Appendix

Appendix A1: Results from unit root tests without structural breaks

Level	Test specification	ADF (AIC)	ADF (BIC)	PP	KPSS	First difference	Test specification	ADF (AIC)	ADF (BIC)	PP	KPSS	Order of integration
log(cc_sa)	constant	-2.43	-2.70 **	-2.94 **	0.88 ***	dlog(cc_sa)	constant	-3.26 **	-3.26 **	-6.02 ***	0.58 **	I(1)
	constant and trend	-0.23	0.30	0.01	0.21 **							
log(m1_sa)	constant	-1.25	-1.25	1.38	0.89 ***	dlog(m1_sa)	constant	-3.03 **	-3.03 **	-6.07 ***	0.25	I(1)
	constant and trend	-1.44	-1.44	0.79	0.16 **							
log(m2_sa)	constant	-1.52	-1.52	-1.18	0.91 ***	dog(m2_sa)	constant	-2.32	-2.32	-6.43 ***	0.24	I(1)
	constant and trend	-1.56	0.15	-0.64	0.17 **							
log(hicp_sa)	constant	-1.58	-0.76	-0.65	0.91 ***	dlog(hicp_sa)	constant	-3.63 ***	-4.95 ***	-4.99 ***	0.10	I(1)
	constant and trend	-2.53	-2.06	-1.94	0.07							
log(hicp_c_sa)	constant	-0.91	-0.17	-0.89	0.88 ***	dlog(hicp_c_sa)	constant	-2.20	-3.76 ***	-4.15 ***	0.11	I(1)
	constant and trend	-3.87 **	-2.31	-1.62	0.12 *							
log(ppi)	constant	0.03	0.03	0.11	0.93 ***	dlog(ppi)	constant	-4.70 ***	-4.70 ***	-4.76 ***	0.08	I(1)
	constant and trend	-2.78	-2.78	-2.15	0.11							
log(gdp_p_sa)	constant	0.91	-0.19	-0.12	0.91 ***	dlog(gdp_p_sa)	constant	-8.96 ***	-8.83 ***	-9.05 ***	0.11	I(1)
	constant and trend	0.11	-3.14	-3.19 *	0.13 *							

Notes:
*** indicates statistical significance at 1% level, ** indicates statistical significance at 5% level, * indicates statistical significance at 10% level
cc - currency in circulation; m1 - monetary aggregate M1; m2- monetary aggregate M2; hicp - harmonized index of consumer prices; hicp_c - harmonized index of consumer prices (core); ppi - producer price index; gdp_p - GDP deflator; "_sa" indicates seasonal adjustment
No presence of seasonality was detected for the producer price index.
ADF, PP and KPSS indicate Augmented Dickey-Fuller, Phillips-Perron and Kwiatkowski–Phillips–Schmidt–Shin unit root tests respectively;
ADF (AIC) and ADF (BIC) denote ADF unit root tests based on Akaike and Schwarz information criterion respectively

Appendix A2: Results from Clemente, Montañés and Reyes unit root test (1998) with double mean shifts (null hypothesis of a unit root)

Level	Additive outliers		Innovational outliers		First difference	Additive outliers		Innovational outliers		Order of integration of the variable
	t-stat.	No. structural breaks	t-stat.	No. structural breaks		t-stat.	No. structural breaks	t-stat.	No. structural breaks	
log(cc_sa)	-3.30	2	-5.24	0	**dlog(cc_sa)**	-9.53 **	2	-9.30 **	2	I(1)
log(m1_sa)	-3.21	2	-2.85	1	**dlog(m1_sa)**	-8.07 **	1	-7.90 **	1	I(1)
log(m2_sa)	-2.41	2	-4.09	2	**dlog(m2_sa)**	-5.86 **	1	-9.29 **	1	I(1)
log(hicp_sa)	-2.75	2	-4.24	2	**dlog(hicp_sa)**	-6.05 **	2	-6.40 **	2	I(1)
log(hicp_c_sa)	-3.55	2	-7.46 **	2	**dlog(hicp_c_sa)**	-6.61 **	2	-7.05 **	2	I(1)
log(ppi)	-3.64	2	-2.44	1	**dlog(ppi)**	-6.12 **	0	-7.36 **	2	I(1)
log(gdp_p_sa)	-2.80	2	-1.63	0	**dlog(gdp_p_sa)**	-6.47 **	0	-9.52 **	0	I(1)

Notes:
cc- currency in circulation; m1 - monetary aggregate M1; m2- monetary aggregate M2; hicp - harmonized index of consumer prices; hicp_c - harmonized index of consumer prices (core); ppi - producer price index; gdp_p - GDP deflator; "_sa" indicates seasonal adjustment
No presence of seasonality was detected for the producer price index.
Number of structural breaks indicates significant structural breaks at 5% significance level.
** indicates statistical significance at 5% level

Appendix B: Correlograms

Correlogram of dlog(hicp_sa)
Sample: 1999Q1 - 2012Q1
Included observations: 53

Lag	AC	PAC	Q-Stat	Prob
1	0.352 **	0.352 **	6.95	0.01
2	0.113	-0.013	7.67	0.02
3	0.087	0.059	8.12	0.04
4	-0.015	-0.072	8.13	0.09
5	-0.091	-0.076	8.63	0.13
6	-0.149	-0.108	10.01	0.12
7	-0.024	0.085	10.05	0.19
8	0.027	0.032	10.10	0.26
9	0.098	0.105	10.73	0.29
10	0.021	-0.079	10.76	0.38
11	-0.242	-0.306 **	14.81	0.19
12	-0.232	-0.116	18.64	0.10
13	0.002	0.205	18.64	0.14
14	-0.118	-0.096	19.68	0.14
15	-0.142	-0.054	21.23	0.13
16	-0.032	-0.048	21.31	0.17

Correlogram of dlog(hicp_c_sa)
Sample: 1999Q1 - 2012Q1
Included observations: 53

Lag	AC	PAC	Q-Stat	Prob
1	0.827 **	0.827 **	38.34	0.00
2	0.680 **	-0.011	64.80	0.00
3	0.567 **	0.024	83.56	0.00
4	0.355 **	-0.375 **	91.05	0.00
5	0.222	0.100	94.05	0.00
6	0.072	-0.227	94.37	0.00
7	-0.070	0.040	94.68	0.00
8	-0.133	-0.025	95.83	0.00
9	-0.200	0.020	98.49	0.00
10	-0.243	-0.068	102.49	0.00
11	-0.302 **	-0.212	108.81	0.00
12	-0.389 **	-0.196	119.55	0.00
13	-0.400 **	0.057	131.22	0.00
14	-0.395 **	0.038	142.87	0.00
15	-0.424 **	-0.144	156.68	0.00
16	-0.410 **	-0.062	169.91	0.00

Correlogram of dlog(cc_sa)
Sample: 1999Q1 - 2012Q1
Included observations: 53

Lag	AC	PAC	Q-Stat	Prob
1	0.304 **	0.304 **	5.17	0.02
2	0.378 **	0.315 **	13.35	0.00
3	0.318 **	0.175	19.23	0.00
4	0.262	0.069	23.31	0.00
5	0.157	-0.058	24.81	0.00
6	0.221	0.075	27.85	0.00
7	0.073	-0.076	28.19	0.00
8	0.060	-0.061	28.42	0.00
9	0.167	0.144	30.28	0.00
10	-0.074	-0.182	30.65	0.00
11	0.037	0.015	30.74	0.00
12	0.045	0.062	30.89	0.00
13	0.066	0.085	31.20	0.00
14	0.032	0.027	31.28	0.01
15	0.049	-0.057	31.47	0.01
16	-0.101	-0.146	32.26	0.01

