An analysis of asymmetric consumer price responses and asymmetric cost pass-through in the french coffee market.

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This analysis is funded by the European Commission through the project *Transparency of Food Pricing*

General context, objective and related literature

- Asymmetric price response of a cost shock in a variety of markets: (Meyer and Cramon-Taubadel, 2005; Peltzman, 2000; Muller and Ray, 2007; Boreinstein et al., 1997; Noel, 2009)
- Welfare and policy implications
- Some possible causes: menu costs, market power, inventory, input price volatility, consumers perceptions
- Statistical analyses: correlations rather than causal effects (focus on short vs long term price transmission, speed of adjustements among others)

General context, objective and related literature

- Objective: to investigate one possible causes of asymmetric price transmission in a structural model, the possible role of asymmetries in demand

- Asymmetric consumer price response
  - Consumers could be more sensitive to price increase than to price decrease: psychological literature (Monroes, 1990; Doob et al., 1969; Delia Bitta and Monroe, 1974), prospect theory (Kahneman and Tversky, 1992), empirical economic studies (Uhl and Brown, 1971; Mazumdar and Raj, 1992)
  - Consumers could be less sensitive to price increase than to price decrease: consumer loyalty & stockpilling behavior (Bultez, 1975)

- Application: French coffee market

Methodology: a structural econometric model

- Two steps
  - Demand model to assess
    - asymmetric consumer price response
    - own and cross price elasticities
  - Using vertical contracts between manufacturers and retailers and demand estimates, simulations of negative and positive cost shocks

Step 1: Random coefficients logit model

The indirect utility function that consumer *i* buys the product *j* at time *t*

$$U_{ijt} = \delta_j + \eta_t - \alpha_i p_{jt} + X_{jt}\beta + \xi_{jt} + \varepsilon_{ijt}$$

- δ_j are product fixed effects; η_t are time fixed effects
- p_{jt} is the price of the product j at period t and α_i the marginal disutility of price for consumer i,

$$\alpha_i = \alpha + \sigma\upsilon_i$$

or

$$\alpha_i = \left(\alpha^1 + \alpha^2 1_{\left[p_{jt} - rp_{jt-1} > 0\right]}\right) + \sigma\upsilon_i \quad \text{with asymmetric price response}$$

- X_{jt} is a vector of observed product characteristics and β captures the consumer i's taste for those product characteristics,
- ξ_{jt} captures the unobserved variation across time in the product characteristics and ε_{ijt} is an unobserved individual-specific error term

Objective: to assess flexible own and cross price elasticities with and without taking into account asymmetric price response of consumers

Methodology: a structural econometric model

- Two steps
  - Demand model to assess
    - asymmetric consumer price response
    - own and cross price elasticities
  - **Using vertical contracts between manufacturers and retailers and demand estimates, simulations of negative and positive cost shocks**

Step 2: vertical contracts and cost pass-through

- Two part tariff contracts between processors and retailers with resale price maintenance (Bonnet and Dubois, 2010; Bonnet and Réquillart, 2012; Bonnet, Dubois, Villas boas and Klapper, 2012)

- Price cost margins from the FOC of the profits maximization

$$\Gamma_{jt} = p_{jt} - \mu_{jt} - c_{jt} = h^{f(j)}(\hat{\theta}, p_t) \Rightarrow C_{jt} = \mu_{jt} + c_{jt} = p_{jt} - \Gamma_{jt}$$

- New marginal cost $\tilde{C}_{jt} : C_{jt} = f(R_{jt}, \omega_j, \tau_t, \mu_{jt}); \Delta R_{jt} \Rightarrow \Delta C_{jt} \Rightarrow \tilde{C}_{jt}$

