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Common shocks, uncommon effects: food inflation in the EU

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Motivation

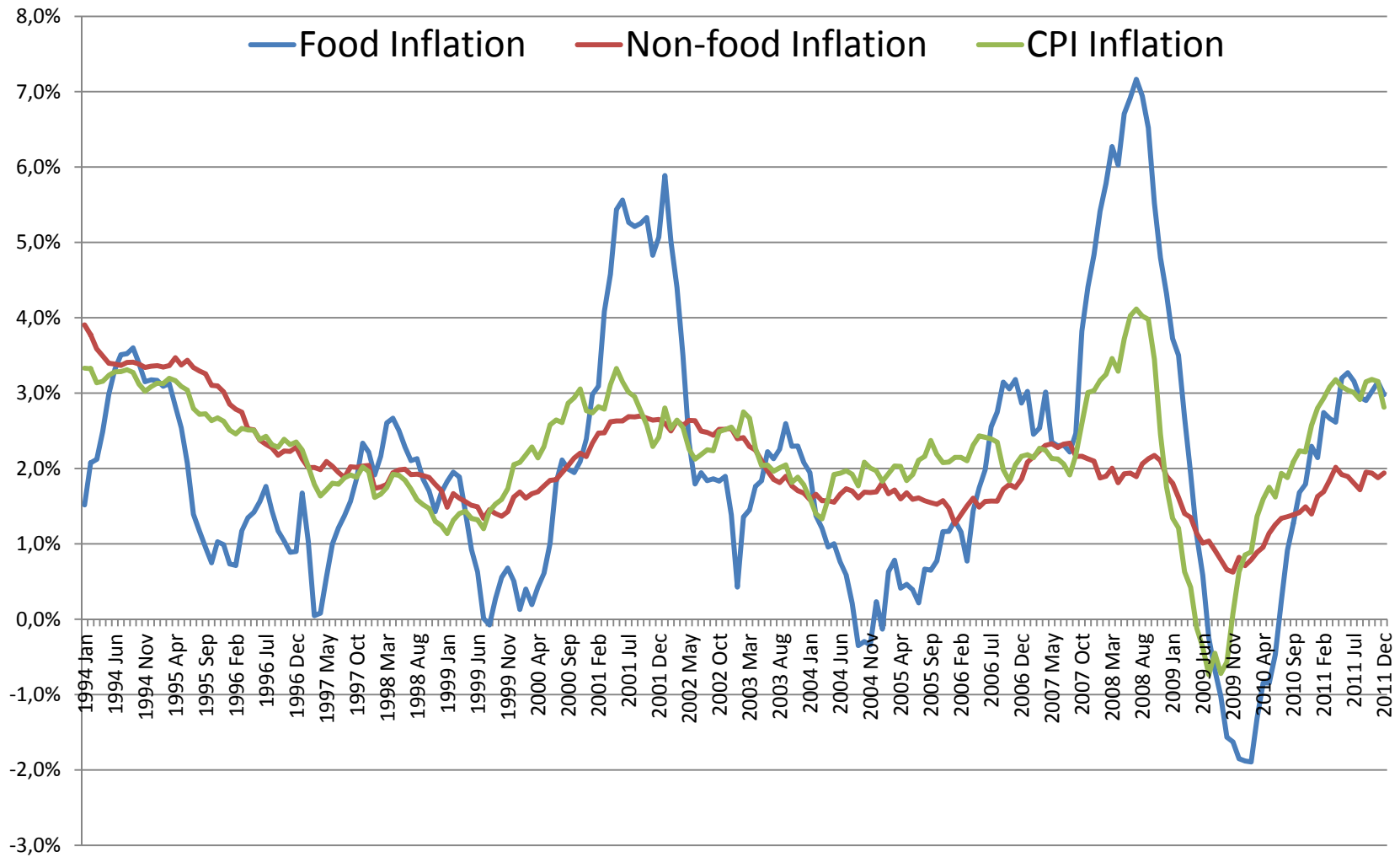
- World commodity price spike 2007-8 was a shock common to all countries
- Experience of food price inflation has varied within the EU (WP2 report)
- Our goal is simply to find out why
 - Are the sources of shock (drivers) different?
 - Do common shocks produce different responses?
- Different shocks or different responses (or both)?
- Why?

Approach

- Another explanation for different responses different national food baskets
- Explore a single good instead – retail bread inflation
- Price transmission model (*wheat-bread*)
- Apply Structural Vector Autoregression (S-VAR) to time series data
- Report preliminary results for 13 countries 1997(1) 2011(12)

