-0.603371	0.153227	-3.937753	0.0003
LM2	0.338971	0.077773	4.358461	0.0001
LOG(P(-1))	0.622881	0.069949	8.904824	0.0000
C	-1.738085	0.674370	-2.577347	0.0129

R-squared	0.997257	Mean dependent var	5.814738
Adjusted R-squared	0.997096	S.D. dependent var	1.925534
S.E. of regression	0.103773	Akaike info criterion	-4.461144
Sum squared resid	0.549215	Schwarz criterion	-4.315157
Log likelihood	48.63986	F-statistic	6180.306
Durbin-Watson stat	0.919574	Prob(F-statistic)	0.000000

## 6) LS // Dependent Variable is (LP-0.540213\*LP(-1))

Date: 02/27/97 Time: 11:36

Sample(adjusted): 1993:04 1997:09

Included observations: 54 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
(LNY-0.540213*LNY(-1))	-0.624935	0.139571	-4.477540	0.0000
(LM2-0.540213*LM2(-1))	0.470925	0.089945	5.235715	0.0000
(LP(-1)-0.540213*LP(-2))	0.507703	0.074727	6.794152	0.0000
C	-1.370187	0.405941	-3.375340	0.0014

R-squared	0.989051	Mean dependent var	2.782934
Adjusted R-squared	0.988394	S.D. dependent var	0.776109
S.E. of regression	0.083612	Akaike info criterion	-4.891958
Sum squared resid	0.349545	Schwarz criterion	-4.744626
Log likelihood	59.46019	F-statistic	1505.516
Durbin-Watson stat	1.992738	Prob(F-statistic)	0.000000

## 7) LS // Dependent Variable is LOG(P)

Date: 02/27/97 Time: 11:23

Sample(adjusted): 1993:03 1997:09

Included observations: 55 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNY	-0.447306	0.165125	-2.708892	0.0091
LNMM	0.142900	0.036988	3.863414	0.0003
LOG(P(-1))	0.786101	0.047455	16.56529	0.0000

R-squared	0.996635	Mean dependent var	5.814738
Adjusted R-squared	0.996506	S.D. dependent var	1.925534
S.E. of regression	0.113818	Akaike info criterion	-4.293304
Sum squared resid	0.673639	Schwarz criterion	-4.183813
Log likelihood	43.02424	F-statistic	7701.563
Durbin-Watson stat	0.970865	Prob(F-statistic)	0.000000

**8) LS // Dependent Variable is (LP-0.5145675\*LP(-1))**

Date: 02/27/97 Time: 11:24

Sample(adjusted): 1993:04 1997:09

Included observations: 54 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
(LNY-0.5145675*LNY(-1))	-0.555094	0.160732	-3.453526	0.0011
(LNMM-0.5145675*LNMM(-1))	0.176808	0.035871	4.929002	0.0000
(LP(-1)-0.5145675*LP(-2))	0.732654	0.047578	15.39907	0.0000
R-squared	0.987218	Mean dependent var	2.931287	
Adjusted R-squared	0.986717	S.D. dependent var	0.825096	
S.E. of regression	0.095093	Akaike info criterion	-4.651844	
Sum squared resid	0.461178	Schwarz criterion	-4.541345	
Log likelihood	51.97710	F-statistic	1969.560	
Durbin-Watson stat	2.041991	Prob(F-statistic)	0.000000	