Correlogram of dlog(m1_sa)
Sample: 1999Q1 - 2012Q1
Included observations: 53

Lag	AC	PAC	Q-Stat	Prob
1	0.277 **	0.277 **	4.31	0.04
2	0.369 **	0.316	12.07	0.00
3	0.242	0.102	15.50	0.00
4	0.100	-0.093	16.09	0.00
5	0.121	0.010	16.98	0.01
6	0.082	0.041	17.39	0.01
7	0.109	0.071	18.14	0.01
8	-0.122	-0.241	19.11	0.01
9	0.036	0.038	19.19	0.02
10	-0.118	-0.052	20.14	0.03
11	-0.030	0.053	20.20	0.04
12	-0.077	-0.071	20.62	0.06
13	0.072	0.172	21.00	0.07
14	-0.092	-0.131	21.63	0.09
15	-0.039	-0.010	21.74	0.12
16	-0.119	-0.179	22.85	0.12

Correlogram of dlog(m2_sa)
Sample: 1999Q1 - 2012Q1
Included observations: 53

Lag	AC	PAC	Q-Stat	Prob
1	0.157	0.157	1.39	0.24
2	0.314 **	0.296 **	7.02	0.03
3	0.304 **	0.250 **	12.39	0.01
4	0.091	-0.053	12.88	0.01
5	0.091	-0.085	13.37	0.02
6	0.001	-0.103	13.37	0.04
7	-0.036	-0.054	13.46	0.06
8	-0.088	-0.068	13.96	0.08
9	-0.028	0.050	14.02	0.12
10	-0.015	0.085	14.03	0.17
11	0.002	0.069	14.03	0.23
12	0.064	0.064	14.32	0.28
13	0.076	0.042	14.75	0.32
14	-0.028	-0.135	14.81	0.39
15	0.033	-0.081	14.89	0.46
16	-0.078	-0.130	15.37	0.50

**indicates statistical significance at 5% level.

Appendix C: Box-Jenkins univariate models

Fitted univariate (ARMA) models to the first-differenced series of money and prices

1. HICP

dlog(hicp_sa) = 0.013 + 0.353*MA(1)
(0.002)[1] (0.127)

$x^2(6) = 6.73$ - Ljung and Box (1978) chi-square statistic[2], with $x^2[0.05](6) = 12.59$

SSE (sum of squared residuals) = 0.007; **S.E. of regression** = 0.012

2. HICP_C

dlog(hicp_c_sa) = 0.008 + 0.319*AR(2)+0.551*AR(3)-0.232*AR(4)+1.08*MA(1)+0.518*MA(2)
(0.004) (0.113) (0.106) (0.082) (0.133) (0.141)

$x^2(2) = 4.70$ - Ljung and Box (1978) chi-square statistic, with $x^2[0.05](2) = 5.99$

SSE (sum of squared residuals) = 0.001; **S.E. of regression** = 0.004

3. CC

dlog(cc_sa) = 0.029 + 0.558*AR(3)+0.349*MA(1)+0.580*MA(2)-0.458*MA(3)-0.038*dummy (Q1'2009)
(0.010) (0.074) (0.129) (0.105) (0.123) (0.017)

$x^2(2) = 1.49$ - Ljung and Box (1978) chi-square statistic, with $x^2[0.05](2) = 5.99$

SSE (sum of squared residuals) = 0.023; **S.E. of regression** = 0.022

4. M1

dlog(m1_sa) = 0.033 + 0.428*AR(2)+0.109*dummy(Q1'2005)
(0.008) (0.126) (0.032)

$x^2(5) = 4.14$ - Ljung and Box (1978) chi-square statistic, with $x^2[0.05](5) = 11.07$

SSE (sum of squared residuals) = 0.063; **S.E. of regression** = 0.035

5. M2

dlog(m2_sa) = 0.040 +
(0.007)
0.260*AR(1)+0.305*MA(1)+0.750*MA(2)+1.059*MA(3)+0.386*MA(5)+dummies
(0.143) (0.080) (0.097) (0.053) (0.128)

$x^2(1) = 3.02$ - Ljung and Box (1978) chi-square statistic, with $x^2[0.05](1) = 3.84$

SSE (sum of squared residuals) = 0.006; **S.E. of regression** = 0.011

[1] Standard errors in parentheses

[2] The Ljung and Box (1978) chi-square statistic can be used to test whether a group of autocorrelations is significantly different from zero. For more details, see Enders, W., "Applied Econometric Time Series", 2nd edition, pp.67-69 and Ljung, G. and G.Box, "On a measure of lack of fit in time series models", *Biometrika* (1978), 65, 2, pp.297-303
The application of the chi-square test is done for 8 lags of the residuals of all fitted univariate models but the M2 model for which the chi-square statistic is calculated for 9 lags.

Appendix D: Application of Haugh's *s* statistic[3]

Test of the Lack of Relationship between monetary growth (CC) and HICP inflation rate
based on Haugh's (1976) *s* statistic for small samples (quarterly data)

$$s^* = n^2 \sum_{k=-M}^{M} (n-|k|)^{-1} r_{12}(k)^2$$

Type of Relationship	Lags (-M)	Leads (M)	Degrees of freedom	*s**	Significance
1. Feedback					
	-8	8	17	34.2	***
	-12	12	25	40.4	**
2. Monetary growth causes inflation					
		1 to 8	8	12.1	
		1 to 12	12	14.2	
3. Inflation causes monetary growth					
	-1 to -8		8	13.4	
	-1 to -12		12	16.6	

The test is performed for the cross-correlations between the residuals of the ARMA models fitted for CC growth rate and HICP inflation rate: resid_CC $_t$ and resid_HICP $_{t-k}$, k = ± 0,1,2,3….M; -M is the number of lags and M is the number of leads (M is chosen arbitrarily); r_{12} is the cross-correlation estimate at the specific lag/lead between the two residual series of length n. The asymptotic distribution of s* is chi-square with 2M+1 degrees of freedom when k is from –M to +M and with M degrees of freedom when k is from 1 to M. The null hypothesis is that the series CC growth and HICP inflation are unrelated. *** indicates statistical significance at 1% level, ** indicates statistical significance at 5% level, * indicates statistical significance at 10% level

Test of the Lack of Relationship between monetary growth (CC) and HICP core inflation rate
based on Haugh's (1976) *s* statistic for small samples (quarterly data)

$$s^* = n^2 \sum_{k=-M}^{M} (n-|k|)^{-1} r_{12}(k)^2$$

Type of Relationship	Lags (-M)	Leads (M)	Degrees of freedom	*s**	Significance
1. Feedback					
	-8	8	17	22.4	
	-12	12	25	35.9	*
2. Monetary growth causes inflation					
		1 to 8	8	15.2	*
		1 to 12	12	18.8	*
3. Inflation causes monetary growth					
	-1 to -8		8	7.2	
	-1 to -12		12	17.1	

The test is performed for the cross-correlations between the residuals of the ARMA models fitted for CC growth rate and HICP core inflation rate: resid_CC $_t$ and resid_HICP_C $_{t-k}$. See also notes above for testing the relationship between CC growth rate and HICP inflation rate.