Some Background

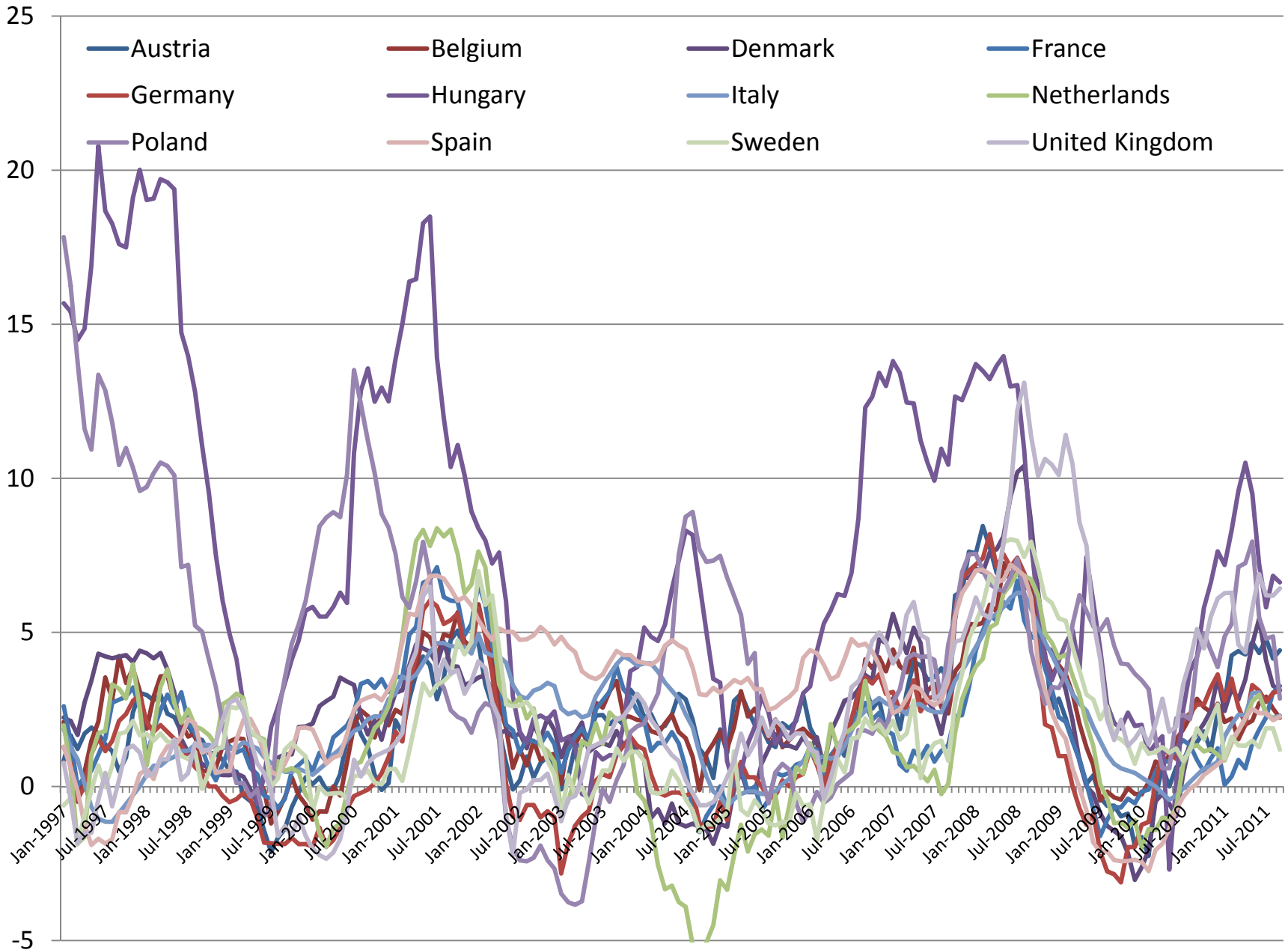
All goods and food inflation in EU(15)



