

Countervailing Power in a Vertical Market Experiment

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- **Empirical studies:** retail prices depend on cost structure, concentration and firm size, supplier competition, bargaining power and provide mixed results. Draganska, Klapper and Villas-Boas (2010) german coffee market, Crawford and Yurukoglu (2012) cable TV industry, Smith and Thanassoulis (2015) milk industry, Ho and Lee (2017), Barrette, Gowrisankaran, and Town (2021), Craig, Grennan, and Swanson (2021) healthcare markets , Hollenbeck and Giroldo (2021) cannabis market

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- **Theoretical studies:** Greenhut and Ohta (1976), Tyagi (1999): wholesale pricing does not depend on retail market structure, Von Ungern-Sternberg (1996) CP works only if downstream competition is fierce, Dobson and Waterson (1997), Chypty Snyder (1999) merger beneficial to retailers, Christou and Papadopoulos (2015) CP does not work if modeled as a exogenous bargaining power, Gaudin (2016, 2018) CP works when increasing pass-through that depends on contract type and curvature of demand function .

- **Experimental studies:** Ruffle (2000), 2 sellers, 4 and 2 retailers, repeated game, strategic demand withholding reduces retail prices, Engle-Warnick and Ruffle (2005) monopolist prices more cautiously against 2 than 4 retailers, Normann, Ruffle, and Snyder (2007) experimentally confirm Chipty and Snyder (1999) that merged buyers receive a price discount if the seller's surplus function is concave. Davis and Wilson (2008) study the effect of a seller merger wrto to human or simulated buyers.

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- Ruffle (2005) : *"One question left unanswered by most of this literature is whether the lower prices obtained by a large buyer or a highly concentrated buying side of the market are passed on to final consumers...These theoretical models beg experimental tests that include not only the usual negotiation between wholesalers and retailers, but **an additional stage of competition between retailers for consumer demand**"*

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- What's missing: Human participants for all three parties (especially, no consumer demand).

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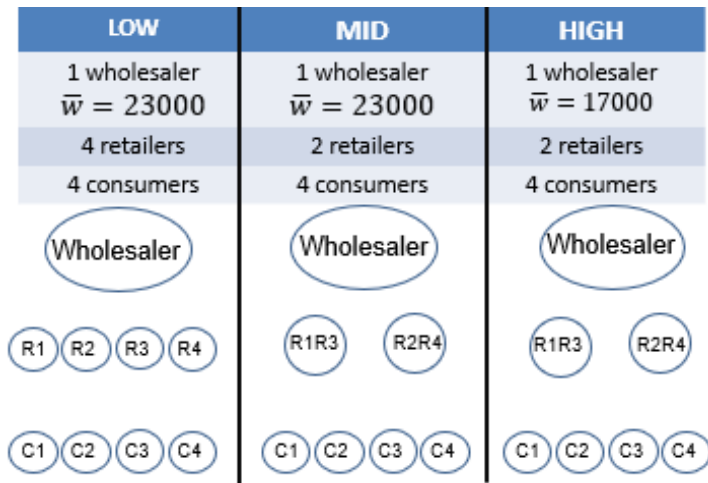
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- Game theoretic analysis of a vertical market structure (wholesale market combined with a retail market)
- Analysis of different scenarios regarding behavioral assumptions of retailer behavior (Cournot behavior versus perfectly competitive behavior)
- Conclusion: Countervailing power might be beneficial for consumers „if there is fierce competition at the retail level“

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Hypotheses

The countervailing power effect hinges on three partial effects: i) $CP \uparrow \Rightarrow w \downarrow$, retail power increase decreases w , ii) $w \downarrow \Rightarrow p \downarrow$, reduction in w is passed-through to consumers iii) $N \downarrow \not\Rightarrow p \uparrow$ the decrease in the number of retailers does not increase collusion among retailers.

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- ④ **Hypothesis 4:** Reducing the number of retailers increases collusion; i.e., collusion is higher in treatments MID and HIGH compared to treatment LOW

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 - Non-uniform retail prices: We look at average retail price

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- A trade is concluded if a retailer accepts a bid or a consumer accepts an ask.

| | Bid Price | Ask Price | |
|---------|-----------|-----------|------------------|
| Buyer 3 | 29000 | | |
| | | Seller 2 | 32000 |
| | | Seller 1 | 31250 |
| Buyer 1 | 30500 | | |
| Buyer 3 | 31000 | | |
| | | Seller 2 | Accepts 31000 |
| | | | Trade 1 at 31000 |
| Buyer 4 | 30750 | | |
| Buyer 2 | | | Accepts 30750 |
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- All entries of retail and wholesale prices were restricted to the range 8,000 to 36,000
- A session took about 50 minutes including instruction phase and practice periods.
- On average, wholesalers earned 46.92 EUR, while retailers and consumers earned 13.79 EUR and 8.42 EUR, respectively

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- $\pi_0 = p(Q_i) q_i - C_i(q_i)$
- $p(Q) = a - bQ$ with $Q = \sum_i q_i$, $a = 36,000$, $b = 250$.

