APPENDIX

List of appendices

DATA

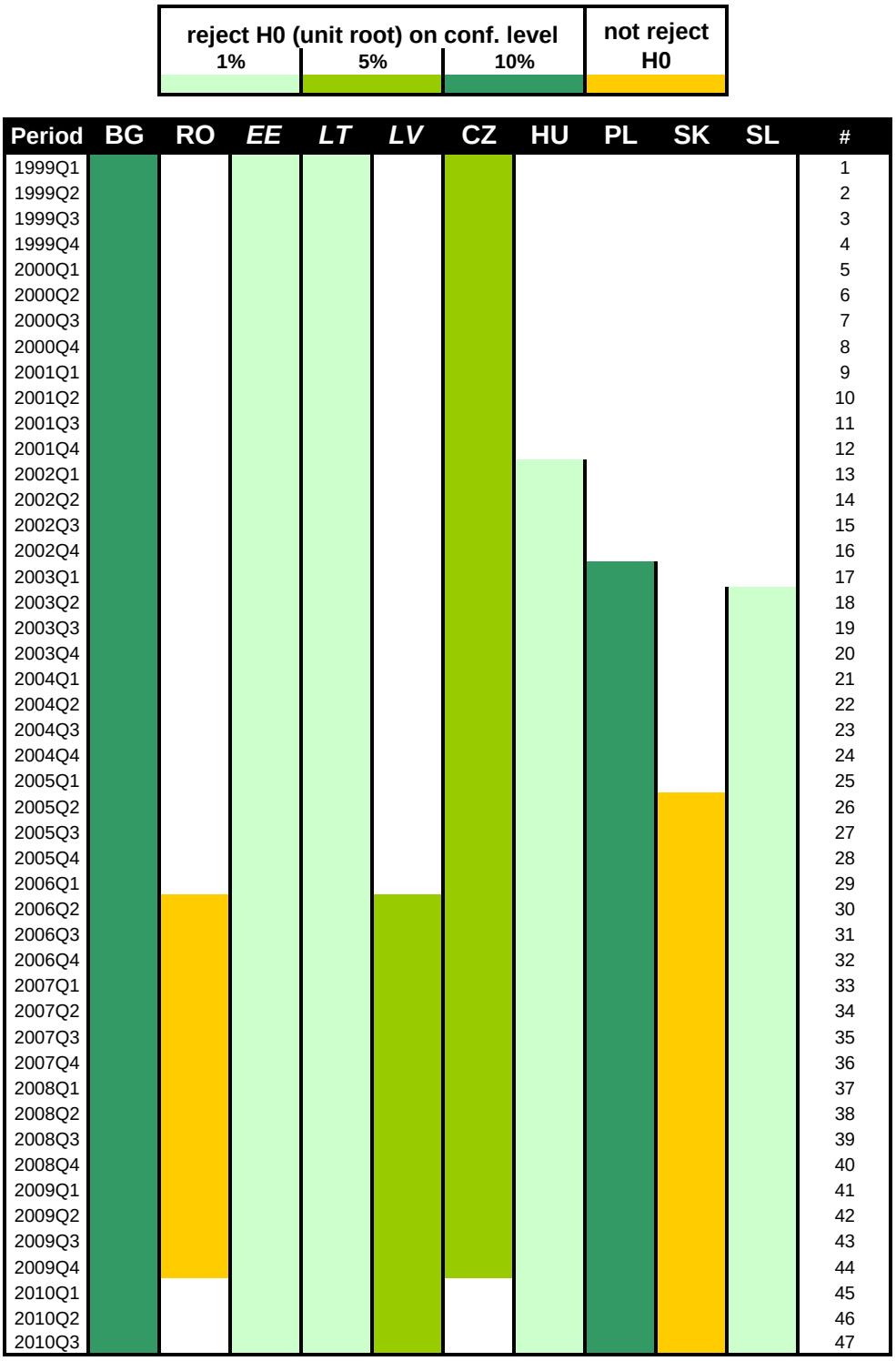
Table A1) Data description

Variable	Code	Notes	Frequency	Type	Unit	First data available for all	Last data	Source	Code in the source
Real GDP	RGDP	SA	Q	chain-linked volumes, reference year	millions EUR	1997Q1 9 countries, 2000Q1 all	2010Q3	Eurostat	namq_gdp_k
Unemployment	UNEMP	From 25 to 74 years	Q	-	percent	2001Q4	2010Q2	Eurostat	lfsq_urgan
Inflation	HICP		M => Q	HICP (2005 = 100)	-	1997M1	2010M12	Eurostat	prc_hicp_midx
Labor force	LABF		Q	sum	persons in 1000s	ca 2001Q2	2010Q2	IMF IFS	9****D..ZF...
Construction cost index of new residential buildings	CONS		Q	index (2005=100)	-	2000Q1	2010Q3	Eurostat	sts_copi_q
Direct investment	DIRINV		Q	volumes	millions USD	2000Q1	2010Q1	IMF IFS	9***8BEDZF...
House purchase loans	MORTG		M => Q	volumes	millions EUR	2004M1	2010M11	EMF	-

Country	First data	Last data	Coverage	Source	Type of data
Bulgaria	1993Q1	2010Q4	Country ; district centers	National Statistical Institute	average market price per m2 of dwellings
Czech Rep.	1998Q1	2009Q4	Country ; regions	National Statistical Office	quarterly price index and yearly published prices of family houses, flats, residential buildings
Estonia	1997Q1	2009Q5	Capital ; large towns	National Statistical Office	average market price per m2 of flats with 3 rooms and a kitchen
Hungary	2001Q4	2010Q3	Capital	Central Statistical Office	average price per m2 of existing dwellings
Latvia	2006Q1	2010Q2	Country	National Statistical Office	average price per m2 of existing flats
Lithuania	1998Q4	2010Q4	Country	Central Bank	average price per m2 of existing dwellings
Poland	2002Q3	2010Q3*	Capital ; large towns	Central Bank	cost of construction of a m2 in a residential building