[3] For similar analysis see Schwert, G.William, "Tests of Causality: The message in the innovations", Carnegie-Rochester Conference Series on Public Policy, 1979, Volume 10, pp.55-96

Test of the Lack of Relationship between monetary growth (M1) and HICP inflation rate
based on Haugh's (1976) *s* statistic for small samples (quarterly data)

$$s^* = n^2 \sum_{k=-M}^{M} (n-|k|)^{-1} r_{12}(k)^2$$

Type of Relationship	Lags (-M)	Leads (M)	Degrees of freedom	*s**	Significance
1. Feedback					
	-8	8	17	26.1	*
	-12	12	25	29.6	
2. Monetary growth causes inflation					
		1 to 8	8	14.1	*
		1 to 12	12	16.0	
3. Inflation causes monetary growth					
	-1 to -8		8	9.0	
	-1 to -12		12	10.3	

The test is performed for the cross-correlations between the residuals of the ARMA models fitted for M1 growth rate and HICP inflation rate: $resid\_M1_{t}$ and $resid\_HICP_{t-k}$. See also notes above for testing the relationship between CC growth rate and HICP inflation rate.

Test of the Lack of Relationship between monetary growth (M1) and HICP core inflation rate
based on Haugh's (1976) *s* statistic for small samples (quarterly data)

$$s^* = n^2 \sum_{k=-M}^{M} (n-|k|)^{-1} r_{12}(k)^2$$

Type of Relationship	Lags (-M)	Leads (M)	Degrees of freedom	*s**	Significance
1. Feedback					
	-8	8	17	33.6	***
	-12	12	25	39.8	**
2. Monetary growth causes inflation					
		1 to 8	8	22.7	***
		1 to 12	12	25.7	**
3. Inflation causes monetary growth					
	-1 to -8		8	10.8	
	-1 to -12		12	14.1	

The test is performed for the cross-correlations between the residuals of the ARMA models fitted for M1 growth rate and HICP core inflation rate: $resid\_M1_{t}$ and $resid\_HICP\_C_{t-k}$. See also notes above for testing the relationship between CC growth rate and HICP inflation rate.

Test of the Lack of Relationship between monetary growth (M2) and HICP inflation rate
based on Haugh's (1976) *s* statistic for small samples (quarterly data)

$$s^* = n^2 \sum_{k=-M}^{M} (n-|k|)^{-1} r_{12}(k)^2$$

Type of Relationship	Lags (-M)	Leads (M)	Degrees of freedom	*s**	Significance
1. Feedback					
	-8	8	17	34.0	***
	-12	12	25	39.3	**
2. Monetary growth causes inflation					
		1 to 8	8	20.8	***
		1 to 12	12	23.2	**
3. Inflation causes monetary growth					
	-1 to -8		8	10.0	
	-1 to -12		12	12.7	

The test is performed for the cross-correlations between the residuals of the ARMA models fitted for M2 growth rate and HICP inflation rate: $resid\_M2_{t}$ and $resid\_HICP_{t-K}$. See also notes above for testing the relationship between CC growth rate and HICP inflation rate.

Test of the Lack of Relationship between monetary growth (M2) and HICP core inflation rate
based on Haugh's (1976) *s* statistic for small samples (quarterly data)

$$s^* = n^2 \sum_{k=-M}^{M} (n-|k|)^{-1} r_{12}(k)^2$$

Type of Relationship	Lags (-M)	Leads (M)	Degrees of freedom	*s**	Significance
1. Feedback					
	-8	8	17	27.5	**
	-12	12	25	36.5	*
2. Monetary growth causes inflation					
		1 to 8	8	17.9	**
		1 to 12	12	24.1	**
3. Inflation causes monetary growth					
	-1 to -8		8	4.9	
	-1 to -12		12	7.3	

The test is performed for the cross-correlations between the residuals of the ARMA models fitted for M2 growth rate and HICP core inflation rate: $resid\_M2_{t}$ and $resid\_HICP\_C_{t-K}$. See also notes above for testing the relationship between CC growth rate and HICP inflation rate.

Appendix E: Granger Causality Tests

GRANGER CAUSALITY TEST RESULTS - HICP INFLATION				
INDICATORS: Δln HICP & Δln CURRENCY IN CIRCULATION				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2012Q1	INCONCLUSIVE	1	
1998Q2	2012Q1	TWO-WAY	1	**
1998Q3	2012Q1	HICP → CC	2	*
1998Q4	2012Q1	HICP → CC	2	*
1999Q1	2012Q1	INCONCLUSIVE	1	
1999Q2	2012Q1	HICP → CC	3	*
1999Q3	2012Q1	HICP → CC	3	*
1999Q4	2012Q1	HICP → CC	3	*
2000Q1	2012Q1	CC → HICP	1	**
2000Q2	2012Q1	CC → HICP	2	**
2000Q3	2012Q1	CC → HICP	2	*
2000Q4	2012Q1	CC → HICP	2	*
2001Q1	2012Q1	CC → HICP	1	**
2001Q2	2012Q1	CC → HICP	2	**
2001Q3	2012Q1	CC → HICP	2	*
2001Q4	2012Q1	CC → HICP	2	**
2002Q1	2012Q1	CC → HICP	1	**
2002Q2	2012Q1	INCONCLUSIVE	2	
2002Q3	2012Q1	INCONCLUSIVE	2	
2002Q4	2012Q1	INCONCLUSIVE	2	
2003Q1	2012Q1	INCONCLUSIVE	1	
2003Q2	2012Q1	HICP → CC	2	*
2003Q3	2012Q1	INCONCLUSIVE	2	
2003Q4	2012Q1	CC → HICP	2	*
2004Q1	2012Q1	HICP → CC	2	**
2004Q2	2012Q1	CC → HICP	2	*
2004Q3	2012Q1	HICP → CC	2	*
2004Q4	2012Q1	HICP → CC	2	**

GRANGER CAUSALITY TEST RESULTS - HICP INFLATION				
INDICATORS: Δln HICP & Δln M1				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2012Q1	INCONCLUSIVE	1	
1998Q2	2012Q1	INCONCLUSIVE	2	
1998Q3	2012Q1	M1 → HICP	2	*
1998Q4	2012Q1	M1 → HICP	2	*
1999Q1	2012Q1	INCONCLUSIVE	1	
1999Q2	2012Q1	INCONCLUSIVE	2	
1999Q3	2012Q1	INCONCLUSIVE	2	
1999Q4	2012Q1	INCONCLUSIVE	2	
2000Q1	2012Q1	HICP → M1	2	*
2000Q2	2012Q1	HICP → M1	2	*
2000Q3	2012Q1	INCONCLUSIVE	2	
2000Q4	2012Q1	M1 → HICP	2	*
2001Q1	2012Q1	M1 → HICP	1	***
2001Q2	2012Q1	M1 → HICP	2	*
2001Q3	2012Q1	M1 → HICP	2	*
2001Q4	2012Q1	M1 → HICP	2	*
2002Q1	2012Q1	M1 → HICP	2	**
2002Q2	2012Q1	M1 → HICP	2	*
2002Q3	2012Q1	M1 → HICP	2	*
2002Q4	2012Q1	M1 → HICP	2	*
2003Q1	2012Q1	INCONCLUSIVE	1	
2003Q2	2012Q1	M1 → HICP	2	**
2003Q3	2012Q1	M1 → HICP	2	**
2003Q4	2012Q1	M1 → HICP	2	*
2004Q1	2012Q1	INCONCLUSIVE	2	
2004Q2	2012Q1	INCONCLUSIVE	2	
2004Q3	2012Q1	M1 → HICP	5	**
2004Q4	2012Q1	M1 → HICP	6	***