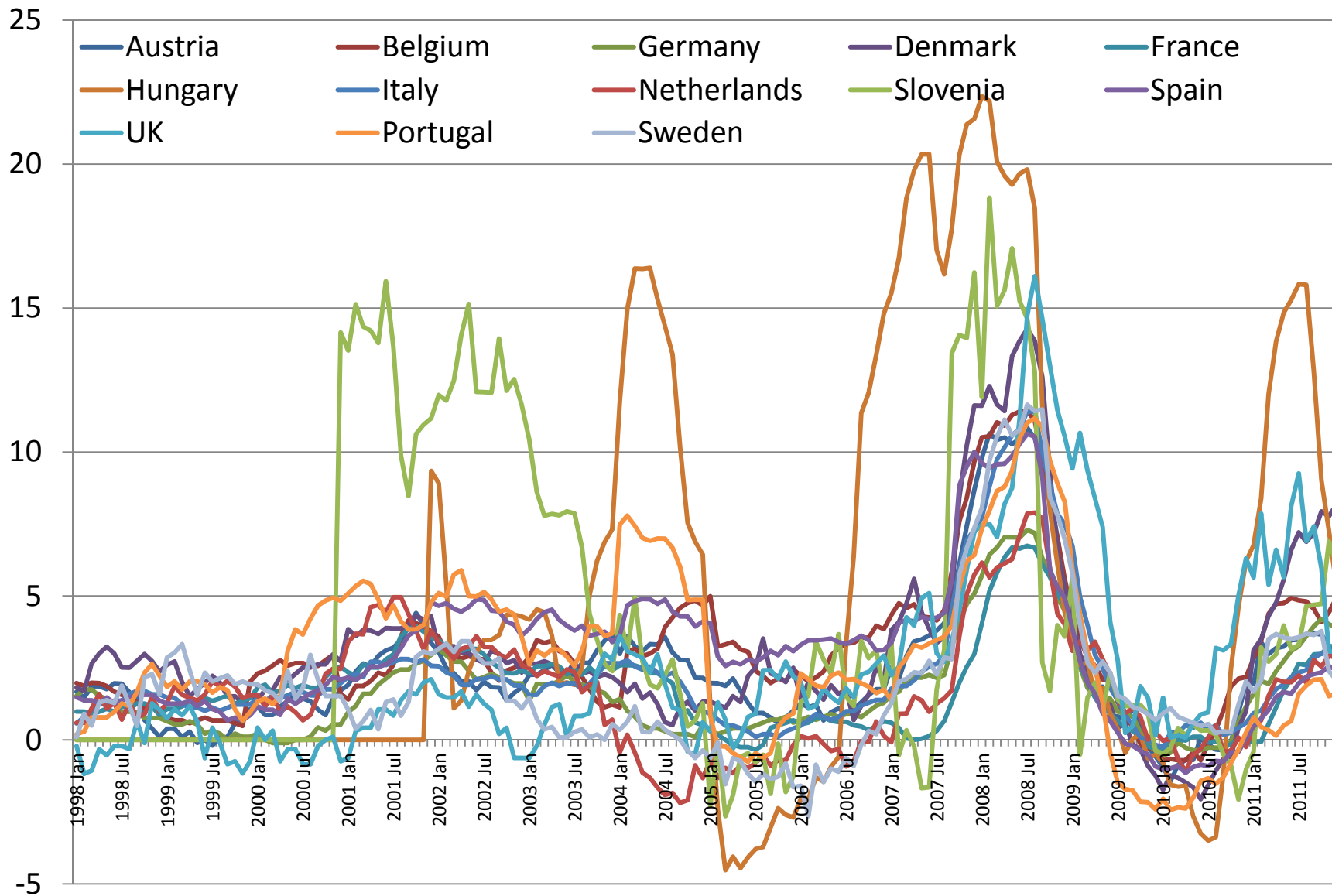
Average Food inflation 1990(1) to 2011(12)

Country	Average	Maximum	Minimum
Austria	1.97%	8.12%	-3.26%
Belgium	1.86%	7.00%	-2.00%
Czech Republic	2.47%	15.25%	-7.33%
Denmark	2.00%	9.90%	-3.08%
Estonia	4.72%	20.24%	-6.66%
France	1.68%	6.87%	-1.69%
Germany	1.42%	7.87%	-3.16%
Greece	5.84%	22.05%	-2.58%
Hungary	12.11%	31.86%	-2.73%
Ireland	1.63%	8.87%	-8.54%
Italy	2.85%	6.77%	-1.15%
Netherlands	1.46%	8.05%	-5.91%
Norway	1.75%	5.76%	-7.33%
Poland	4.96%	19.24%	-3.91%
Portugal	2.90%	15.16%	-6.53%
Romania	20.39%	101.86%	-0.32%
Slovenia	3.36%	13.61%	-15.89%
Spain	2.89%	6.95%	-2.78%
Sweden	1.18%	8.12%	-8.06%
United Kingdom	2.83%	12.31%	-2.38%
Old Members	2.51%	9.96%	-4.20%
New Members	6.96%	48.69%	-7.75%

Annualised Food inflation 1997(1) to 2011(12)



Bread Inflation (%) 1998(1) 2011(12)



Framework

- Being a rate of change of food prices, food inflation may be expected to be stationary . While possible, modelling food inflation directly is not ideal. It denies cointegration.
- Food prices themselves may be expected to be $I(1)$ allowing long run relationships, improving the modelling. Hence we model the relationship between food prices and drivers in a price transmission model
- Retail price of bread and wheat markets
 - World and domestic wheat prices
- Augmented with relevant shifters
 - Demand (unemployment)
 - Supply (Exchange rates, oil prices)
- Country level

Data

- 13 Countries:
Austria, Belgium, Denmark, France, Germany, Hungary, Italy, Netherlands, Portugal, Slovenia, Spain, Sweden, UK
- Sample
Jan 1997 – Dec 2011 (179 observations)
- For each country, a price transmission model is formulated containing:
 - Retail bread prices
 - World and domestic wheat prices
 - Exchange rates
 - Level of unemployment
 - Oil prices

