a/simmetrie | associazione italiana per lo studio delle asimmetrie economiche

«Asymmetric asymmetries» in Eurozone markets gasoline pricing

Alberto Bagnai[a,b,c], Christian Alexander Mongeau Ospina[a,c]

[a] Department of Economics – Gabriele d'Annunzio University (Pescara, Italy)
[b] CREAM – University of Rouen (France)
[c] a/simmetrie (Rome, Italy)

a/ 2 Route map…

1. **Motivations (many)**
2. **Literature (a little)**
3. **Methodology (a very little)**
4. **Results (as much as you want…)**
5. **Interpretation (…)**
6. **Au revoir**

a/ 3 Motivation: SEVENTY TIMES SEVEN/1

Scenes from an Italian debate…

« In case of devaluation, gasoline price will increase by seven times »
(Alessandro **Plateroti**, vice director of **Il Sole 24 Ore**)

« I tell you, not seven times, but seventy-seven times »
(**Matthew**, 18:22)

a/ 4 Motivation: SEVENTY TIMES SEVEN/2

Bagnai, A., Mongeau Ospina, C.A. 2015. Long- and short-run asymmetries and hysteresis in the Italian gasoline market. *Energy Policy*, 78, 41-50.

1. It was **7%** (in response to a 20% devaluation), not seven times (600%)
2. Adjustment to exchange rate (local price of foreign currency) positively asymmetric
3. **Negative** asymmetry to crude oil price

a/ 5 Literature: ROCKETS AND FEATHERS

1. **Economics of price asymmetry**
   - Bacon, R W. 1991. Rockets and feathers. Energy Econ. 13, 211–218.
   - Peltzman, S. 2000. Prices rise faster than they fall. J. Polit. Econ. 108, 466–502.
2. **Econometrics of asymmetry**
   - Many models: A-ECM, TAR-ECM, M-TAR-ECM, LSTVAR, GARCH-M VAR, and many more…
   - As of 2007, 114 studies on gasoline (of which 30 in Europe)
   - One feature: no long-run asymmetry allowed (i.e., only short-run elasticities depend on sign)

a/ 6 Literature: SURVEY

	Crude oil price		Exchange rate	
	positive	*negative*	*positive*	*negative*
Galeotti et al. (2003)				
France	**0.56**	**0.16**	*0.32*	*0.69*
Germany	**0.79**	**0.55**	*0.25*	*0.41*
Italy	0.20	0.24	*-0.06*	*0.46*
Spain	**0.24**	**0.16**	*0.16*	*0.14*
Grasso and Manera (2007) [1]				
France	0.44	-0.01	**0.51**	**0.61**
Germany	0.41	0.38	**-0.22**	**0.50**
Italy	0.26	0.26	**0.09**	**0.68**
Spain	**0.18**	**0.11**	**0.20**	**0.18**
Grasso and Manera (2007) [2]				
France	**0.10**	**0.51**	0.54	0.75
Germany	0.37	0.51	**0.45**	**1.02**
Italy	0.42	0.26	**1.10**	**0.25**
Spain	0.33	0.20	0.43	0.25

[1] A-ECM (Granger and Lee, 1989)
[2] TAR-ECM (Enders and Granger, 1998)

a/7 Literature: **ISSUES**

1. **What causes asymmetric responses?**
2. **What are their policy implications?**
3. **First and foremost: do they exist?**

a/8 RECONCILING THE EVIDENCE

Many different settings!

1. Models (see above)
2. Frequency of data (daily to monthly)
3. Measurement of variables (wholesale vs retail prices, pre-tax vs after tax,…)
4. Control variables (volatility,…)

A lot of untested assumptions!

1. **Long-run symmetry** (i.e., the long-run response to positive and negative changes is equal)
2. **Homogeneity of response** (i.e., crude price and exchange rate have equal coefficients)