GRANGER CAUSALITY TEST RESULTS - HICP INFLATION				
INDICATORS: Δln HICP & Δln M2				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2012Q1	TWO-WAY	3	**
1998Q2	2012Q1	TWO-WAY	3	**
1998Q3	2012Q1	TWO-WAY	3	**
1998Q4	2012Q1	TWO-WAY	3	**
1999Q1	2012Q1	TWO-WAY	3	**
1999Q2	2012Q1	M2 → HICP	2	**
1999Q3	2012Q1	TWO-WAY	4	**
1999Q4	2012Q1	TWO-WAY	3	**
2000Q1	2012Q1	TWO-WAY	3	**
2000Q2	2012Q1	M2 → HICP	2	**
2000Q3	2012Q1	TWO-WAY	3	**
2000Q4	2012Q1	TWO-WAY	3	**
2001Q1	2012Q1	TWO-WAY	3	**
2001Q2	2012Q1	M2 → HICP	5	**
2001Q3	2012Q1	M2 → HICP	5	**
2001Q4	2012Q1	M2 → HICP	2	**
2002Q1	2012Q1	TWO-WAY	3	**
2002Q2	2012Q1	M2 → HICP	2	**
2002Q3	2012Q1	HICP → M2	4	**
2002Q4	2012Q1	HICP → M2	4	***
2003Q1	2012Q1	M2 → HICP	2	**
2003Q2	2012Q1	M2 → HICP	2	**
2003Q3	2012Q1	M2 → HICP	4	**
2003Q4	2012Q1	M2 → HICP	4	**
2004Q1	2012Q1	INCONCLUSIVE	2	
2004Q2	2012Q1	HICP → M2	3	**
2004Q3	2012Q1	HICP → M2	4	**
2004Q4	2012Q1	M2 → HICP	2	**

GRANGER CAUSALITY TEST RESULTS - CORE INFLATION				
INDICATORS: Δln CORE HICP & Δln CURRENCY IN CIRCULATION				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2012Q1	INCONCLUSIVE	2	
1998Q2	2012Q1	INCONCLUSIVE	5	
1998Q3	2012Q1	INCONCLUSIVE	2	
1998Q4	2012Q1	INCONCLUSIVE	2	
1999Q1	2012Q1	CORE HICP → CC	2	***
1999Q2	2012Q1	CC → CORE HICP	2	**
1999Q3	2012Q1	CORE HICP → CC	3	*
1999Q4	2012Q1	CC → CORE HICP	1	**
2000Q1	2012Q1	CC → CORE HICP	2	**
2000Q2	2012Q1	CC → CORE HICP	2	**
2000Q3	2012Q1	CC → CORE HICP	2	**
2000Q4	2012Q1	CC → CORE HICP	2	**
2001Q1	2012Q1	CC → CORE HICP	1	**
2001Q2	2012Q1	INCONCLUSIVE	5	
2001Q3	2012Q1	CC → CORE HICP	2	*
2001Q4	2012Q1	CC → CORE HICP	3	**
2002Q1	2012Q1	CC → CORE HICP	1	***
2002Q2	2012Q1	CC → CORE HICP	2	**
2002Q3	2012Q1	CC → CORE HICP	2	**
2002Q4	2012Q1	INCONCLUSIVE	3	
2003Q1	2012Q1	CORE HICP → CC	6	**
2003Q2	2012Q1	CORE HICP → CC	2	**
2003Q3	2012Q1	INCONCLUSIVE	5	
2003Q4	2012Q1	CC → CORE HICP	5	*
2004Q1	2012Q1	INCONCLUSIVE	5	
2004Q2	2012Q1	CORE HICP → CC	5	*
2004Q3	2012Q1	INCONCLUSIVE	5	
2004Q4	2012Q1	CC → CORE HICP	6	***

GRANGER CAUSALITY TEST RESULTS - CORE INFLATION				
INDICATORS: Δln CORE HICP & Δln M1				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2012Q1	M1 → CORE HICP	2	**
1998Q2	2012Q1	M1 → CORE HICP	2	**
1998Q3	2012Q1	M1 → CORE HICP	2	**
1998Q4	2012Q1	M1 → CORE HICP	2	**
1999Q1	2012Q1	M1 → CORE HICP	2	**
1999Q2	2012Q1	M1 → CORE HICP	2	***
1999Q3	2012Q1	M1 → CORE HICP	2	***
1999Q4	2012Q1	M1 → CORE HICP	2	***
2000Q1	2012Q1	M1 → CORE HICP	2	***
2000Q2	2012Q1	M1 → CORE HICP	3	***
2000Q3	2012Q1	M1 → CORE HICP	2	**
2000Q4	2012Q1	M1 → CORE HICP	2	**
2001Q1	2012Q1	M1 → CORE HICP	1	**
2001Q2	2012Q1	INCONCLUSIVE	3	
2001Q3	2012Q1	INCONCLUSIVE	3	
2001Q4	2012Q1	M1 → CORE HICP	3	***
2002Q1	2012Q1	M1 → CORE HICP	3	***
2002Q2	2012Q1	M1 → CORE HICP	2	***
2002Q3	2012Q1	M1 → CORE HICP	2	***
2002Q4	2012Q1	M1 → CORE HICP	2	***
2003Q1	2012Q1	M1 → CORE HICP	2	***
2003Q2	2012Q1	M1 → CORE HICP	2	***
2003Q3	2012Q1	M1 → CORE HICP	4	**
2003Q4	2012Q1	M1 → CORE HICP	3	***
2004Q1	2012Q1	INCONCLUSIVE	8	
2004Q2	2012Q1	INCONCLUSIVE	3	
2004Q3	2012Q1	M1 → CORE HICP	5	**
2004Q4	2012Q1	M1 → CORE HICP	6	***