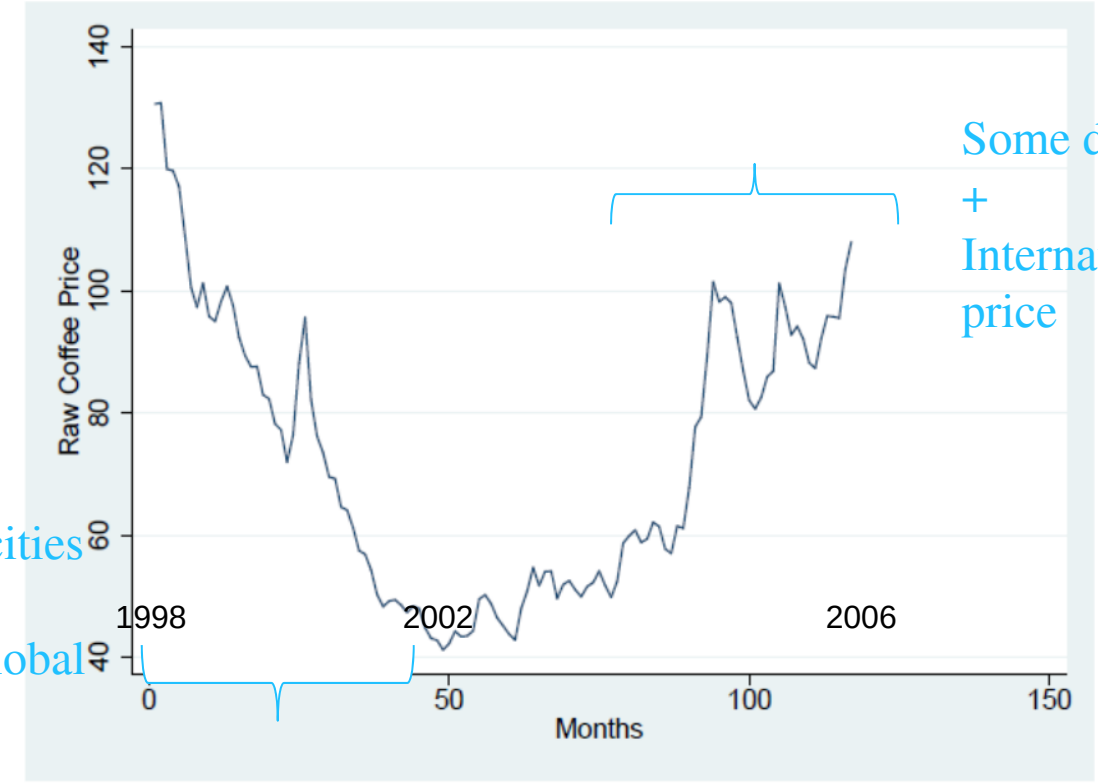
- New price equilibrium $p_{jt}^* : \min_{p_t^*} \left\| p_t^* - \Gamma(p_t^*) - \tilde{C}_t \right\|$

- Cost pass-through: $PT = \dfrac{p_t^* - p_t}{\tilde{C}_t - C_t}$

Coffee market and data

Composite indicator of the international organization of coffee

Expanded production capacities of Brazil and Vietnam
+ slightly decrease of the global demand



