Econ 366 – Energy Economics

Fall 2012

Pricing Cycles in Retail Gasoline Markets

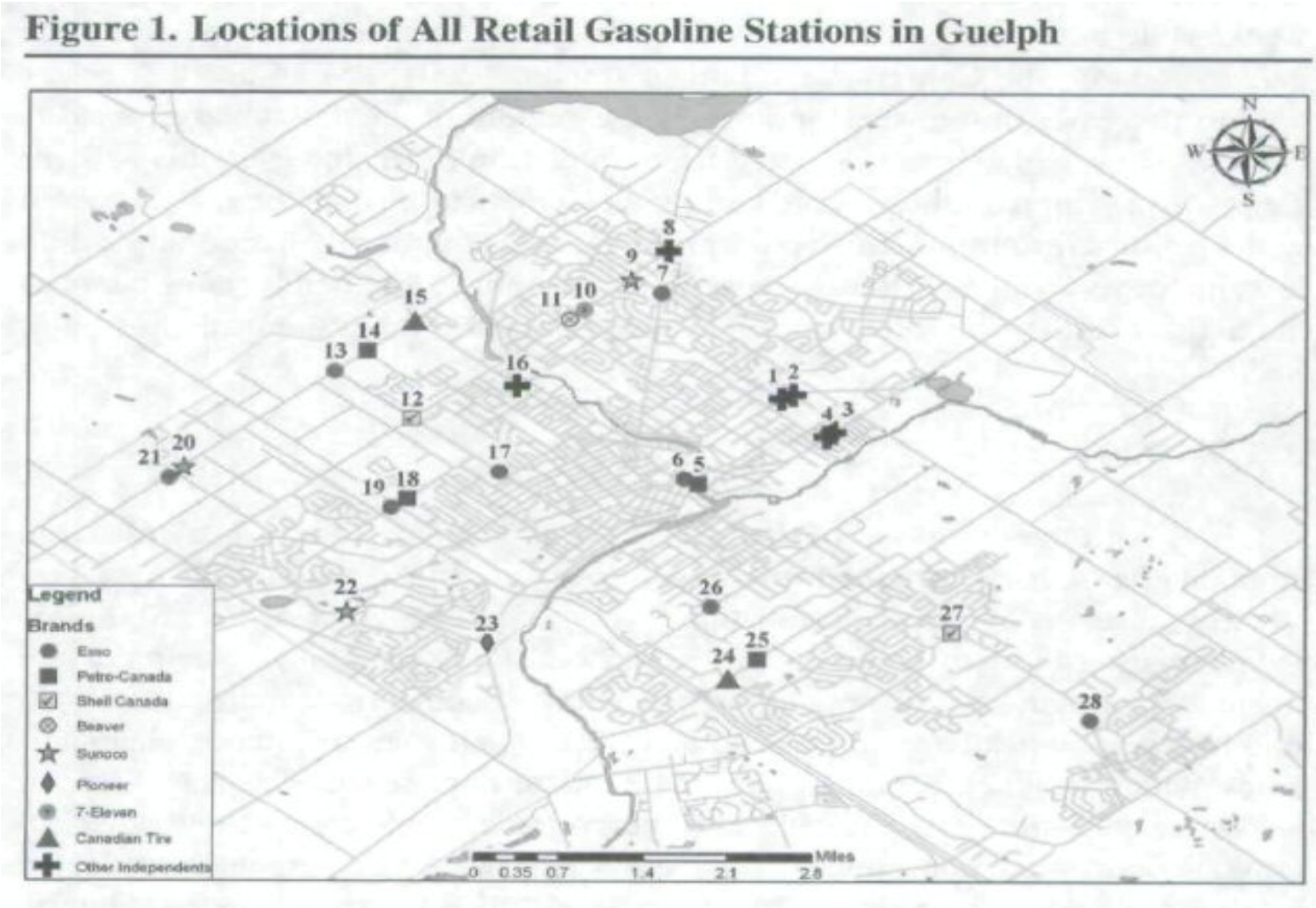
Retail Gasoline Prices

- Gasoline prices in some markets move in cycles: substantial increases over one or two days followed by gradual decreases over a period of several days
- Is this a sign of collusion (firms working together to set prices)? Of intense competition (firms all facing the same market signals and making the same decisions)?
- Data from Guelph collected and analyzed by Atkinson, B. (2009) "Retail Gasoline Price Cycles: Evidence from Guelph, Ontario Using Bi-Hourly, Station-Specific Retail Price Data," *Energy Journal* 30, 85-109.

Data Set

- bi-hourly (8 am to 10 pm) retail prices observed by the author (Ben) at 27 gas stations in Guelph Ontario from Aug 14 to Nov 24, 2005
- Station characteristics: open 24 hours?; full-serve?; capacity (# of nozzles); brand?; convenience store?; mechanic services?; car wash?
- Price control data for Petro-Can, Shell and Sunoco (Esso would not provide info): some “brand” stations have prices controlled by head office, others have prices set by station manager
- “cost” data: wholesale (rack) prices from London, Ont

Figure 1: Map of Stations (numbered by order of data collection)



Edgeworth Cycle Theory (Maskin and Tirole; Eckert)

- How might economists expect a small group of rival retailers to behave? Edgeworth Cycle is <u>one</u> possibility
  - Equilibrium cycle:
    1. Starting with all firms at 'peak', one firm undercuts price of rival → can serve the market until rivals respond