GRANGER CAUSALITY TEST RESULTS - CORE INFLATION				
INDICATORS: Δln CORE HICP & Δln M2				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2012Q1	M2 → CORE HICP	5	**
1998Q2	2012Q1	M2 → CORE HICP	2	**
1998Q3	2012Q1	M2 → CORE HICP	5	**
1998Q4	2012Q1	M2 → CORE HICP	5	**
1999Q1	2012Q1	M2 → CORE HICP	5	**
1999Q2	2012Q1	M2 → CORE HICP	2	**
1999Q3	2012Q1	INCONCLUSIVE	4	
1999Q4	2012Q1	INCONCLUSIVE	4	
2000Q1	2012Q1	TWO-WAY	3	**
2000Q2	2012Q1	M2 → CORE HICP	4	*
2000Q3	2012Q1	TWO-WAY	3	**
2000Q4	2012Q1	M2 → CORE HICP	4	*
2001Q1	2012Q1	INCONCLUSIVE	4	
2001Q2	2012Q1	M2 → CORE HICP	2	**
2001Q3	2012Q1	M2 → CORE HICP	3	***
2001Q4	2012Q1	M2 → CORE HICP	3	***
2002Q1	2012Q1	M2 → CORE HICP	7	***
2002Q2	2012Q1	M2 → CORE HICP	5	**
2002Q3	2012Q1	INCONCLUSIVE	4	
2002Q4	2012Q1	TWO-WAY	5	**
2003Q1	2012Q1	TWO-WAY	5	**
2003Q2	2012Q1	TWO-WAY	5	**
2003Q3	2012Q1	TWO-WAY	6	***
2003Q4	2012Q1	TWO-WAY	6	***
2004Q1	2012Q1	INCONCLUSIVE	5	
2004Q2	2012Q1	TWO-WAY	6	***
2004Q3	2012Q1	INCONCLUSIVE	3	
2004Q4	2012Q1	TWO-WAY	3	**

Notes: Granger causality results are based on a rolling basis with a moving start and a fixed end-date.
Significance is reported based on p-values obtained from χ2 (Wald) statistics of the joint significance of each of the lagged endogenous variables in the equation. *** indicates statistical significance at 1% level, ** indicates statistical significance at 5% level, * indicates statistical significance at 10% level

Tests are determined to be inconclusive when Granger causality is found in none of the directions or when a two-way causality is found, but in the latter case coefficients are significant at more than 5% level of significance. Tests are also considered inconclusive where residual autocorrelation could not have been avoided in the specifications.

GRANGER CAUSALITY TEST RESULTS - HICP INFLATION				
INDICATORS: ΔIn HICP & ΔIn CURRENCY IN CIRCULATION				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2006Q4	HICP → CC	3	*
1999Q1	2007Q4	INCONCLUSIVE	3	
2000Q1	2008Q4	INCONCLUSIVE	2	
2001Q1	2009Q1	INCONCLUSIVE	2	
2002Q1	2010Q1	INCONCLUSIVE	2	
2003Q1	2011Q1	INCONCLUSIVE	2	
2004Q1	2012Q1	HICP → CC	2	**

GRANGER CAUSALITY TEST RESULTS - HICP INFLATION				
INDICATORS: ΔIn HICP & ΔIn M1				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2006Q1	HICP → M1	2	***
1999Q1	2007Q1	HICP → M1	2	***
2000Q1	2008Q1	HICP → M1	2	**
2001Q1	2009Q1	M1 → HICP	3	**
2002Q1	2010Q1	INCONCLUSIVE	3	
2003Q1	2011Q1	M1 → HICP	2	*
2004Q1	2012Q1	M1 → HICP	2	*

GRANGER CAUSALITY TEST RESULTS - HICP INFLATION				
INDICATORS: ΔIn HICP & ΔIn M2				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2006Q1	HICP → M2	5	**
1999Q1	2007Q1	INCONCLUSIVE	5	
2000Q1	2008Q1	INCONCLUSIVE	7	
2001Q1	2009Q1	M2 → HICP	6	*
2002Q1	2010Q1	INCONCLUSIVE	5	
2003Q1	2011Q1	M2 → HICP	2	*
2004Q1	2012Q1	INCONCLUSIVE	2	

GRANGER CAUSALITY TEST RESULTS - CORE INFLATION				
INDICATORS: ΔIn CORE HICP & ΔIn CURRENCY IN CIRCULATION				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2006Q1	INCONCLUSIVE	2	
1999Q1	2007Q1	INCONCLUSIVE	2	
2000Q1	2008Q1	CC → CORE	2	*
2001Q1	2009Q1	INCONCLUSIVE	2	
2002Q1	2010Q1	INCONCLUSIVE	2	
2003Q1	2011Q1	CC → CORE	3	**
2004Q1	2012Q1	CC → CORE	5	*

GRANGER CAUSALITY TEST RESULTS - CORE INFLATION				
INDICATORS: ΔIn CORE HICP & ΔIn M1				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2006Q1	INCONCLUSIVE	2	
1999Q1	2007Q1	INCONCLUSIVE	2	
2000Q1	2008Q1	M1 → CORE	2	*
2001Q1	2009Q1	M1 → CORE	2	***
2002Q1	2010Q1	M1 → CORE	2	***
2003Q1	2011Q1	M1 → CORE	2	***
2004Q1	2012Q1	INCONCLUSIVE	7	

GRANGER CAUSALITY TEST RESULTS - CORE INFLATION				
INDICATORS: ΔIn CORE HICP & ΔIn M2				
PERIOD		DIRECTION	LAG LENGTH	SIGNI-FICANCE
1998Q1	2006Q1	INCONCLUSIVE	2	
1999Q1	2007Q1	INCONCLUSIVE	3	
2000Q1	2008Q1	CORE → M2	6	**
2001Q1	2009Q1	INCONCLUSIVE	2	
2002Q1	2010Q1	INCONCLUSIVE	2	
2003Q1	2011Q1	TWO-WAY	2	**
2004Q1	2012Q1	INCONCLUSIVE	2	

Notes: Granger causality results are based on a moving window with fixed length of eight years. See also the notes for the Granger test results based on a rolling basis with a moving start and a fixed end-date presented above.

Appendix F: VECM RESULTS

F1: VECM for cc, hicp, real retail sales and interest rate on new term deposits

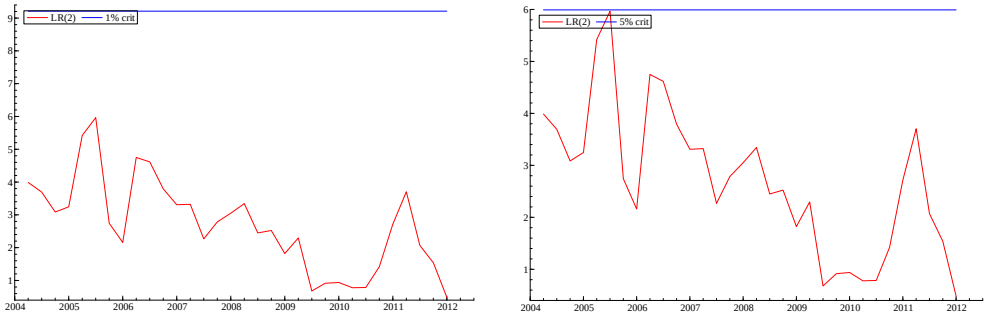
1. Unrestricted Cointegration Rank Test (Trace)

