PRICING UNDER FAIRNESS CONCERNS

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CUSTOMERS AND FIRMS CARE ABOUT FAIRNESS

• evidence from marketing, psychology, sociology, economics

• but very little theoretical work on fair pricing

• problematic: pricing models are widely used to analyze policy
  – industrial organization: monopolistic pricing
  – international trade: tariffs and exchange rates
  – public economics: incidence of taxation
  – macroeconomics: monetary policy

• realistic microfoundations matter here:
  – microfoundations → model’s welfare properties → policy
• firms set prices to maximize profits given that
  – customers care about the fairness of markups
  – customers systematically misperceive markups
• in monopoly model:
  – price rigidity: incomplete passthrough of costs into prices
• in New Keynesian model:
  – nonneutrality of monetary policy
EVIDENCE ON FAIRNESS
12,000 firms in the US, Canada, Europe say that they “tacitly agree to stabilize prices, perhaps out of fairness to customers” – Blinder et al [1998] and Fabiani et al [2005]

median rank of macro theories:
- nominal contracts: 3/11
- menu costs: 10/11
- informational frictions: 11/11
Kahneman, Knetsch, Thaler [1986]: “A hardware store has been selling snow shovels for $15. The morning after a large snowstorm, the store raises the price to $20.”

- acceptable: 18%
- unfair: 82%
Kahneman, Knetsch, Thaler [1986]: “Due to a transportation mixup, the wholesale price of lettuce has increased. A grocer has bought lettuce at a price that is 30 cents per head higher than normal. The grocer raises the price of lettuce to customers by 30 cents per head.”

• acceptable: 79%

• unfair: 21%
MONEY ILLUSION SUGGESTS MISINFORMATION

Shafir, Diamond, Tversky [1997]: “Imagine that within a six-month period all salaries and all prices went up by 25%. You now earn and spend 25% more than before. Six months ago, you were planning to buy a leather armchair whose price during the 6-month period went up from $400 to $500. Would you be more or less likely to buy the armchair now?”

- as or more likely: 62%
- less likely: 38%
ANGER AT INFLATION SUGGESTS MISINFORMATION

- Shiller [1996] surveyed 600 people in USA, Germany, Brazil
- 85% said that “when they go to the store and see that prices are higher, they sometimes feel a little angry at someone”
- someone = “greedy store owners and businesses”
### OPINIONS ABOUT PRICE MOVEMENTS IN JAPAN

**(BANK OF JAPAN SURVEY, 2001–2017)**

<table>
<thead>
<tr>
<th>perceived price change</th>
<th>favorable</th>
<th>neutral</th>
<th>unfavorable</th>
</tr>
</thead>
<tbody>
<tr>
<td>prices have gone up</td>
<td>2.5%</td>
<td>13.0%</td>
<td>83.7%</td>
</tr>
<tr>
<td>((N = 68,491))</td>
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<tr>
<td>prices have gone down</td>
<td>43.0%</td>
<td>34.2%</td>
<td>21.9%</td>
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<tr>
<td>((N = 18,257))</td>
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MONOPOLY PRICING UNDER FAIRNESS CONCERNS
given price of consumption $P$, income $I$, and fairness function $F$

choose money $M$ and consumption $Y$

to maximize quasilinear utility

$$\frac{\epsilon}{\epsilon - 1} (F \cdot Y)^{(\epsilon - 1)/\epsilon} + M$$

subject to budget constraint $M + P \cdot Y = I$

different from social-preference approach to fairness

FAIRNESS FUNCTION $F$

- takes as argument $K^p \equiv P/\text{MC}_p$: perceived markup
  - $P$: observed price
  - $\text{MC}_p$: perception of hidden marginal cost

- is positive: $F(K^p) > 0$

- is decreasing: $F'(K^p) < 0$

- is linear or concave: $F''(K^p) \leq 0$
  - stronger response to increases in price than decreases
EXAMPLE OF FAIRNESS FUNCTION

\[ F \]

\[ Kp \]

\[ 0 \]

\[ 1 \]

\[ Kf \]
EXAMPLE OF FAIRNESS FUNCTION

\[
F
K_p K_f \quad 0
1
\]