### **Appendix 3. Causality Test and Correlation among the variables.**

#### **Pairwise Granger Causality Tests**

Date: 04/03/98 Time: 17:11

Sample: 1993:01 1997:12

	Lags: 6			Lags: 3		
	Obs	F-Statistic	Probability	Obs	F-Statistic	Probability
Null Hypothesis:						
LNY does not Granger Cause LM2	51	2.44977	0.04223	54	0.28187	0.83822
LM2 does not Granger Cause LNY		2.22551	0.06152		3.06865	0.03683
LP does not Granger Cause LM2	52	2.04068	0.08317	55	2.15913	0.10508
LM2 does not Granger Cause LP		2.99506	0.01669		5.51853	0.00245
LCPI does not Granger Cause LM2	52	2.09180	0.07631	55	2.60633	0.06243
LM2 does not Granger Cause LCPI		3.96441	0.00344		5.72162	0.00198
LNY doesn't Granger Cause LNMM	51	1.40856	0.23669	54	0.64878	0.58766
LNMM doesn't Granger Cause LNY		3.46946	0.00783		3.33146	0.02729
LP does not Granger Cause LNMM	52	0.39413	0.87828	55	0.43338	0.73007
LNMM does not Granger Cause LP		2.58262	0.03333		4.32739	0.00886
LCPI don't Granger Cause LNMM	52	0.60774	0.72252	55	0.72451	0.54234
LNMM don't Granger Cause LCPI		3.56759	0.00651		4.95355	0.00447

#### **Correlation matrix**

	LM2	LNMM
LNY	-0.877779	-0.876036

#### **Appendix 4. Time Series.**

obs	CPI	EXRATE	M0	M2	MM	P	Y
1993:01	NA	0.009470	3.293900	33520.00	30110.00	NA	9.450000
1993:02	174.5974	0.013410	7.644000	38250.00	32920.00	1.854282	9.660000
1993:03	213.1834	0.020100	8.999150	60887.07	46867.07	2.184030	10.53500
1993:04	263.4947	0.030020	10.86440	67040.00	49670.00	2.652667	10.78000
1993:05	336.2193	0.030130	11.72762	71860.00	51830.00	3.631983	9.380000
1993:06	577.2885	0.038050	16.81617	106653.4	79323.35	6.517505	7.455000
1993:07	794.3490	0.047510	25.93098	155490.0	121340.0	8.776212	8.330000
1993:08	966.7227	0.080220	28.28061	238120.0	195770.0	11.11100	9.275000
1993:09	1743.001	0.137020	51.85616	306596.2	260086.2	19.84066	7.735000
1993:10	2895.125	0.256960	76.64900	353299.0	302469.0	30.10345	7.875000
1993:11	4206.616	0.311500	90.32658	409966.6	356906.6	42.27660	6.615000
1993:12	8026.224	0.308000	127.6860	480616.0	381616.0	78.44409	5.000000
1994:01	9567.259	0.305000	157.3844	499430.4	394107.4	94.80480	4.400000
1994:02	10782.30	0.302000	193.5659	571811.9	457239.9	107.9991	4.400000
1994:03	11396.89	0.301690	230.3331	680711.1	549038.1	114.6418	5.000000
1994:04	12080.70	0.341650	283.0067	781104.6	677876.7	121.5204	4.900000
1994:05	12708.90	0.396490	278.3890	899341.1	753889.1	126.5063	4.700000
1994:06	13204.55	0.399700	332.7644	1082044.	932924.4	130.8758	5.200000
1994:07	13481.84	0.399700	402.8621	1277246.	1101912.	134.5901	5.700000
1994:08	13832.37	0.402180	442.2559	1578798.	1390806.	140.0502	5.000000
1994:09	14842.14	0.470180	520.1621	1862825.	1604612.	152.1479	5.600000
1994:10	18196.46	0.714860	569.3001	2252617.	1692340.	183.3296	5.700000
1994:11	31352.50	0.934390	693.8463	2834720.	1875406.	335.8323	5.100000
1994:12	40256.61	1.081960	793.1067	3215694.	2194537.	437.2181	4.600000
1995:01	48791.01	1.093310	827.9200	3218276.	2087006.	544.7450	4.400000
1995:02	57622.18	1.222250	955.5400	3643179.	2318059.	627.2899	4.100000
1995:03	64191.11	1.324160	1134.440	3935191.	2681291.	693.1955	4.400000
1995:04	67914.19	1.316680	1473.980	4244744.	3063214.	731.3586	4.300000
1995:05	71038.24	1.309210	1497.800	4702850.	3330160.	772.6668	4.400000
1995:06	74448.08	1.420360	1782.410	5296625.	3854475.	822.2340	5.000000
1995:07	78319.38	1.440320	2028.400	5930998.	4385618.	861.7804	4.980000
1995:08	81922.07	1.606930	2106.950	6216922.	4550642.	915.1855	5.280000
1995:09	93555.01	1.656640	2235.270	6386319.	4644009.	1029.028	4.900000
1995:10	102068.5	1.746730	2121.790	6232016.	4548386.	1125.333	4.920000
1995:11	108396.8	1.779550	2226.010	6234572.	4598622.	1185.363	4.790000
1995:12	113383.0	1.795540	2623.300	6846329.	5269299.	1229.741	4.540000
1996:01	124041.0	1.829530	2575.410	6514340.	4987690.	1314.097	4.590000
1996:02	133220.0	1.881090	2799.090	6805490.	5297070.	1387.115	4.380000
1996:03	137216.6	1.890190	2800.070	7086180.	5562160.	1428.173	4.360000
1996:04	140509.8	1.872160	3077.180	7186880.	5698140.	1457.319	4.460000
1996:05	141493.4	1.844500	3190.240	7339320.	5852650.	1468.098	4.310000
1996:06	141634.9	1.818270	3324.000	7522330.	6076550.	1471.316	3.990000
1996:07	141776.6	1.779320	3616.660	7861030.	6454230.	1475.715	4.720000
1996:08	149857.8	1.760200	3190.000	7539840.	6162150.	1528.611	4.430000
1996:09	152854.9	1.760000	3330.000	7592800.	6220800.	1553.269	4.090000
1996:10	155147.7	1.820000	3471.000	7821000.	6407000.	1568.205	4.490000
1996:11	157009.5	1.874000	3499.000	7996000.	6434000.	1587.024	4.150000
1996:12	158422.6	1.886000	4040.000	9023550.	7305550.	1601.307	4.590000