Sample: 2000Q3 - 2012Q1

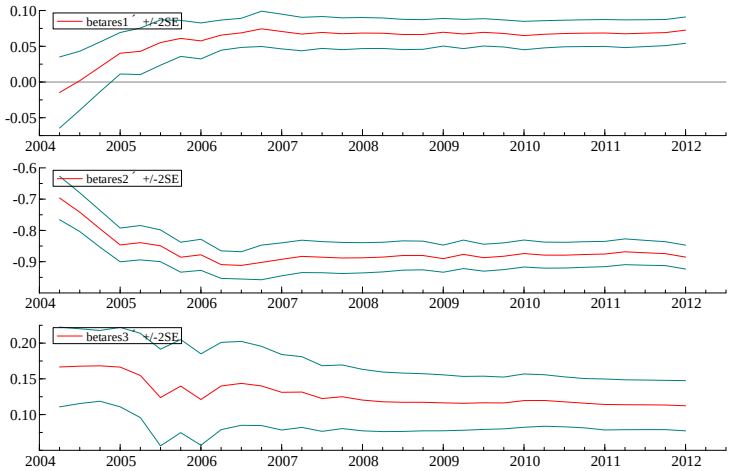
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value 0.05	Reinsel and Ahn (1988) correction of the critical value
None	0.67	105.16 **	47.86	57.67
At most 1	0.52	52.46 **	29.80	35.91
At most 2	0.25	17.78	15.49	18.67
At most 3	0.09	4.41	3.84	4.63

** indicates statistical significance at 5% level, considering sample size adjusted critical values

2. Recursively estimated likelihood ratio (LR) test statistic for over-identifying restrictions, scaled by the 1% and 5% critical values respectively



3. Recursively estimated coefficients in the two identified cointegrating vectors



4. Short-run dynamics estimated by OLS

   Cointegrating relations:

   CIa=1*log(cc_sa) - 1*log(hicp_sa) - 0.885*log(tradec_sa) + 0.073*m_tdir_n

   CIb=1*log(hicp_sa) - 1*log(tradec_sa) + 0.112*m_tdir_n

`equation for dlog(cc_sa)`

	Coefficient	Std.Error	t-value	Stat. significance
Constant	3.796	0.741	5.120	***
CIa(-1)	-0.536	0.103	-5.180	***
CIb(-1)	-0.020	0.040	-0.500	
dlog(cc_sa(-1))	0.203	0.136	1.500	
dlog(hicp_sa(-1))	-0.518	0.316	-1.640	
d(m_tdir_n(-1))	-0.013	0.011	-1.200	
dlog(tradec_sa(-1))	-0.050	0.337	-0.147	
d_04_2008	0.006	0.020	0.306	
d_04_2000	-0.034	0.022	-1.580	

`sigma = 0.018 RSS = 0.012`

`equation for dlog(hicp_sa)`

	Coefficient	Std.Error	t-value	Stat. significance
Constant	1.372	0.329	4.170	***

CIa(-1)	-0.187	0.046	-4.070	***
CIb(-1)	-0.092	0.018	-5.130	***
dlog(cc_sa(-1))	0.206	0.060	3.420	***
dlog(hicp_sa(-1))	-0.005	0.141	-0.036	
d(m_tdir_n(-1))	-0.002	0.005	-0.448	
dlog(tradec_sa(-1))	-0.728	0.150	-4.860	***
d_04_2008	-0.026	0.009	-2.990	***
d_04_2000	-0.001	0.010	-0.084	

sigma = 0.008 RSS = 0.002

*Note: The short-run equations are presented only for the money and price variables. *** indicates statistical significance at 1% level, ** indicates statistical significance at 5% level, * indicates statistical significance at 10% level

5. Specification tests for the short-run error-correction model

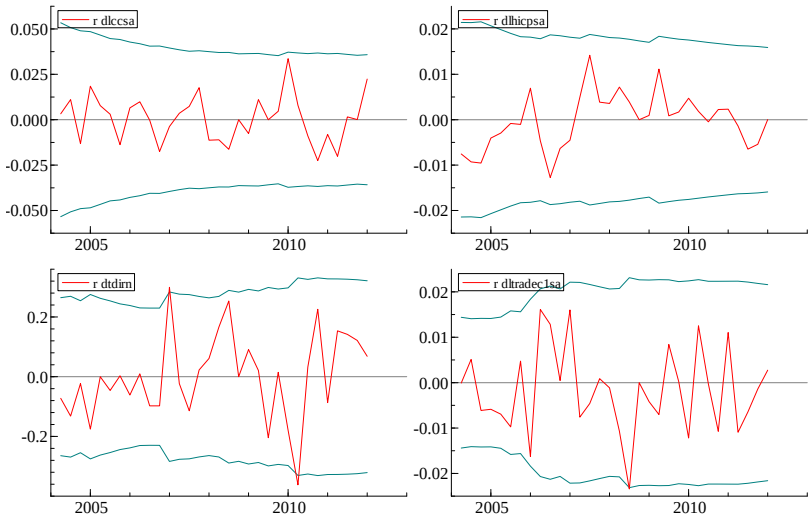
Single-equation diagnostics using reduced-form residuals

```
dlog(cc_sa)      : AR 1-4 test:       F(4,34)   =   0.894 [0.4778]
dlog(cc_sa)      : ARCH 1-4 test:     F(4,39)   =   1.481 [0.2267]
dlog(cc_sa)      : Normality test:    Chi^2(2)  =   2.746 [0.2534]
dlog(cc_sa)      : Hetero test:       F(12,32)  =   0.628 [0.8028]
dlog(hicp_sa)    : AR 1-4 test:       F(4,34)   =   1.075 [0.3843]
dlog(hicp_sa)    : ARCH 1-4 test:     F(4,39)   =   0.270 [0.8957]
dlog(hicp_sa)    : Normality test:    Chi^2(2)  =   2.682 [0.2616]
dlog(hicp_sa)    : Hetero test:       F(12,32)  =   0.833 [0.6169]
d(m_tdir_n)      : AR 1-4 test:       F(4,34)   =   1.569 [0.2048]
d(m_tdir_n)      : ARCH 1-4 test:     F(4,39)   =   0.104 [0.9806]
d(m_tdir_n)      : Normality test:    Chi^2(2)  =   1.493 [0.4741]
d(m_tdir_n)      : Hetero test:       F(12,32)  =   1.309 [0.2616]
dlog(tradec_sa)  : AR 1-4 test:       F(4,34)   =   1.866 [0.1391]
dlog(tradec_sa)  : ARCH 1-4 test:     F(4,39)   =   0.070 [0.9906]
dlog(tradec_sa)  : Normality test:    Chi^2(2)  =   1.075 [0.5841]
dlog(tradec_sa)  : Hetero test:       F(12,32)  =   1.152 [0.3543]
```

Vector tests

```
Vector AR 1-4 test:       F(64,76)  =   1.104 [0.3384]
Vector Normality test:    Chi^2(8)  =   7.358 [0.4986]
Vector ZHetero test:      F(48,113) =   1.080 [0.3633]
Vector RESET23 test:      F(32,101) =   1.523 [0.0593]
```

6. Constancy of 1-step ahead recursively estimated residuals in the short-run model



F2: VECM for m1, ppi, industrial production index and interest rate on new term deposits