    2. Series of incremental cuts occur until price falls to marginal cost (with large undercuts near end in order to hasten move to next stage of cycle)
    3. War-of-attrition as firms wait for someone else to initiate a price 'restoration' (and temporarily lose market share)
    4. Leader re-sets peak price at a higher than monopoly price [knowing it will soon be undercut (see 1.) and then prices will move back down to the monopoly price on the way back to price equals marginal cost]

Large vs Small Firms

- Some firms may operate more retail outlets than others
- Large firms will tend to be the ones to initiate price increases
- Small firms tend to be the ones to do a lot of undercutting
- Easier for large firms to ‘coordinate’ a restoration to high prices by (its) many outlets at the same time

Previous empirical results

- Study of twice-a-day prices for 22 stations in Toronto → several major brands will raise prices on the same day; independents tend to undercut prices of rivals
- Study of internet gas price sites: cycles more likely to occur when there are ‘mavericks’ who thwart the efforts of major retailers to collude
- Restorations tend to occur early in the week, often near midday

Atkinson's results

- Cycle Definitions:
  - 'Attempted' Restoration Day (Day 0) occurs when the citywide mode (most common outcome) price rises after a station had raised price to that mode
  - This begins the restoration phase.
  - Restoration phase ends when last station sets its peak price
  - Undercutting Phase: remainder of cycle