Bread, Domestic and World Wheat prices

Selected countries

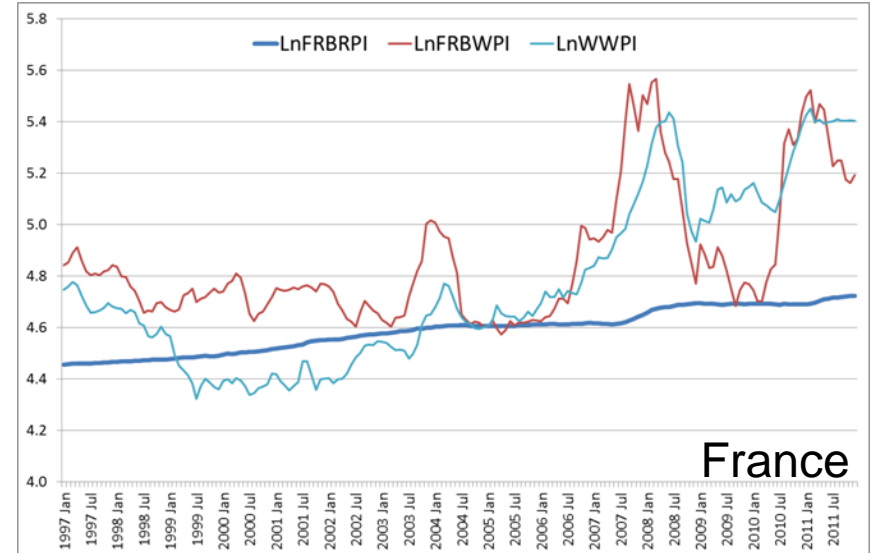
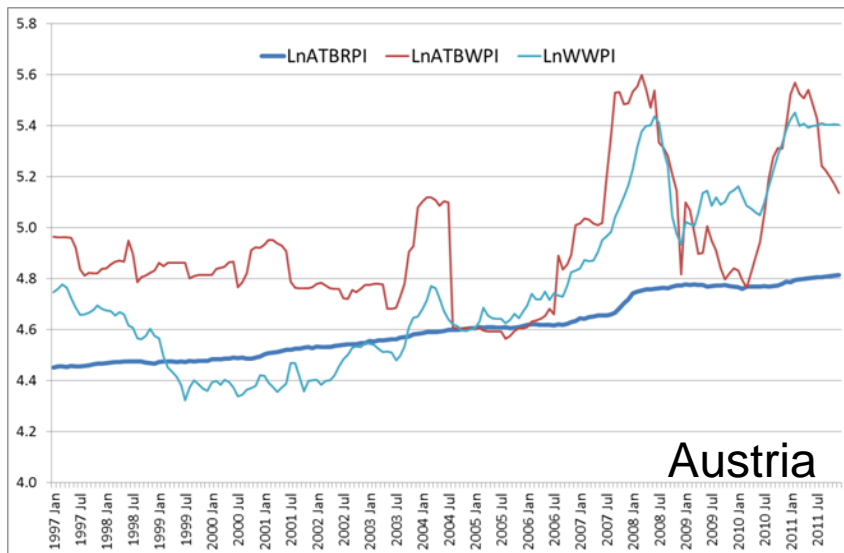
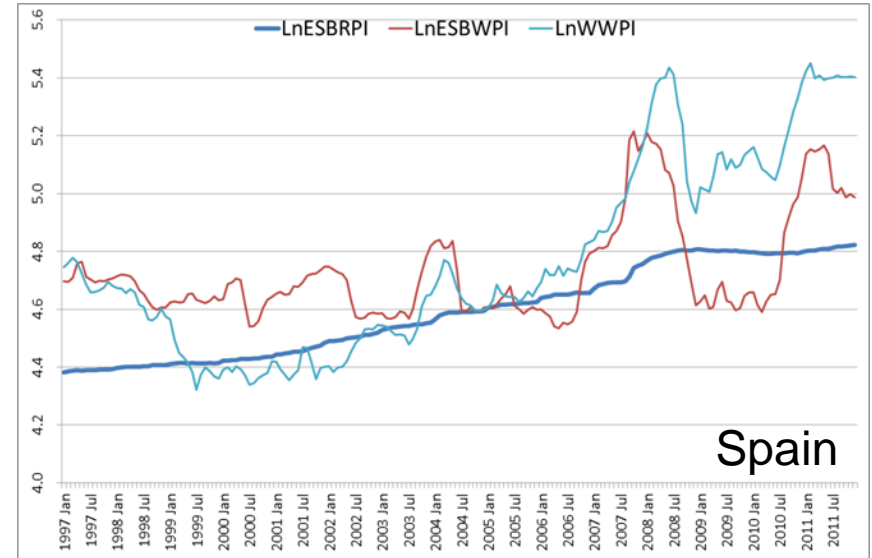
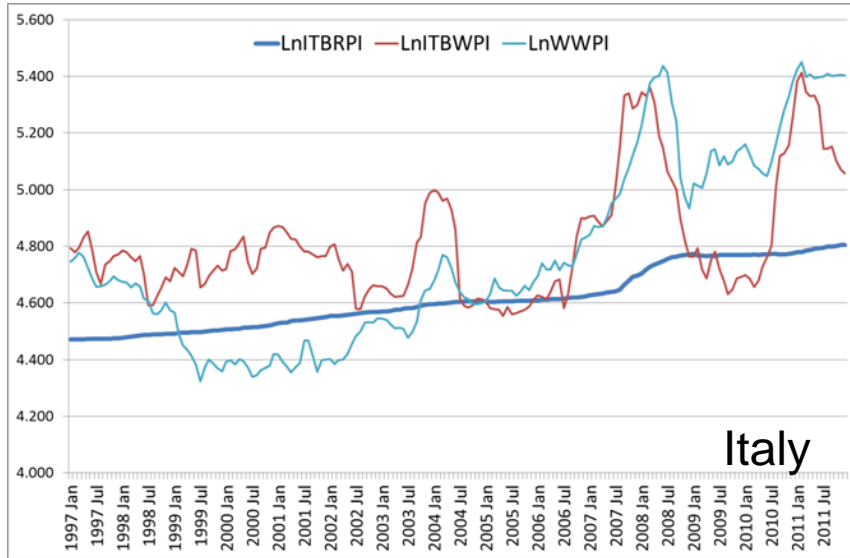