Some droughts
+
International actions to support price

FIG. 1 – Raw Coffee Price from 1998 to 2006

Coffee market and data

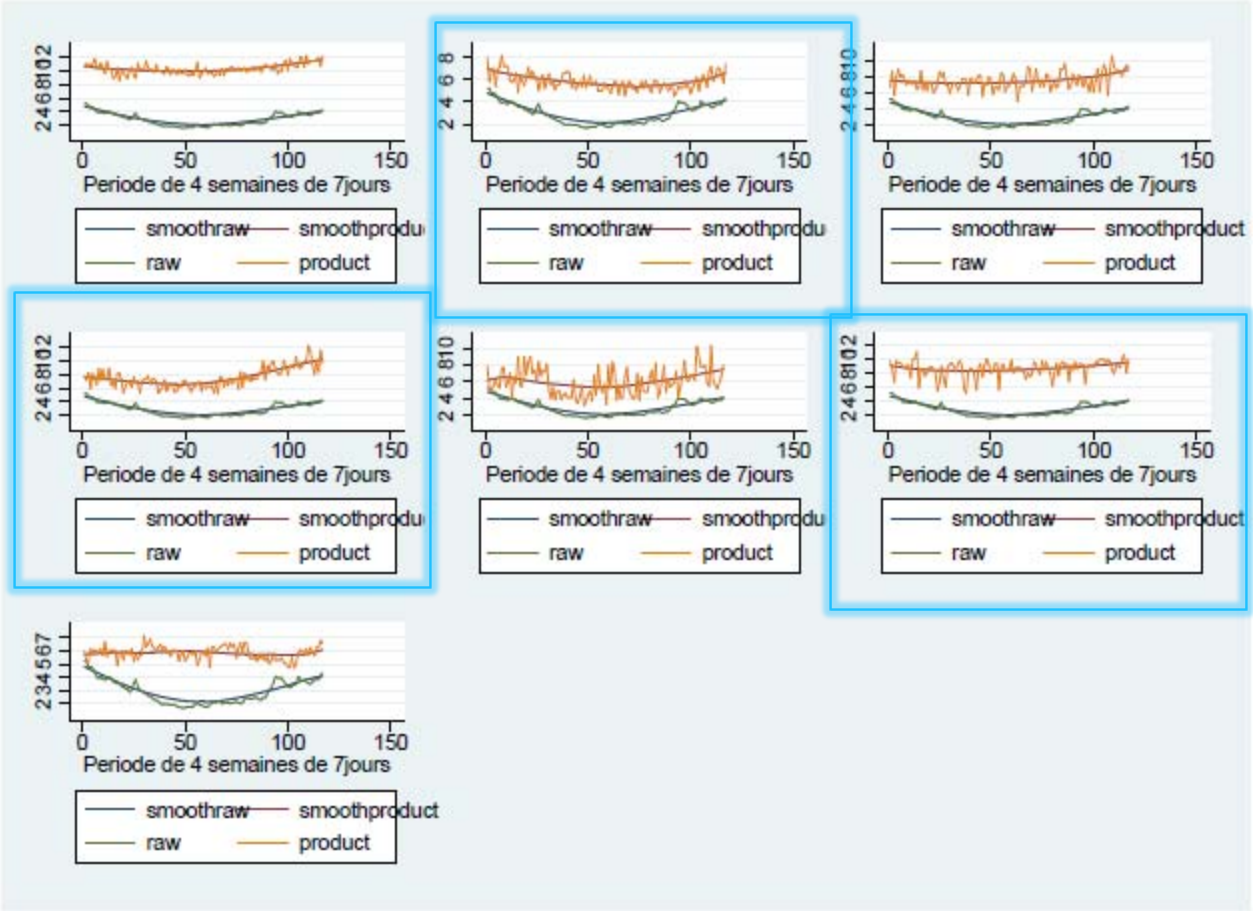


FIG. 2 – Raw coffee price and brand prices in a retailer.

Coffee market and data

- French dataset of household purchases on the period 1998-2006;
- Information: price, quantity, brand, store, characteristics of the product
- 6 national brands (produced by 3 manufacturers), 1 private labels, 7 retailers: 49 differentiated products
- Outside good: other coffee products with low market shares and purchases in other retailers
- Reduced form analysis:

TAB. 1 – **Reduced form analysis of the impact of raw price on coffee retail price.**

Price	Mean (std)	Mean (std)
Raw	0.008 (0.002)	
Raw^+		0.011 (0.002)
Raw^-		0.007 (0.002)
Product fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
R^2	0.75	0.75

Demand results: random coefficients logit model

TAB. 4 – **Demand Estimates (standard errors are in parenthesis).**

	Model 1 Mean (Std)	**Model 2** Mean (Std)
Price (α^1)	-0.74 (0.02)	-0.73 (0.03)
Price$\times 1_{[p_t - p_{t-1} > 0]}$ (α^2)		0.12 (0.06)
Price (σ)	0.16 (0.08)	0.18 (0.09)
Promotion rate	-0.24 (0.07)	0.43 (0.35)
Arabica coffee rate	2.63 (0.25)	1.64 (0.56)
Robusta coffee rate	-0.38 (0.11)	0.15 (0.30)
Bean coffee rate	-1.52 (0.25)	-2.09 (0.40)
Caffeine-free coffee rate	-0.27 (0.16)	-1.08 (0.43)
$\delta_j, \eta_{y(t)}$ and $\eta_{m(t)}$ not shown		
GMM objective (df)	3.67($\chi^2(7)$)	2.25($\chi^2(7)$)

Demand results: price elasticities

TAB. 5 – **Own price elasticities from the Random Coefficients logit Model (standar errors are in parenthesis).**

	Model 1		Model 2	
	$\Delta p > 0$	$\Delta p \leq 0$	$\Delta p > 0$	$\Delta p \leq 0$
Brand 1	-5.96 (0.38)	-5.77 (0.33)	-4.40 (0.26)	-5.48 (0.31)
Brand 2	-3.95 (0.43)	-3.58 (0.43)	-3.10 (0.31)	-3.49 (0.40)
Brand 3	-5.08 (0.50)	-4.61 (0.55)	-3.87(0.34)	-4.44 (0.50)
Brand 4	-5.07 (0.73)	-4.66 (0.74)	-3.85 (0.46)	-4.48 (0.68)
Brand 5	-3.83 (0.80)	-3.24 (0.57)	-3.01 (0.57)	-3.17 (0.55)
Brand 6	-5.58 (0.49)	-5.07 (0.62)	-4.18 (0.32)	-4.86 (0.56)
Brand 7	-3.90 (0.39)	-3.66 (0.40)	-3.06 (0.28)	-3.57 (0.38)

Simulation results

- Price cost margins: 35% (30% without asymmetric price response of consumers)