Romania	2006Q1	2009Q4	Capital	Real estate agency	asking-price per built square meter of apartments built before 1990
Slovakia	2005Q3	2010Q4	Country ; regions	National Bank	average price per flats and houses
Slovenia	2003Q1	2010Q3	Capital; rest of country	National Statistical Office	price index based on prices of existing flats and family houses

* in Poland from 2002Q3 till 2005Q3 only semi-annual data is available

Table A2) Overview of house price data&its stationarity *in first difference*
The colored lines show available house price data in each country. They were tested first in log, then in first difference by both the Dickey-Fuller and Phillips-Perron test. In log, all had unit root, therefore only results for differenced data are depicted. The p-values of both tests were in all cases in the same "confidence group" (e.g.5%).



Note: the first value displayed in each column was lost due to differencing.

POOLED MEAN GROUP ANALYSIS OF PANEL DATA

Table B1) Results of Pesaran's CD test for cross-section independence of time series

Variable	CD test statistic
logHP	19.38***
logRGDP	25.66***
logHICP	31.51***
UNEMP	16.25***

H_0 : The time series are cross-section independent; *** means rejection of null hypothesis on 1% level of significance.

Table B2) Results of Pesaran's pescadf test for unit root

all variables besides UNEMP are in natural logarithms

	CADF(0)	CADF(1)	CADF(2)
HP	0.244	0.426	0.753
RGDP	0.998	0.996	0.977
HICP	0.685	0.589	0.248
UNEMP	**0**	0.999	0.999

the variables besides UNEMP are differenced natural logarithms

	CADF(0)	CADF(1)	CADF(2)
D.HP	**0**	**0**	**0.005**
D.RGDP	**0**	**0.024**	0.796
D.HICP	**0**	**0**	**0**
D.UNEMP	**0**	**0**	**0.017**

Note: The figures in the tables are p-values. The number of lags is in brackets. H_0 is that all time series are nonstationary.