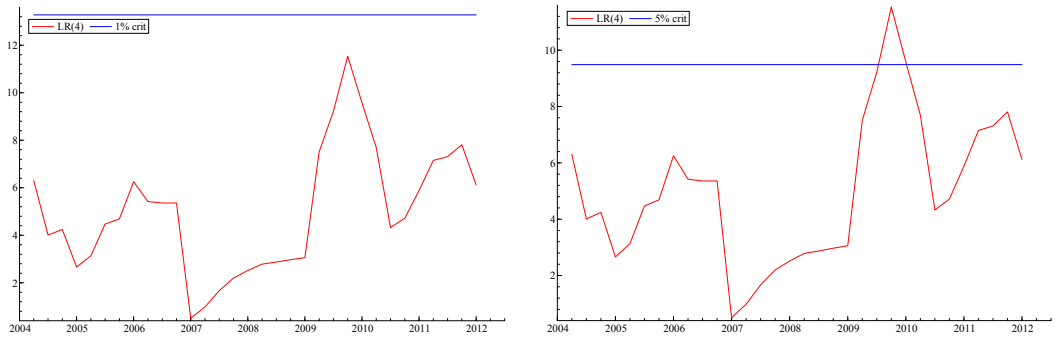
1. Unrestricted Cointegration Rank Test (Trace)

Sample: 2000Q2 - 2012Q1

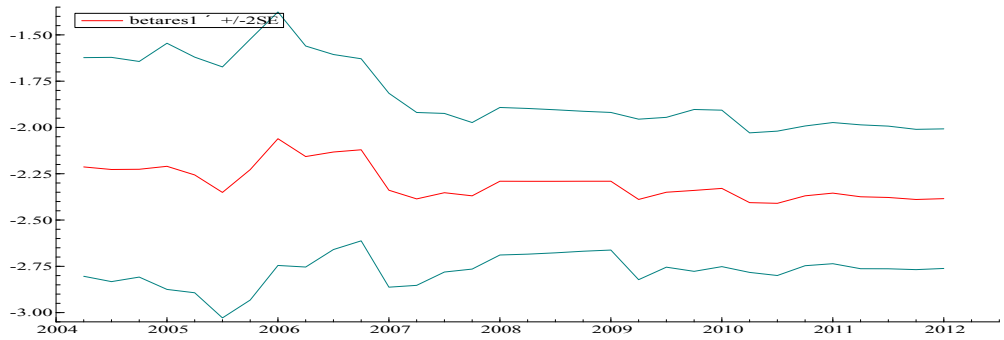
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value 0.05	Reinsel and Ahn (1988) correction of the critical value
None	0.67	70.52 **	47.86	52.21
At most 1	0.30	17.63	29.80	32.51
At most 2	0.01	0.70	15.49	16.90
At most 3	0.00	0.00	3.84	4.19

** indicates statistical significance at 5% level, considering sample size adjusted critical values

2. Recursively estimated likelihood ratio (LR) test statistic for over-identifying restrictions, scaled by the 1% and 5% critical values respectively



3. Recursively estimated unrestricted coefficient of the industrial production index variable in the identified cointegrating vector



4. Short-run dynamics estimated by OLS

Cointegrating relation:

CIa = 1*log(m1_sa) - 1*log(ppi) - 2.385*log(indp_sa)

equation for dlog(m1_sa)

	Coefficient	Std.Error	t-value	Stat. significance
Constant	-0.339	0.141	-2.410	**
CIa(-1)	-0.162	0.040	-4.010	***
log(er(-2))	0.108	0.032	3.350	***
dlog(oil_p)	0.041	0.037	1.130	
d_03_2008	-0.064	0.035	-1.830	*
D_01_2009	-0.086	0.036	-2.410	**

sigma = 0.033 RSS = 0.045

equation for dlog(ppi)

	Coefficient	Std.Error	t-value	Stat. significance
Constant	0.058	0.048	1.210	
CIa(-1)	-0.024	0.014	-1.760	*
log(er(-2))	-0.006	0.011	-0.534	
dlog(oil_p)	0.085	0.012	6.840	***
d_03_2008	0.034	0.012	2.890	***
D_01_2009	-0.049	0.012	-4.040	***

sigma = 0.011 RSS = 0.005

*Note: The short-run equations are presented only for the money and price variables. *** indicates statistical significance at 1% level, ** indicates statistical significance at 5% level, * indicates statistical significance at 10% level

5. Specification tests for the short-run error-correction model

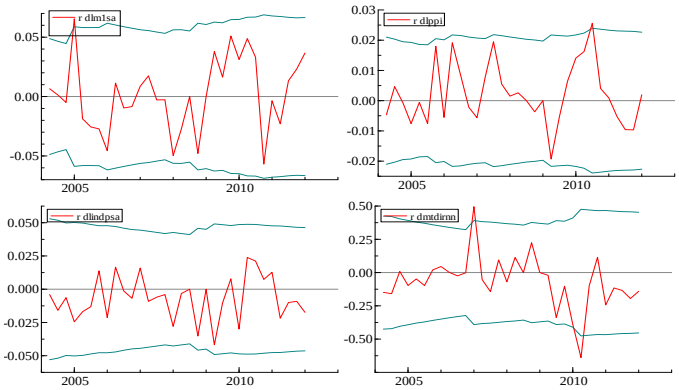
Single-equation diagnostics using reduced-form residuals

```
dlog(m1_sa)      : AR 1-4 test:      F(4,37)   =   1.738 [0.1623]
dlog(m1_sa)      : ARCH 1-4 test:    F(4,39)   =   0.405 [0.8035]
dlog(m1_sa)      : Normality test:   Chi^2(2)  =   2.378 [0.3046]
dlog(m1_sa)      : Hetero test:      F(6,38)   =   1.298 [0.2817]
dlog(ppi)        : AR 1-4 test:      F(4,37)   =   0.631 [0.6436]
dlog(ppi)        : ARCH 1-4 test:    F(4,39)   =   0.656 [0.6265]
dlog(ppi)        : Normality test:   Chi^2(2)  =   1.758 [0.4152]
dlog(ppi)        : Hetero test:      F(6,38)   =   1.402 [0.2393]
dlog(indp_sa)    : AR 1-4 test:      F(4,37)   =   3.494 [0.0162]*
dlog(indp_sa)    : ARCH 1-4 test:    F(4,39)   =   2.245 [0.0817]
dlog(indp_sa)    : Normality test:   Chi^2(2)  =   0.476 [0.7882]
dlog(indp_sa)    : Hetero test:      F(6,38)   =   1.414 [0.2347]
d(m_tdir_n)      : AR 1-4 test:      F(4,37)   =   0.240 [0.9137]
d(m_tdir_n)      : ARCH 1-4 test:    F(4,39)   =   0.919 [0.4626]
d(m_tdir_n)      : Normality test:   Chi^2(2)  =   3.196 [0.2023]
d(m_tdir_n)      : Hetero test:      F(6,38)   =   2.139 [0.0711]
```

Vector tests

```
Vector AR 1-4 test:      F(64,88)  =   1.239 [0.1749]
Vector Normality test:   Chi^2(8)  =   8.437 [0.3920]
Vector ZHetero test:     F(24,123) =   1.000 [0.4714]
Vector RESET23 test:     F(32,112) =   2.655 [0.0001]**
```

6. Constancy of 1-step ahead recursively estimated residuals in the short-run model



F3: VECM for m2, ppi, industrial production, interest rate on new term deposits, interest rates on loans