Diagram with a curve labeled \( K_f \) and a point at \( (1, K_f) \).
PERCEIVED MARGINAL COST

\[ MC^p(P) = (MC^b)\gamma \cdot \left[ \frac{P}{\epsilon / (\epsilon - 1)} \right]^{1-\gamma} \]

- \( MC^b \): prior belief about monopoly’s marginal cost
- \( P/[\epsilon/ (\epsilon - 1)] \): marginal cost with rational customers
- \( \gamma \in (0, 1] \): amount of misinference
  - \( \gamma = 1 \): no inference
  - \( \gamma = 0 \): rational inference
\[ K^p(P) = \frac{P}{MC^p(P)} = \left( \frac{\epsilon}{\epsilon - 1} \right)^{1-\gamma} \left( \frac{P}{MC^b} \right)^\gamma \]

- misinference (\(\gamma > 0\)): \(K^p\) increasing in \(P\)
- rational inference (\(\gamma = 0\)): constant \(K^p\)
\[ Y^d(P) = P^{-\epsilon} \cdot F(K^p(P))^{\epsilon-1} \]

- \( P^{-\epsilon} \): traditional effect of \( P \) on demand
  - \( P \rightarrow \) customers’ budget sets \( \rightarrow \) demand
- \( F(K^p(P))^{\epsilon-1} \): effect of \( P \) on demand through fairness
  - \( P \rightarrow \) perceived markup \( \rightarrow \) perceived fairness \( \rightarrow \) marginal utility of consumption \( \rightarrow \) demand
THE MONOPOLY

- given marginal cost of production $MC$
  - unobservable to customers
- chooses output $Y$ and price $P$
- to maximize profits $Y \cdot (P - MC)$
- subject to customers’ demand $Y = Y^d(P)$
PROFIT-MAXIMIZING PRICE

• profit-maximizing price: $P = K \cdot MC$

• $K$: profit-maximizing markup

\[ K = \frac{E}{E - 1} \]

• $E$: (positive) price elasticity of demand

\[ E \equiv -\frac{P}{Y^d} \cdot \frac{dY^d}{dP} \]
PRICE ELASTICITY OF DEMAND

• $Y^d(P) = P^{-\epsilon} \cdot F(K^p(P))^{\epsilon-1}$

• price elasticity of perceived markup $= \gamma$

• $\phi(K^p) \equiv$ (positive) markup elasticity of fairness function

• then we obtain:

$$E(P) = \epsilon + (\epsilon - 1) \cdot \gamma \cdot \phi(K^p(P))$$
MARKUP ELASTICITY OF FAIRNESS FUNCTION

\[
\phi(K^p) = - \frac{K^p}{F(K^p)} \cdot \frac{dF}{dK^p}
\]

- \(\phi\) is positive
  - because \(F > 0\)
  - and \(F' < 0\)

- \(\phi\) is increasing in \(K^p\)
  - because \(F\) is decreasing in \(K^p\)
  - and \(-F'\) is weakly increasing in \(K^p\)
NO FAIRNESS CONCERNS: FLEXIBLE PRICES

\[ E(P) = \epsilon + (\epsilon - 1) \cdot \gamma \cdot \phi(K^P(P)) = 0 \]

- standard elasticity: \( E = \epsilon \)
- standard markup: \( K = \epsilon / (\epsilon - 1) \)
- passthrough of marginal costs into prices = 100%
  - because markup is constant
RATIONAL INFERENCES: FLEXIBLE PRICES

\[ E(P) = \epsilon + (\epsilon - 1) \cdot \gamma \cdot \phi(K^P(P)) \]

- standard elasticity: \( E = \epsilon \)
- standard markup: \( K = \epsilon / (\epsilon - 1) \)
- marginal-cost passthrough = 100%
FAIRNESS CONCERNS & MISINFERENCES:

MORE COMPETITION

\[ E(P) = \epsilon + (\epsilon - 1) \cdot \gamma \cdot \phi(K^p(P)) \]

• elasticity of demand is higher: \( E > \epsilon \)