Figure 2: Log of World Oil Price 1997-2011

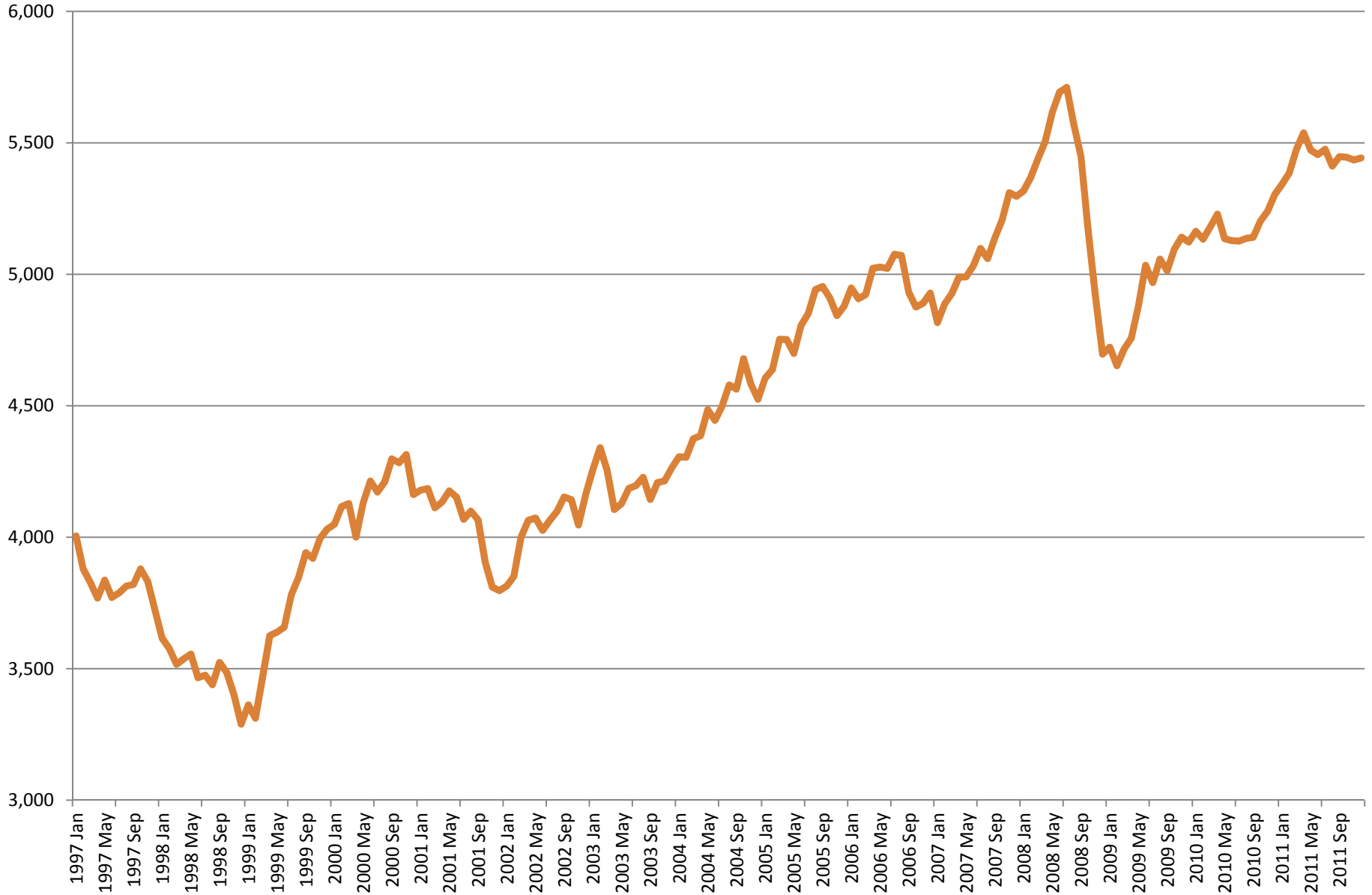
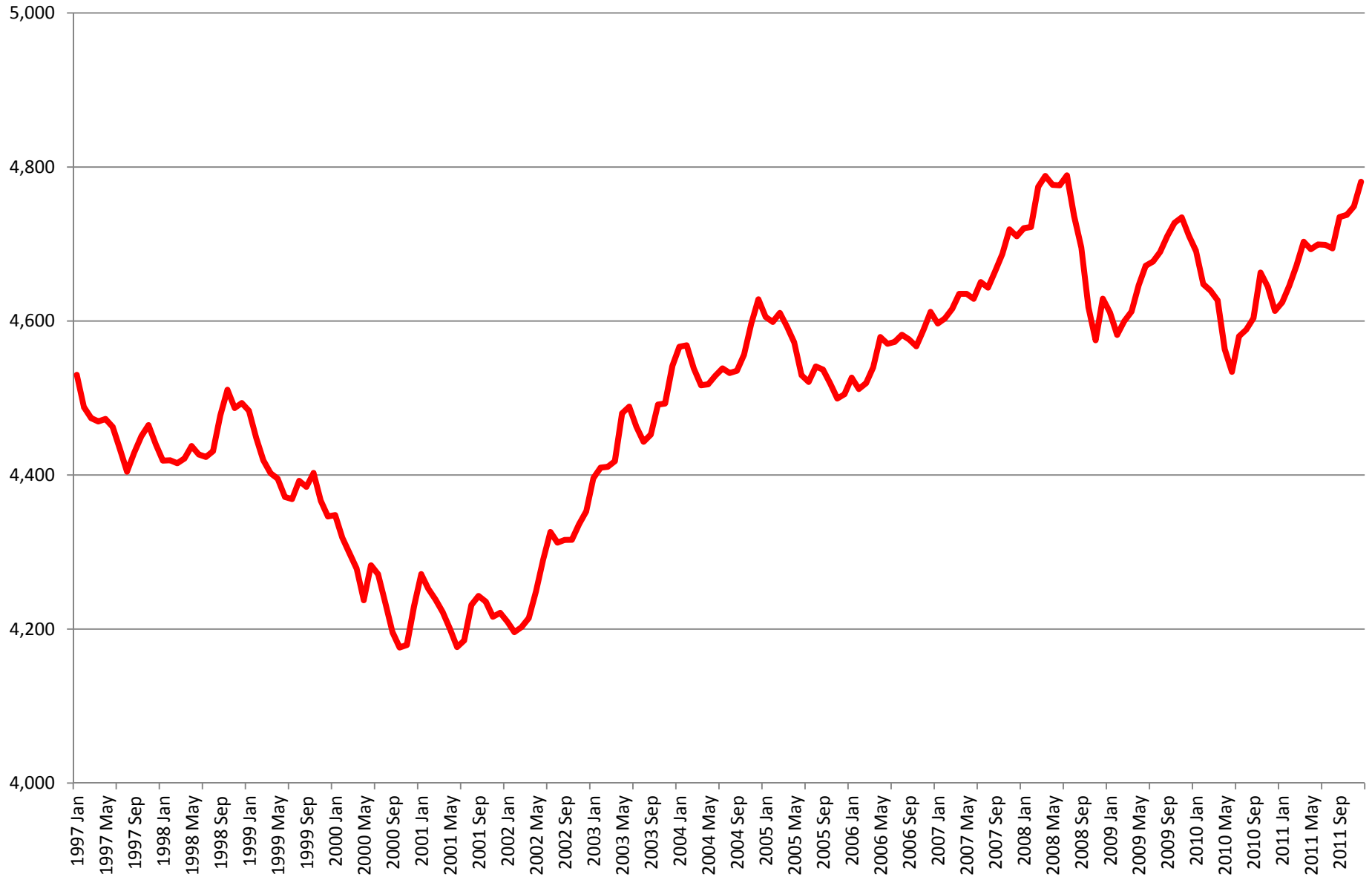