Table B3) Results of Fisher's xtfisher test for unit root

the variables besides UNEMP are differenced natural logarithms

	lags(0)	lags(1)	lags(2)
D.HP	**0**	**0**	**0.005**
D.RGDP	**0**	**0**	**0.0014**
D.HICP	**0**	**0**	**0**
D.UNEMP	**0**	**0**	**0**

Note: the figures in the tables are p-values. H_0 is that all time series are nonstationary.

Table B4) Detailed results of Pooled Mean Group estimation

Number of obs.:			306
Number of groups:			10
Obs. per group:		min	15
		avg	30.6
		max	41

	D.lc	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ec							
	lrgdp	2.324147	.3213779	7.23	0.000	1.694258	2.954036
	lhicp	-.1308725	.1957143	-0.67	0.504	-.5144654	.2527204
	un	-.0320413	.0098217	-3.26	0.001	-.0512914	-.0127912
SR							
	ec	-.233516	.0605024	-3.86	0.000	-.3520985	-.1149334
	lrgdp D1.	1.373672	.4831166	2.84	0.004	.4267811	2.320563
	lhicp D1.	.0015894	.2344976	0.01	0.995	-.4580175	.4611964
	un D1.	-.0011152	.0059596	-0.19	0.852	-.0127959	.0105655
	_cons	-1.246507	.3207859	-3.89	0.000	-1.875235	-.6177777

PRICE LEADER EFFECT ANALYSIS

Table C1) Tests preceding VAR analysis of price leader effect

Tests of stationarity

	BG	*CZ*	*EE*	*SK*	*SL*
dfuller, lags(x)	(10)	(10)	(9)	(8)	(9)
log(country)	**0.3673**	**0.5074**	**0.3354**	0.0384	**0.3891**
log(cap.)	**0.9421**	**0.4235**	**0.8886**	0.0251	**0.391**
pperron, lags(x)	(10)	(10)	(9)	(8)	(9)
log(country)	**0.8148**	**0.5781**	**0.3043**	**0.4053**	**0.4681**
log(cap.)	**0.9487**	**0.6452**	**0.5492**	**0.3479**	**0.2857**

Tests of stationarity after differencing

	BG	*CZ*	*EE*	*SK*	*SL*
dfuller, lags(x)	(1)	(2)	(2)	(3)	(2)
D.log(country)	**0.257**	0.101	**0.479**	**0.312**	**0.323**
D.log(cap.)	0.019	0.031	0.095	**0.656**	**0.536**
pperron, lags(x)	(1)	(2)	(2)	(3)	(2)
D.log(country)	**0.131**	0.044	0.001	**0.442**	0.0035
D.log(cap.)	0.0003	0.006	0	**0.339**	0.0265

Optimum number of lags (varsoc)

	BG	*CZ*	*EE*	*SK*	*SL*
maxlag(x)	(10)	(10)	(8)	(4)	(8)
FPE	1	2	2	3	2
AIC	1	2	2	3	8
HQIC	1	2	2	3	8
SBIC	1	2	2	1	0
final	**1**	**2**	**2**	**none***	**8**

* no test was eventually run because of unfulfilled requirements

Cointegration (vecrank)

	BG	*CZ*	*EE*	*SK*	*SL*
lags(x)	1; 2	1; 2; 4	2	3	3; 4; 6; 8
maximum rank	0	0	0	-	0; 0; 0; 1

H_0 of DF and PP test of stationarity is unit root.