1997:01	161907.9	1.879000	4087.168	9003170.	7511170.	1625.546	3.670000
1997:02	163850.8	1.836000	4142.536	9083540.	7598540.	1640.149	3.660000
1997:03	164014.7	1.845000	4305.910	9515000.	8041000.	1644.866	4.340000
1997:04	165326.8	1.840000	4763.000	10041000	8474000.	1658.644	4.370000
1997:05	166649.4	1.860000	4846.900	10263000	8716000.	1668.790	4.350000
1997:06	166816.1	1.860000	5102.000	10971000	9279000.	1672.339	4.250000
1997:07	166982.9	1.860000	5549.000	11413000	9735000.	1675.898	4.450000
1997:08	166982.9	1.860000	6242.000	12259000	10530000	1675.898	4.440000
1997:09	168986.7	1.870000	6031.000	12222000	10464000	1689.061	5.020000
1997:10	170507.6	1.880000	5865.000	11760000	10123000	1705.527	NA
1997:11	172042.1	1.890000	5713.000	11550000	9927000.	1713.846	NA
1997:12	174450.7	1.900000	6132.000	NA	NA	1732.099	NA

## **Appendix 5. Glossary<sup>i</sup>**

**Cointegration** means that despite being individually nonstationary, a linear combination of two or more time series can be stationary.

**Dickey - Fuller tests** – tests for detecting nonstationarity based on the  $\tau$  (tau) statistics, whose critical value was tabulated by Dickey and Fuller.

**Durbin - Watson tests** – tests for detecting serial correlation developed by statisticians Durbin and Watson.

**First order moving average or MA(1) scheme**– the error-generating scheme obtained by taking the average of two adjacent random variables.

**Granger Causality Test** – a test for determining the direction of causation between two time series.

**M0** – money aggregate that includes currency in cash.

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<sup>i</sup> Glossary was constructed on the basis of **Gujaraty D.** Op. Cit.