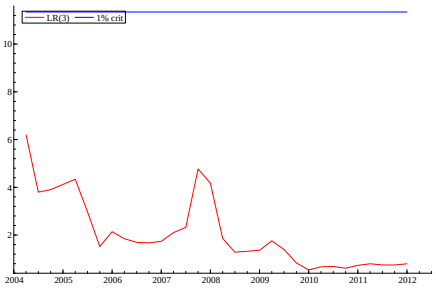
1. Unrestricted Cointegration Rank Test (Trace)

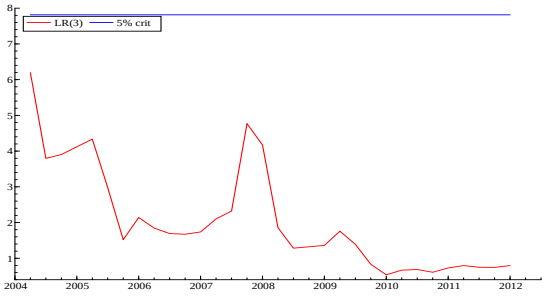
Sample: 2000Q3 2012Q1

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value 0.05	Reinsel and Ahn (1988) correction of the critical value
None	0.67	96.23 **	69.82	88.69
At most 1	0.43	44.53	47.86	60.79
At most 2	0.21	17.96	29.80	37.85
At most 3	0.11	7.18	15.49	19.68
At most 4	0.03	1.64	3.84	4.88

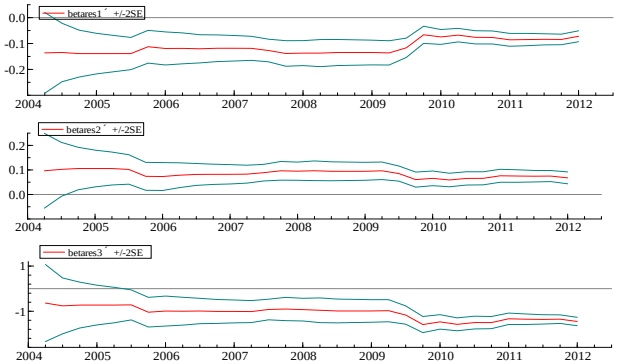
** indicates statistical significance at 5% level, considering sample size adjusted critical values

2. Recursively estimated likelihood ratio (LR) test statistic for over-identifying restrictions





3. Recursively estimated unrestricted coefficients in the identified cointegrating vector



4. Short-run dynamics estimated by OLS
   Cointegrating relation:

CIa=1*log(m2_sa) - 1*log(indp_sa) - 1.454*log(ppi) - 0.072*m_tdir_n + 0.068*ir_loans

equation for dlog(m2_sa)

	Coefficient	Std.Error	t-value	Stat. significance
Constant	0.930	0.319	2.910	***
CIa(-1)	-0.156	0.045	-3.470	***
dlog(indp_sa(-1))	0.200	0.076	2.630	**
d(m_tdir_n(-1))	-0.010	0.013	-0.744	
d(ir_loans(-1))	0.013	0.004	3.470	***
dlog(m2_sa(-1))	0.186	0.102	1.820	*
dlog(ppi(-1))	-0.330	0.186	-1.780	*
log(er(-1))	0.014	0.015	0.872	
dlog(oil_p)	0.018	0.021	0.851	
dlog(rgdp_ea_sa)	0.109	0.326	0.336	
d_01_2005	0.117	0.013	8.970	***
d_02_2005	-0.094	0.019	-4.930	***
d_01_2007	0.007	0.014	0.513	
d_04_2008	-0.037	0.023	-1.640	
d_01_2009	-0.035	0.021	-1.710	*

sigma = 0.012 RSS = 0.005

equation for dlog(ppi)

	Coefficient	Std.Error	t-value	Stat. significance
Constant	-0.042	0.274	-0.155	
CIa(-1)	0.016	0.038	0.415	
dlog(indp_sa(-1))	-0.027	0.065	-0.416	
d(m_tdir_n(-1))	0.002	0.011	0.140	
d(ir_loans(-1))	0.002	0.003	0.755	
dlog(m2_sa(-1))	0.183	0.087	2.090	**
dlog(ppi(-1))	0.490	0.159	3.080	***
log(er(-1))	-0.012	0.013	-0.874	
dlog(oil_p)	0.078	0.018	4.360	***
dlog(rgdp_ea_sa)	-0.542	0.279	-1.940	*
d_01_2005	-0.017	0.011	-1.520	
d_02_2005	-0.016	0.016	-0.960	
d_01_2007	0.004	0.012	0.307	
d_04_2008	-0.035	0.020	-1.790	*
d_01_2009	-0.034	0.018	-1.940	*

sigma = 0.011 RSS = 0.004

*Note: The short-run equations are presented only for the money and price variables. *** indicates statistical significance at 1% level, ** indicates statistical significance at 5% level, * indicates statistical significance at 10% level

5. Specification tests for the short-run error-correction model

Single-equation diagnostics using reduced-form residuals

dlog(indp_sa)	AR 1-4 test:	F(4,28)	=	3.598 [0.0173]*
dlog(indp_sa)	ARCH 1-4 test:	F(4,39)	=	0.707 [0.5922]
dlog(indp_sa)	Normality test:	Chi^2(2)	=	0.302 [0.8597]
dlog(indp_sa)	Hetero test:	F(18,23)	=	1.360 [0.2409]
d(m_tdir_n)	AR 1-4 test:	F(4,28)	=	0.511 [0.7283]
d(m_tdir_n)	ARCH 1-4 test:	F(4,39)	=	3.938 [0.0089]**
d(m_tdir_n)	Normality test:	Chi^2(2)	=	5.676 [0.0586]
d(m_tdir_n)	Hetero test:	F(18,23)	=	1.026 [0.4696]
d(ir_loans)	AR 1-4 test:	F(4,28)	=	2.094 [0.1083]
d(ir_loans)	ARCH 1-4 test:	F(4,39)	=	0.515 [0.7248]
d(ir_loans)	Normality test:	Chi^2(2)	=	3.267 [0.1953]
d(ir_loans)	Hetero test:	F(18,23)	=	0.905 [0.5801]
dlog(m2_sa)	AR 1-4 test:	F(4,28)	=	0.787 [0.5436]
dlog(m2_sa)	ARCH 1-4 test:	F(4,39)	=	0.845 [0.5042]
dlog(m2_sa)	Normality test:	Chi^2(2)	=	0.402 [0.8177]
dlog(m2_sa)	Hetero test:	F(18,23)	=	1.810 [0.0900]
dlog(ppi)	AR 1-4 test:	F(4,28)	=	0.792 [0.5402]
dlog(ppi)	ARCH 1-4 test:	F(4,39)	=	0.594 [0.6693]
dlog(ppi)	Normality test:	Chi^2(2)	=	3.477 [0.1758]
dlog(ppi)	Hetero test:	F(18,23)	=	1.408 [0.2176]

Vector tests

Vector AR 1-4 test:	F(100,43)	=	1.020 [0.4835]
Vector Normality test:	Chi^2(10)	=	19.46 [0.0348]*
Vector ZHetero test:	F(90,96)	=	1.469 [0.0322]*
Vector RESET23 test:	F(50,85)	=	1.176 [0.2523]

6. Constancy of 1-step ahead recursively estimated residuals in the short-run model