Table C2) Results of VAR analysis of price leader effect

Results of VAR analysis

		BG	***CZ***	***EE***	***SL***
	lags	1	2	2	2
coef. R=>R	D1	**0.877*** (0.132)**	**0.872*** (0.17)**	0.197 (0.171)	0.079 (0.207)
	D2		**-0.39** (0.179)**	-0.25 (0.181)	**-0.55*** (0.214)**
coef. C=>R	D1	-0.115 (0.112)	0.206 (0.174)	**0.341* (0.178)**	0.379 (0.271)
	D2		-0.02 (0.17)	**0.326** (0.165)**	**0.568** (0.25)**
coef. R=>C	D1	**0.583*** (0.213)**	**0.753*** (0.164)**	**0.397** (0.176)**	0.262 (0.173)
	D2		**-0.561*** (0.172)**	0.197 (0.186)	0.009 (0.179)
coef. C=>C	D1	0.036 (0.181)	0.182 (0.168)	-0.228 (0.183)	0.216 (0.226)
	D2		0.24 (0.164)	0.024 (0.17)	0.115 (0.209)
R^2 R		0.61	0.60	0.25	0.30
R^2 C		0.27	0.56	0.23	0.29

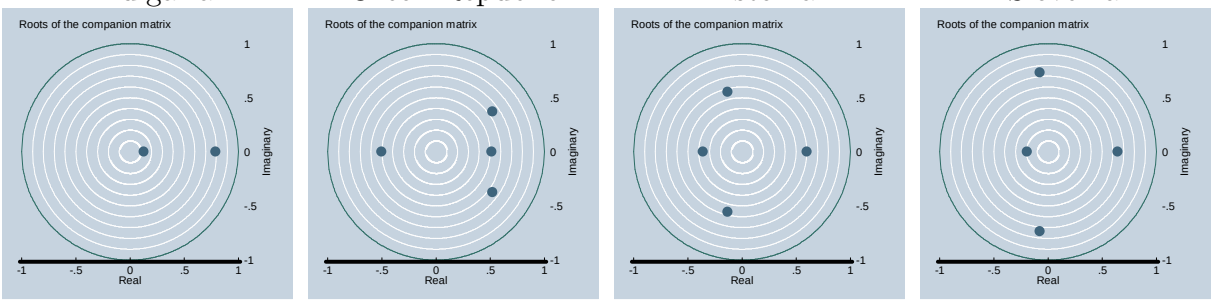
Results of Granger causality test (vargranger)

	BG	***CZ***	***EE***	***SK***	***SL***
C=>R	0.307	0.494	**0.037**	-	**0.014**
R=>C	**0.006**	**0**	**0.026**	-	0.317

R is the rest of the country, C is the capital, R=>C is the coefficient at R explaining C, etc. R^2 C is the coefficient of determination, corresponding to C, etc. D1 marks first difference of the former time series, lagged by 1, D2 lagged by 2.

Figure C3) Test of stability

Bulgaria Czech Republic Estonia Slovenia



The model is stable (stationary), if all inverse roots of the estimated autoregression polynomial lie within the unit circle.

Table C4) Tests of residuals of VAR models

	BG	***CZ***	***EE***	***SL***
p-value of Q-test	**0.6189**	**0.7002**	**0.2814**	**0.6352**
p-value of Jarque-Bera test	0	**0.6824**	0.037	**0.2706**

In Q-test, H_0 is that the residuals are white noise. In Jarque-Bera test, H_0 is normality of the residuals.

VAR/VECM ANALYSIS OF HOUSE PRICE DETERMINANTS

Table D1) Results of VAR analysis of house prices based only on past values

Optimum number of lags *(varsoc)*

	BG	LT	EE	CZ
maxlag(x)	(8)	(8)	(2)	(4)
FPE	1	4	1	2
AIC	1	4	1	2
HQIC	1	0	1	2
SBIC	1	0	0	0
final	**1**	**1***	**1**	**2**

* a unit root was present with 4 lags

Stationarity

	BG	LT	EE	CZ
dfuller, lags(x)	(1)	(4); (1)	(1)	(2)
D.log(country)	0.255	0.486; 0.002	0	0.003
pperron, lags(x)	(1)	(4); (1)	(1)	(2)
D.log(country)	0.259	0; 0	0.024	0

Results of the VAR model

	BG	LT	EE	CZ
L1.Dlprice	0.82*** (0.087)	0.243* (0.143)	-0.277** (0.148)	0.355** (0.161)
L2.Dlprice				-0.235 (0.16)
R^2	0.666	0.061	0.077	0.118

L1.Dlprice marks differenced natural logarithm of house price, lagged by one, etc.