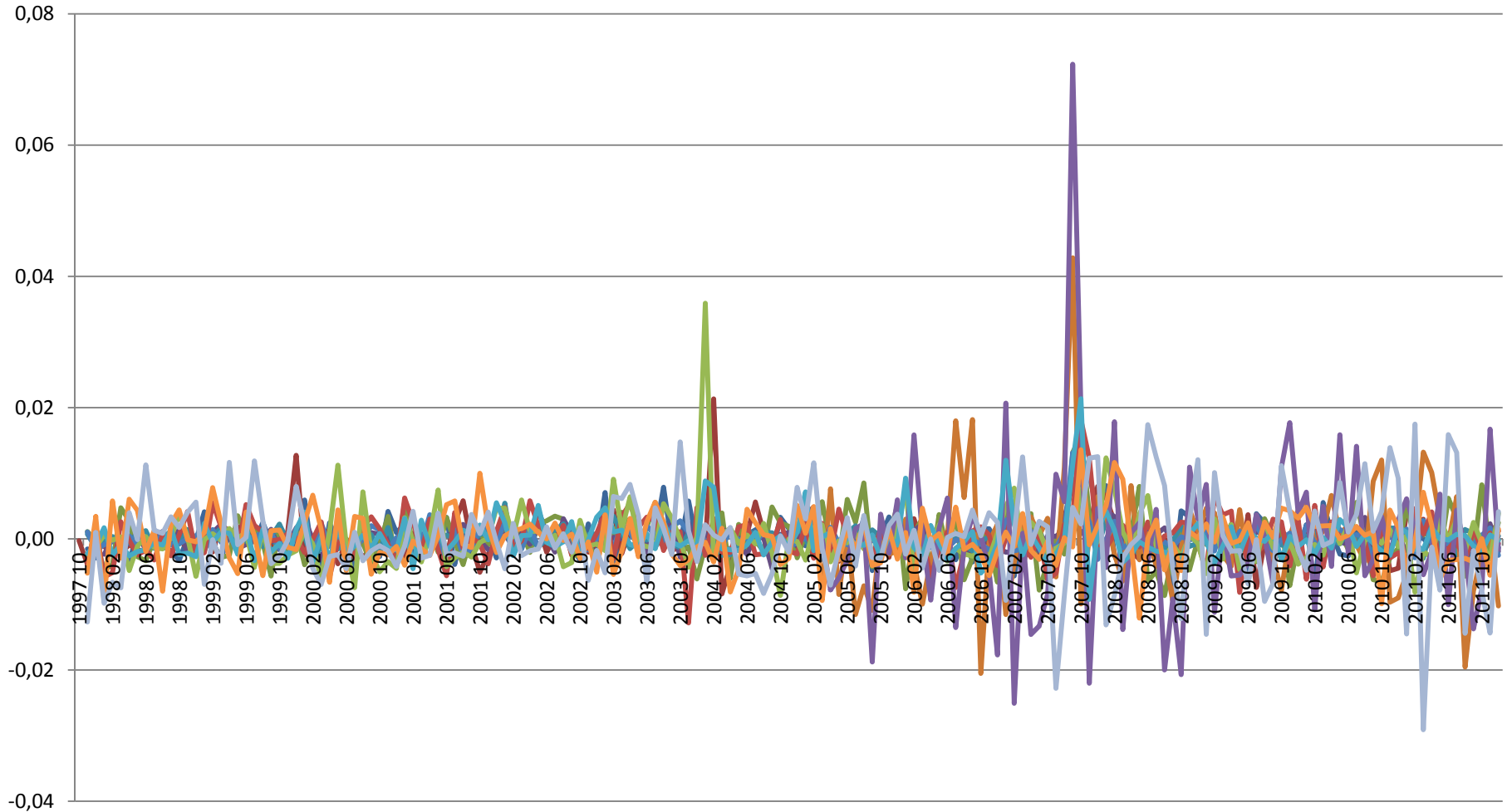
Figure 2: Euro:Dollar Exchange Rate, 1997-2011