• markup is lower: \( K = \frac{E}{(E - 1)} < \frac{\epsilon}{(\epsilon - 1)} \)
FAIRNESS CONCERNS & MISINERENCE:

PRICE RIGIDITY

• equilibrium markup is a fixed point:

\[ K = \frac{E(K \cdot MC)}{E(K \cdot MC) - 1} \]

• thus equilibrium markup satisfies

\[ K = 1 + \frac{1}{\epsilon - 1} \cdot \frac{1}{1 + \gamma \cdot \phi(K^p(K \cdot MC))} \]

• passthrough of marginal costs into prices < 100%
EVIDENCE OF INCOMPLETE PASSTHROUGH

- labor-cost shocks in Sweden: passthrough = 30%
  - Carlsson, Skans [2012]
- reduction in import tariff in India: passthrough = 30% – 40%
  - De Loecker et al [2016]
- marginal-cost shocks in Mexico: passthrough = 20% – 40%
  - Caselli, Chatterjee, Woodland [2017]
EXTENSION TO SIGNALING

• the monopoly can credibly signal marginal costs
• long-run cost: monopoly conceals its cost
• cost decrease: monopoly always conceals its cost
• cost increase: monopoly reveals its cost when the increase is large enough
EVIDENCE OF SIGNALING

Due to the high demand and inclement weather in the south, the price of avocados has risen dramatically. With the sudden spike in cost we are forced to raise the price of the following, till prices come down.

- Sides of Guacamole
- Chips and Guacamole
- Chips, Guacamole, & Salsa

Thank you from the Tallulah’s Team for understanding and your continued patronage.
EVIDENCE OF SIGNALING

GUACAMOLE PRICE INCREASE

AVOCADO SHORTAGE

Mexico’s production on all sizes and grades continues to decline rapidly, there is very little to no fruit left to harvest and this is causing volatile markets and shortages. Volume has decreased by 80%, and the entire industry is feeling this. The start of Mexico’s’ summer crop in early July will be a slow start. The market is in an extreme situation, and will remain as such for many more weeks. Field costs are changing / increasing multiple times per day. Our Avocado suppliers are sending California fruit across the country to help bridge the gap in the Mexican supply. The current reality is that demand exceeds supply; this is industrywide...Increased costing will undoubtedly halt / stall future ads and promotions for the time being. Flexibility with ripening specs **may be necessary** as our ripening partners are facing limited time in the ripening rooms.
Chers clients,

Nous subissons comme vous la flambée des prix des matières premières telles que :

- la semoule de blé dur (base essentielle de nos pâtes)   + 70%
- les oeufs (base essentielle de nos pâtes)              + 28%
- Produits laitiers (parmesan, crème, fromage blanc...) + 25%
  etc...

Aujourd'hui, la pression est telle que nous ne sommes plus en mesure de supporter ces augmentations en totalité comme nous le faisons depuis huit mois, nous sommes donc obligés de répercuter une partie du coût dans nos prix de vente.

Cependant nous avons amorti au mieux cette hausse afin de limiter notre augmentation à + 5% sur notre formule de pâtes qui passe de 11,90 eur à 12,50 eur.

Merci pour votre compréhension.

Toute l’équipe de Pasta Prima qui vous est entièrement dévouée
As a means to deal with the sharp rise in cost most notably the recent increases in minimum wage (which we fully support) and instead of raising prices, a 3.75% surcharge will be added to your check. While this is a new and unorthodox approach, we do appreciate your trust and understanding and will continue to put our heart and soul into providing delicious food, exceptional service and genuine hospitality. To better understand the decision, please visit www.wnlhosp.com/rightthingtodo or contact us at rttd@wnlhosp.com
EVIDENCE OF SIGNALING

Dear Valued Customers,

Every city in the Bay Area is moving toward the establishment of a living minimum wage, including Oakland and Berkeley. This is something at Gregoire we fully embrace. We believe that all employees, including Gregoire staff in both Berkeley and Oakland, deserve to make a fair living wage. The minimum wage will be increasing by 35% starting March 1st in Oakland and will continue to go up yearly.