Table D2) Detailed results of VAR/VECM analysis of house prices

ltotal	ln(real[1] house price or real index)	*ldirinv*	ln(real direct investment)
lhicp	ln(HICP)	*lmortg*	ln(real vol. of mortgages per inhab.)
lgdp	ln(real GDP)	*un*	unemployment in percent

Bulgaria

Vector error-correction model

No. of obs = 41

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_ltotal	10	0.027	0.846	170.33	0

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
_ce1						
L1.	**-0.24*****	0.077	-3.1	0.002	-0.3919	-0.0882
ltotal						
LD.	**0.6059*****	0.168	3.6	0	0.2758	0.9361
L2D.	**0.3842***	0.204	1.88	0.06	-0.0159	0.7842
lhicp						
LD.	-0.2483	0.193	-1.29	0.197	-0.6259	0.1293
L2D.	**-0.2913***	0.177	-1.65	0.1	-0.6380	0.0554
llabf						
LD.	-0.0687	0.156	-0.44	0.659	-0.3735	0.2361
L2D.	**0.3386****	0.156	2.17	0.03	0.0324	0.6448
lmortg						
LD.	0.0519	0.088	0.59	0.554	-0.1198	0.2236
L2D.	-0.0042	0.065	-0.06	0.949	-0.1307	0.1224
cons	0.0043	0.009	0.48	0.633	-0.0132	0.0217

Czech Republic

Vector error-correction model

No. of obs = 42

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_ltotal	5	0.027	0.587	52.551	0

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
_ce1						
L1.	**0.0064****	0.005	1.28	0.2	-0.0034	0.0163
ltotal						
LD.	**0.2850***	0.154	1.85	0.064	-0.0169	0.5868
lgdp						
LD.	**-1.772*****	0.574	-3.09	0.002	-2.8982	-0.6468
un						
LD.	**-0.0187**	0.012	-1.57	0.116	-0.0420	0.0046
cons	0.0283	0.007	4.1	0	0.0148	0.0419

Estonia

Vector autoregression

No. of obs = 41

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_ltotal	7	0.145	0.446	33.047	0

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ltotal						
LD.	**-0.5887*****	0.152	-3.89	0	-0.8856	-0.2917
L2D.	**-0.3009****	0.136	-2.21	0.027	-0.5679	-0.0340
lgdp						
LD.	**3.2421*****	1.244	2.61	0.009	0.8045	5.6796
L2D.	2.0569	1.442	1.43	0.154	-0.7686	4.8825
ldirinv						
LD.	**-0.0649*****	0.023	-2.82	0.005	-0.1100	-0.0198
L2D.	-0.0304	0.026	-1.17	0.241	-0.0813	0.0205
cons	0.0113	0.022	0.52	0.604	-0.0313	0.0538

Lithuania

Vector autoregression

No. of obs = 43

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_ltotal	7	0.076	0.381	26.495	0.0002