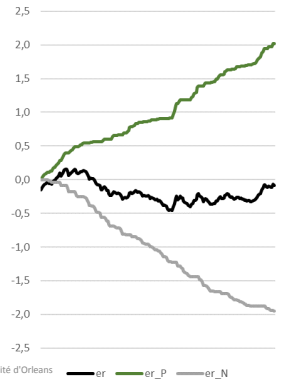
a/10 Methodology: **NARDL/2**

Variable decomposition

$$x_t^+ = \sum_{j=1}^{t} \Delta x_j^- = \sum_{j=1}^{t} \max(\Delta x_j, 0)$$

$$x_t^- = \sum_{j=1}^{t} \Delta x_j^- = \sum_{j=1}^{t} \min(\Delta x_j, 0)$$

$$x_t = x_0 + x_t^+ + x_t^-$$



a/11 Methodology: **NARDL/3**

NARDL: Auto-Regressive Distributed Lag

$$\Delta y_t = \alpha + \rho^+ y_{t-1}^+ + \rho^- y_{t-1}^- + \theta^+ x_{t-1}^+ + \theta^- x_{t-1}^- + \\ + \gamma^+ \Delta y_{t-1}^+ + \gamma^- \Delta y_{t-1}^- + \pi^+ \Delta x_{t-1}^+ + \pi^- \Delta x_{t-1}^- + \varepsilon_t$$

1. **Shin, Yu, Greenwood-Nimmo (2013)** "Modelling asymmetric cointegration and dynamic multipliers on a nonlinear ARDL framework"
2. Both the static and the dynamic component are decomposed
3. This allows simultaneously for both short- and **long-run** asymmetry

a/12 Methodology: **NARDL/4**

NARDL: Auto-Regressive Distributed Lag

$$\Delta y_t = \alpha + \rho^+ y_{t-1}^+ + \rho^- y_{t-1}^- + \theta^+ x_{t-1}^+ + \theta^- x_{t-1}^- + \\ + \gamma^+ \Delta y_{t-1}^+ + \gamma^- \Delta y_{t-1}^- + \pi^+ \Delta x_{t-1}^+ + \pi^- \Delta x_{t-1}^- + \varepsilon_t$$

Short-run symmetry test: $\pi^+ = \pi^-$

Long-run elasticities: $\beta^+ = -\frac{\theta^+}{\rho^+}; \quad \beta^- = -\frac{\theta^-}{\rho^-}$

Long-run symmetry test: $\beta^+ = \beta^-$

a/13 Results: **EQUATION and DATA**

- ***r*** = f(***c***, ***er***)
- Dependent variable:
  - ***r***: log of pre-tax gasoline prices
- Explanatory variables:
  - ***c***: log of Brent crude oil price (as in previous studies)
  - ***er***: log of the EUR/USD exchange rate (an increase is a depreciation)
- Monthly data from 1999m1 to 2015m12

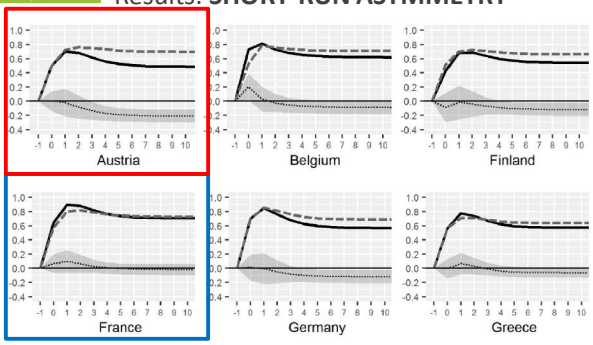
a/14

Results: **OVERVIEW**

1. Very homogeneous results (in comparison to previous studies)
2. Significant long-run relation in 11 out of 12 cases (exception: Portugal)
3. No short-run asymmetry in any case
4. Long-run asymmetry to crude price in 8 out of 11 cases (exceptions: France, Greece, Belgium)
5. Long-run asymmetry to exchange rate in 10 out of 11 cases (exception: France)

a/15

Results: **SHORT-RUN ASYMMETRY**



Dynamic multipliers in response to a 1% crude oil price shock.

a/16

Results: **LONG-RUN ASYMMETRY**

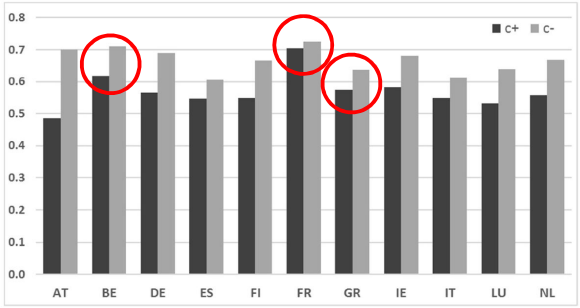


Figure 3 – Long term effect on gasoline prices of a 1% positive (c+) and negative (c–) variations of crude oil price.