Empirical Modelling

- Data analysis
 - Unit root testing
- For each country . . .
 - Estimate a range unrestricted VAR models VAR(10) . . . VAR(1)
 - Test for cointegration
 - Select a preferred model
- Preferred model based on . . .
 - Cointegrating relationship
 - Statistically significant coefficients
 - Parsimony (information criteria)
- Form Structural VAR by Cholesky decomposition
 - Effects of common shocks by impulse response analysis
 - Contribution of drivers to bread prices by variance decomposition

Cointegrating residuals



- Austria ECM(AT45)
- Belgium ECM(BE61)
- Denmark ECM(DK1)
- France ECM(FR28)
- Germany ECM(DE45)
- Hungary ECM(HU34)
- Italy ECM(IT35)
- Netherlands ECM(NL35)
- Portugal ECM(PT48)
- Slovenia ECM(SI46)
- Spain ECM(ES19)
- Sweden ECM(SE36)
- UK ECM(UK15)

Cointegrating Coefficients (p values)

	DK	UK	AS	BE	IT	NK	ES	HY	PT	SE	SI	FR	DE
World Wheat price	0.19	0.22	0.25	0.27	0.31	0.21	0.47	0.65	0.26	0.31	0.50		
	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00		
World Oil price	0.13	0.11	0.13	0.18	0.11	0.13	0.10	0.41	0.18			0.13	0.13
	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.17	0.00			0.00	0.00
Exchange rate	-0.23	-0.27	-0.20	-0.21	-0.38	-0.44					-0.70	-0.49	-0.22
	0.03	0.01	0.01	0.01	0.00	0.00					0.01	0.00	0.01
Domestic Wheat Price	0.25	0.21								0.15		0.40	0.35
	0.00	0.00								0.15		0.00	0.00
Unemployment	-0.08						-0.36	-0.19	-0.19	-0.32	-0.11		
	0.02						0.00	0.46	0.02	0.01	0.01		