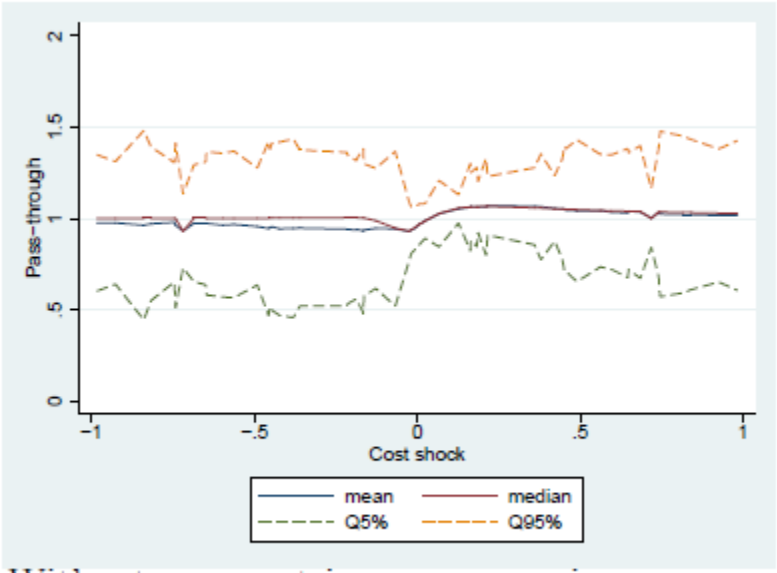
- Cost function:

TAB. 7 – **OLS regression of the marginal cost estimated.**

Marginal cost estimated	Model 1 Mean (Std)	Model 2 Mean (Std)
Raw	0.052 (0.001)	0.048 (0.001)
Product fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
R^2	0.96	0.96
Number of observations	5671	5671

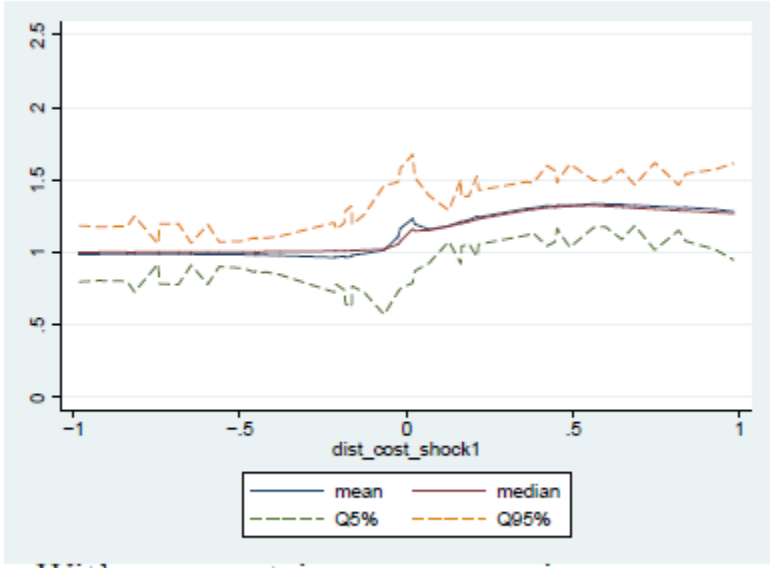
Simulation results

Figure A



Without asymmetric consumer price responce

Figure B



With asymmetric consumer price response

Simulation results

TAB. 6 – **Regression of Pass-through on cost shock variables and product characteristics.**

	With asymmetric consumer price response
Retailer 1	-0.002 (0.001)
Retailer 2	0.000 (0.001)
Retailer 3	0.002 (0.001)*
Retailer 4	0.006 (0.001)**
Retailer 5	0.001 (0.001)
Retailer 6	0.003 (0.001)**
Manufacturer 1^{+}	0.163 (0.002)**
Manufacturer 1^{-}	-0.047 (0.001)**
Manufacturer 2^{+}	0.081 (0.002)**
Manufacturer 2^{-}	0.010 (0.002)**
Manufacturer 3^{+}	0.045 (0.002)**
Manufacturer 3^{-}	-
Private labels^{+}	0.077 (0.002)**
Private labels^{-}	0.013 (0.002)**
Cost variation^{+}	0.233 (0.003)**
Cost variation^{-}	-0.245 (0.003)**
Cost variation$(> 50\%)^{+}$	-0.123 (0.003)**
Cost variation$(>50\%)^{-}$	0.132 (0.003)**
Const	1.073 (0.004)**
Month fixed effects	Yes

Conclusion

- Structural econometric model to find empirical evidence on the role of possible asymmetries in consumers' price reponses into explaining asymmetric cost pass-through
- French households are less sensitive to a price increase than to a price decrease in the coffee market
- A positive cost shock is more transmitted than a negative one
- Heterogeneity in the price transmission across manufacturers
- The PT from a positive cost shock increases with the level of the shock (except when the shock is sufficiently large) whereas we have the opposite result for negative cost shocks

Limits and future works

- Symmetric behaviors of firms
- Robutness checks on the reference price of consumers
- Price thresholds and asymmetric thresholds (Han et al., 2001; Kalyanaram and Little, 1994; Gupta and Cooper, 1992)
  - Adaptation level theory (ex: a loss must exceed a threshold to be perceived in a positive price gap)
  - Saturation effects (ex: consumers limit purchasing, stockpiling products in a negative price gap)

→ Bayesian method as in Teriu and Dahana (2006)