a/17

Results: **LONG-RUN ASYMMETRY**

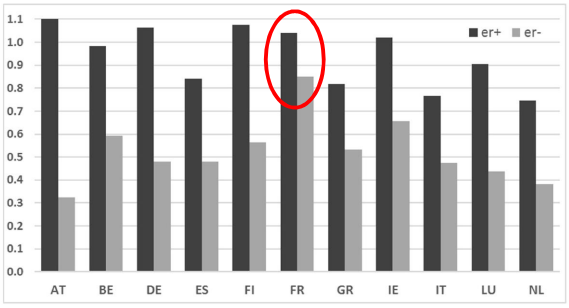


Figure 4 – Long term effect on gasoline prices of a 1% positive (er+) and negative (er–) variations of the exchange rate.

a/18

Results: **CORE vs. PERIPHERY**

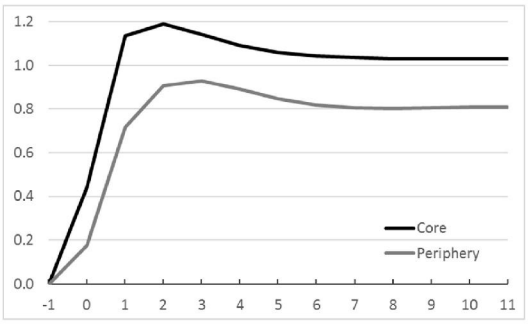


Figure 5 Dynamic multipliers for a 1% exchange rate depreciation in "Core" and "Periphery" Euro area countries (group averages weighted with the gasoline consumption shares within each group), calculated with stochastic simulation (1000 repetitions).

a/19

Summing up…

1. There is no evidence of short-run asymmetry (contrary to previous literature)
2. Asymmetry is pervasive in the long run
3. Asymmetry to crude price is negative (as in Atil et al. 2014)
4. Asymmetry to exchange rate is positive
5. The reaction to exchange rate devaluations is stronger in core than in peripheral countries

a/20 Interpretation: **WHY NEGATIVE ASYMMETRIES?**

1. Greenspan (1999): less pricing power ⇒ less inflation
2. Taylor (2000): less inflation ⇒ less pricing power
3. Ellingsen et al. (2006): price reductions less frequent but larger (*adjustment size puzzle*)
   - Monopolistic firm under random shocks (Barro, 1972)
   - Menu costs (Ball and Mankiw, 1994)
   - Constant price elasticity of demand (instead of linear demand functions)

15/03/2016 LEO - Université d'Orleans

a/21 Interpretation: **WHY ARE ASYMMETRIES ASYMMETRIC?**

1. Pricing behaviour depends on (perceived) price «drift», i.e., inflation
2. A large drift reduces the need to adjust the prices downward if they become «too high» (because of a negative shock to costs)
3. Hypothesis: crude price has a higher inflation-signaling power than the exchange rate
4. Crude price decrease signal low-inflation environment, where inflation «drift» will not compensate for too high a retail price (and hence the firm's market share will shrink if it does not adjust prices downwards)
5. The same does not apply to EUR exchange rate because the euro is perceived as «stable»

15/03/2016 LEO - Université d'Orleans

a/22 Some references…

- **Atil, Lahiani and Mguyen (2014)** "Asymmetric and nonlinear pass-through of crude oil prices to gasoline and natural gas prices", *Energy Policy*, 65
- **Bagnai and Mongeau Ospina (2015)** "Long- and short-run price asymmetries and hysteresis in the Italian gasoline market", *Energy Policy*, 78
- **Clerides (2010)** "Retail Fuel Price Response to Oil Price Shocks in EU Countries", *Cyprus Economic Policy Review*, 4
- **Galeotti, Lanza and Manera (2003)** "Rockets and feathers revisited: an international comparison on European gasoline markets", *Energy Economics*, 25
- **Grasso and Manera (2007)** "Asymmetric error correction models for the oil–gasoline price relationship", *Energy Policy*, 35
- **Taylor (2000)** "Low inflation, pass-through, and the pricing power of firms", *European Economic Review*, 44
- **Shin, Yu, Greenwood-Nimmo (2013)** "Modelling asymmetric cointegration and dymamic multipliers on a nonlinear ARDL framework" http://ssrn.com/abstract=1807745

15/03/2016 LEO - Université d'Orleans

Thank you!

15/03/2016 LEO - Université d'Orleans