At Gregoire the quality of food we produce is our highest priority so in order for us to maintain our high level of standards our prices will reflect these new wage increases.

Thank you for supporting Gregoire Restaurant and its employees,

Gregoire Jacquet
NEW KEYNESIAN MODEL WITH FAIRNESS CONCERNS
FAIRNESS CONCERNS

• fairness-adjusted consumption of good $i$ by household $j$:

$$Z_{ij} = F_i(K^p_i(P_i)) \cdot Y_{ij}$$

• fairness-adjusted consumption by household $j$ is aggregated:

$$Z_j = \left( \int_0^1 Z_{ij}^{(e-1)/e} di \right)^{e/(e-1)}$$

• consumption index $Z_j$ enters utility

$$\mathbb{E}_0 \left[ \sum \beta^t \left( \ln(Z_j) - \frac{N_j(t)^{1+\eta}}{1 + \eta} \right) \right]$$
endogenize parameter $MC^b$ using past belief

perceived marginal cost of good $i$ in period $t$:

$$MC^p_i(t) = \left[MC^p_i(t-1)\right]^{\gamma} \cdot \left[\frac{P_i(t)}{\epsilon/(\epsilon - 1)}\right]^{1-\gamma}$$

$\gamma \in (0, 1]$: misinference
MONETARY POLICY IS NONNEUTRAL IN THE SHORT RUN

- 3 equilibrium variables: $\hat{k}^p(t)$, $\hat{n}(t)$, and $\hat{\pi}(t)$
- belief dynamics: $\hat{k}^p(t) = \gamma \cdot \left[ \hat{\pi}(t) + \hat{k}^p(t - 1) \right]$
- dynamic IS curve:

$$\alpha \hat{n}(t) + \mu \hat{\pi}(t) = \alpha E_t[\hat{n}(t + 1)] + E_t[\hat{\pi}(t + 1)] - s(t)$$

- short-run Phillips curve

$$(1 - \beta \gamma)\hat{k}^p(t) - \Lambda_1 \hat{n}(t) = \beta \gamma E_t[\hat{\pi}(t + 1)] - \Lambda_2 E_t[\hat{n}(t + 1)]$$

- nonneutrality arises from Phillips curve
SHORT-RUN PHILLIPS CURVE IS HYBRID

- Phillips curve is forward-looking + backward-looking

\[
(1 - \beta \gamma) \sum_{i=0}^{+\infty} \gamma^{i+1} \hat{\pi}(t - i) - \Lambda_1 \hat{n}(t) = \beta \gamma \mathbb{E}_t[\hat{\pi}(t + 1)] - \Lambda_2 \mathbb{E}_t[\hat{n}(t + 1)]
\]

- hybrid short-run Phillips curve is more realistic
  - inflation dynamics show more persistence

- empirical evidence: Mavroeidis, Plagborg-Moller, Stock [2014]
CALIBRATION FROM PASSTHROUGH EVIDENCE

misinference parameter

slope of fairness function
MONETARY POLICY TIGHTENING: MARKUP

Impact on fairness over time:
- -0.5% at 1 year
- 0% at 3 years

Comparing standard and fairness:
- Standard shows a decrease in fairness, then stabilizes.
- Fairness initially increases, then stabilizes.

Graph shows the progression of impacts and fairness over a 3-year period.
MONETARY POLICY TIGHTENING: OUTPUT

Impact:
- 1 year: -0.8%
- 3 years: -0.6%

Fairness:
- Standard: -0.4%
- Fairness: -0.2%

Graph showing the impact and fairness over 1 year and 3 years.
MONETARY POLICY IS NONNEUTRAL IN THE LONG RUN

• steady-state perceived markup:

\[ \ln \left( \bar{K}^p \right) = \ln \left( \frac{\epsilon}{\epsilon - 1} \right) + \frac{\chi}{1 - \chi} \cdot \pi \]

• lower inflation → lower perceived markup → higher fairness
  → higher markup → lower output

• empirical evidence:
  – inflation and markups: Benabou [1992]
AN EXPLANATION FOR DE LOECKER, EECKHOUT [2017]