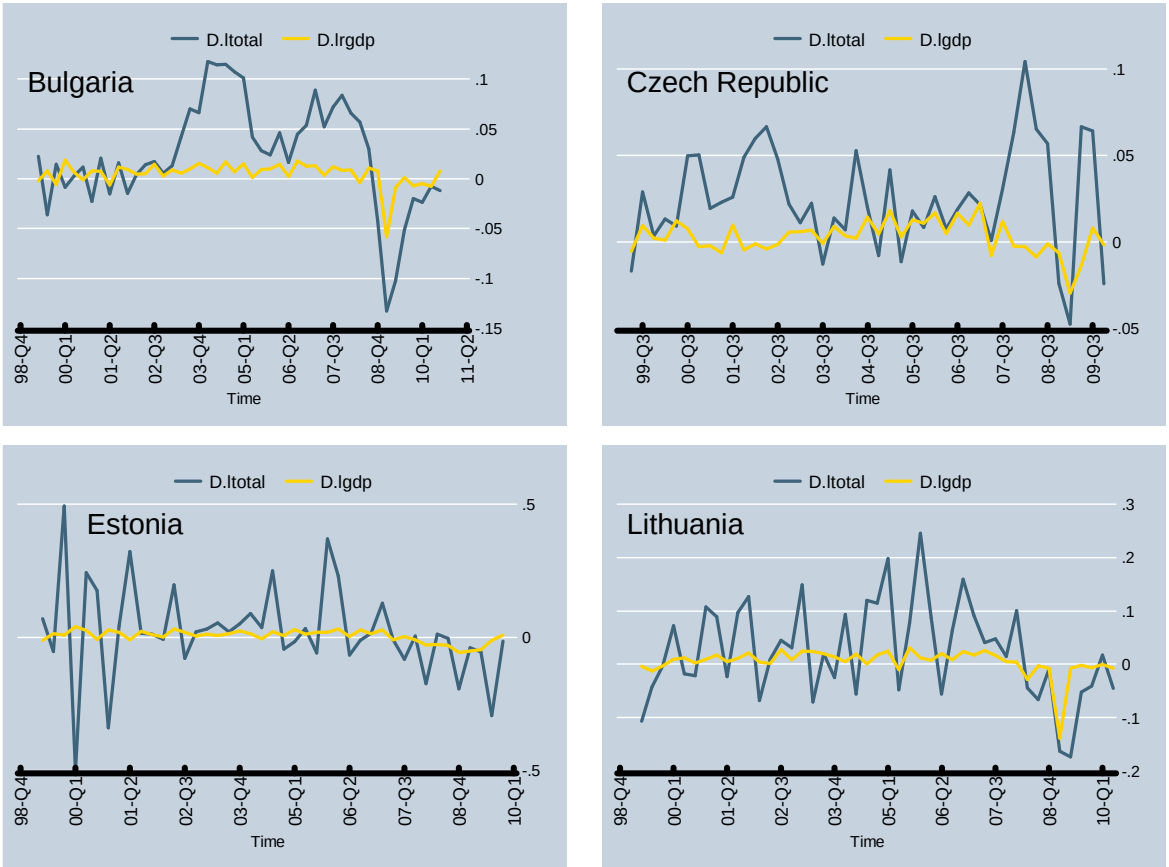
	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
ltotal						
LD.	0.0152	0.146	0.1	0.917	-0.2702	0.3006
L2D.	-0.0106	0.131	-0.08	0.935	-0.2668	0.2456
lhicp						
LD.	-0.4906	0.420	-1.17	0.242	-1.3132	0.3320
L2D.	-0.6638	0.440	-1.51	0.131	-1.5258	0.1982
un						
LD.	-0.0123	0.010	-1.23	0.22	-0.0320	0.0074
L2D.	**-0.0269****	0.011	-2.51	0.012	-0.0479	-0.0059
cons	0.0498	0.014	3.62	0	0.0228	0.0768

Table D3) Results of Granger causality analysis

VECM		VECM		VAR		VAR	
BG		**CZ**		**EE**		**LT**	
omitted	p-value	omitted	p-value	omitted	p-value	omitted	p-value
HICP=>HP	0.173	GDP=>HP	**0.002**	GDP=>HP	**0**	HICP=>HP	**0.088**
LABF=>HP	**0.095**	UN=>HP	0.116	DIRINV=>HP	**0.005**	UN=>HP	**0.004**
MORTG=>HP	0.681						
L2HICP=>HP	0.0996	HP=>UN	**0.006**			HP=>UN	**0**
L2LABF=>HP	**0.03**						

This table contains results for all variables explaining house prices, and those variables whose past values turned out to affect house prices. The p-value at HICP=>HP marks the power of HICP in explaining HP. H_0 is that the former variable has no significant power in explaining the latter, i.e. A does not "Granger cause" B.

Figure D4) Dynamics of real house prices and real GDP



The graphs show quarter-on-quarter percentage changes in the variables.