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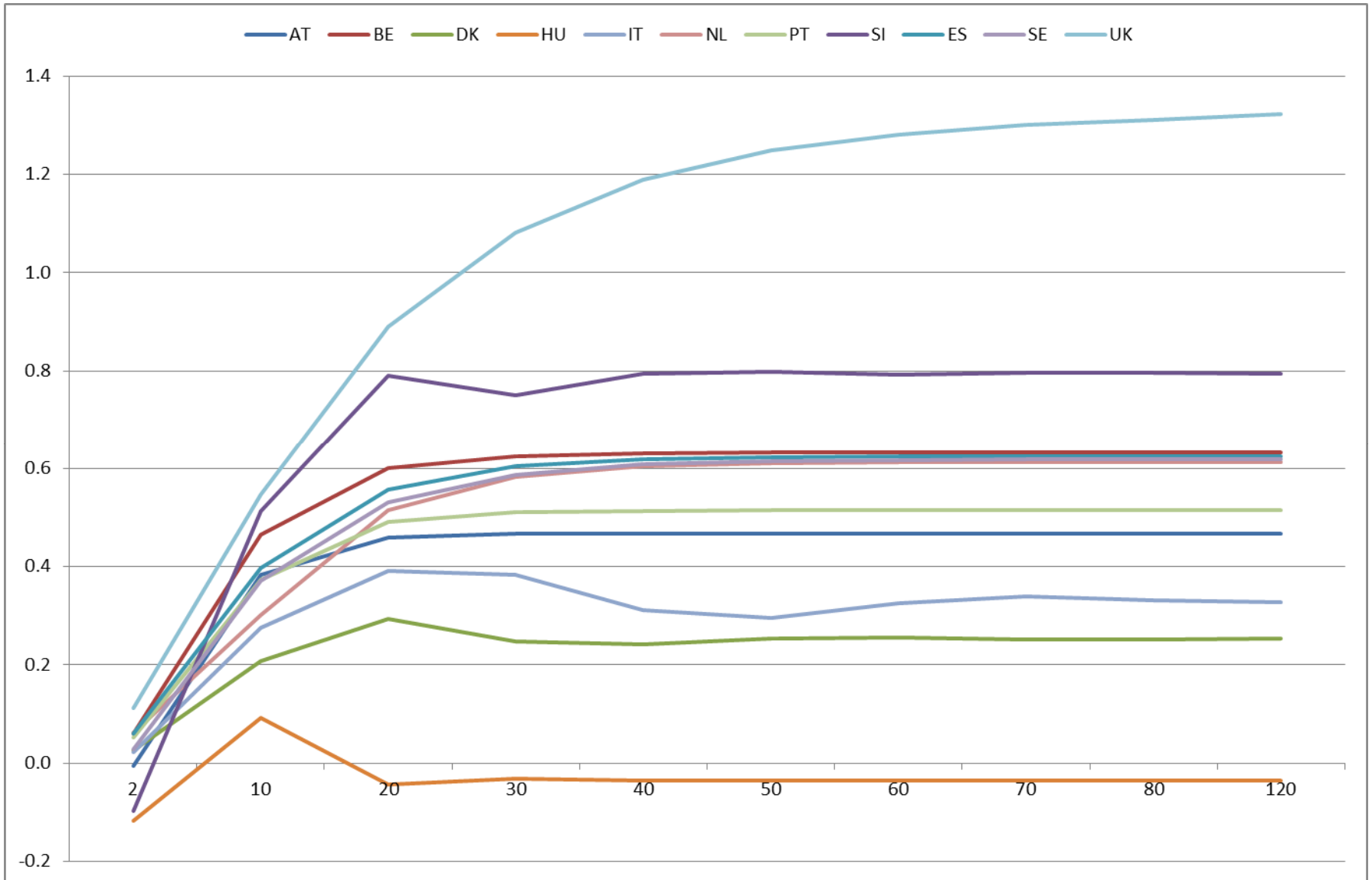
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	0.02						0.00	0.46	0.02	0.01	0.01		

Long Run Retail Bread Price Elasticities

	World wheat price	World oil price	Exchange rate
Hungary	0.653	0.183	-0.698
Slovenia	0.499	0.176	-0.492
Spain	0.468	0.135	-0.445
Italy	0.312	0.134	-0.378
Sweden	0.311	0.132	-0.267
Belgium	0.270	0.131	-0.233
Portugal	0.264	0.126	-0.224
Austria	0.250	0.112	-0.214
UK	0.218	0.108	-0.204
Netherlands	0.206	0.105	
Denmark	0.188		
Average	0.331	0.134	-0.351

Response of Bread Prices to World Wheat Shock



Contribution to Retail Bread Prices

- Forecast error variance decomposition suggests that in the long run
 - Shocks to retail and wheat markets dominate
 - Country differences evident
 - Oil and exchange rates (surprisingly) small

Sources of Shocks to Retail Bread prices

	AT	BE	DK	FR	DE	HU	IT	NL	PT	SI	ES	SE	UK	Average
Retail	64	60	45	32	19	73	77	19	63	32	55	21	12	44
Wheat Market	33	39	47	57	74	0	15	47	27	14	39	76	82	42
Oil Prices	2	0	0	9	7	4	2	8	3	0	0	0	5	3
Exchange Rate	0	1	1	2	0	0	6	27	0	2	0	0	2	3
Unemployment	0	0	7	0	0	23	0	0	7	52	7	4	0	8

The emerging story . . .

- Broadly speaking, while the drivers are common, recent shocks have produced varying impacts
- Price transmission is a large part of the story in all countries
- Importance of price transmission differs by country
- Domestic food chain also play an important role in mediating the effects of shocks

The next steps. . .

- Sensitivity analysis
 - Identifying restrictions
 - Some 'rogue' results

- Explain the differences in terms of country-specific characteristics . . .
 - Self Sufficiency in wheat
 - Income levels
 - Structure of food (bread) industry