Table 1: Theoretical benchmark functions and values

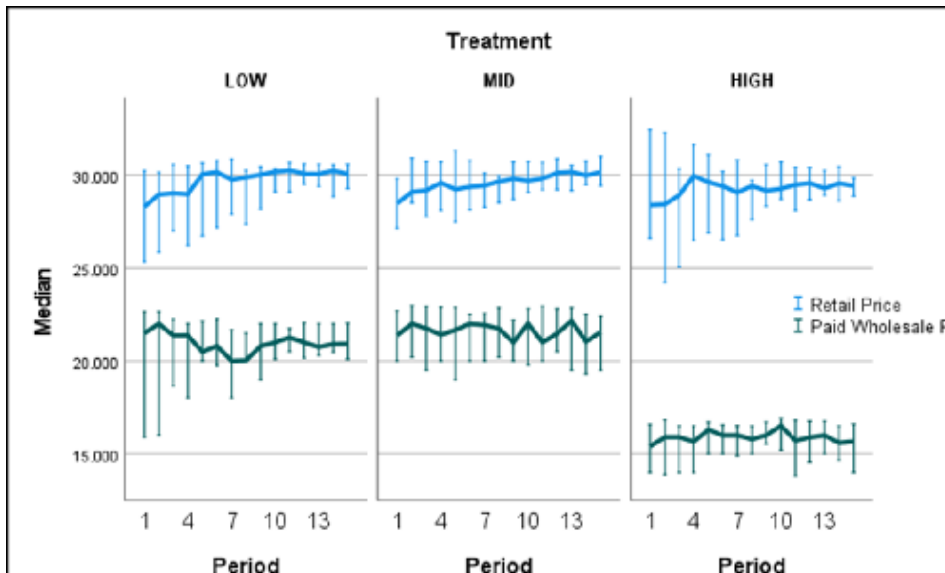
| Market | Retail Price Function $p(w)$ | Retail Price p for $w = 23,000$ | Retail Price p for $w = 17,000$ | Consumer Surplus % |
|--------------------------|------------------------------|-----------------------------------|-----------------------------------|--------------------|
| Retail Cartel | $26,400 + 0.267w$ | 32,533 | 30,933 | 21.05% |
| Cournot with 2 Retailers | $24,923 + 0.308w$ | 32,000 | 30,154 | 26.7% |
| Cournot with 4 Retailers | $24,000 + 0.333w$ | 31,667 | 29,667 | 30.8% |
| Perfect Competition | $22,909 + 0.364w$ | 31,273 | 29,091 | 36.4% |
| Consumer Cartel | $14,000 + 0.611w$ | 28,055 | 24,389 | 72% |

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- On-screen information for consumers comprised the valuation schedule (multi-unit demand), the bid and ask price queues in the retail market (without buyer and seller labels), the profit made on each own trade, and, at the end of each period, the quantity sold and profit made.

Observed Retail and Wholesale Prices by Treatment



Numerical Results

Table 2: Quartiles (25, 50, 75), correlations (ρ) and tests for retail price, paid wholesale price and consumer surplus share. P-Values are provided for two-tailed tests using session averages for periods 11-15 as units of analyses (N = 12, 12 and 13 for treatments LOW, MID and HIGH, respectively).

| | LOW | MID | HIGH |
|----------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Retail Price | 29,575 30,082 30,509 | 29,461 30,018 30,717 | 28,760 29,465 30,175 |
| Paid Wholesale Price | 20,451 21,188 21,342 | 20,065 21,342 22,381 | 14,701 15,690 16,285 |
| Consumer Surplus % | 0.34 0.42 0.53 | 0.28 0.40 0.58 | 0.20 0.28 0.34 |

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- Therefore, the countervailing power effect in its narrow sense failed (Hypothesis 1.a).
- Only the additional increase in retailer power by a reduction of the outside option wholesale price implemented a significant reduction in wholesale price (Hypothesis 2.b).

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- We found a positive correlation between wholesale price and retail price (Hypothesis 3) but a pass-through rate of a wholesale price reduction of only about 10%.

- Furthermore, as expected, the offered wholesale price was substantially less than the theoretically predicted outside option value. However, it was not significantly lower in MID than in LOW.
- We found a positive correlation between wholesale price and retail price (Hypothesis 3) but a pass-through rate of a wholesale price reduction of only about 10%.
- Comparing surplus share we find more collusion of retailers in the retail market when there are two retailers rather than four (Hypothesis 4). This is the classical concentration effect and it works against the countervailing power effect.

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- Even when a retailer obtains a lower wholesale price, only 10% reduction passes on to consumers.
- No support for Galbraith's hypothesis in our experiment