Observed patterns in Atkinson data

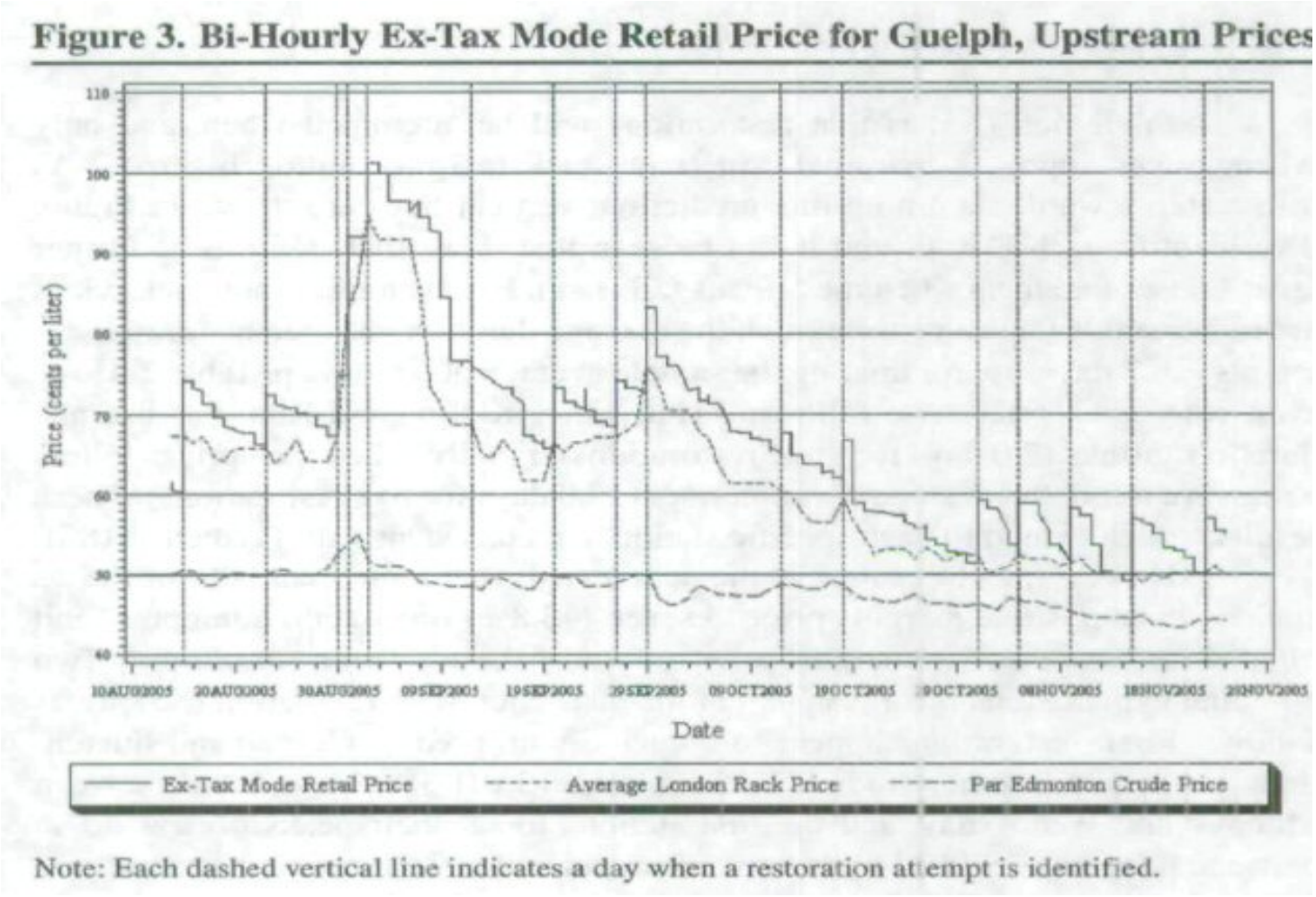
- Retail prices are generally consistent with several "Edgeworth Cycles" of quick 'sharp' increases followed by a more gradual series of decreases:
  - Prices fall more frequently than they rise (116 price drops, 21 price increases on average for stations)
  - Individual price increases are (over 5 times) larger in magnitude than price drops on average
  - Undercutting phases last longer (5.5 days) than restoration phases (1.1 days)
  - Unlike theoretical prediction, prices don't always fall all the way to marginal cost (rack price) before restoration, although they sometimes fall below the rack price

Observed patterns in Atkinson data

- Rack (wholesale) prices, although asymmetric, do not exhibit the same patterns as the retail prices:
  - Decline only 1.4 times more often than they rise
  - Rack increases are only 1.1x bigger than decreases on average

  → Retail price swings aren't driven by wholesale price changes

Graph of Rack and Retail Prices



Other patterns in Atkinson data

- Restorations tend to fall between Monday and Wednesday, always in the early afternoon
- Restorations have a regional aspect, with nearby cities having very similar Day 0's (based on observations of less frequent internet price data)
- Although firm size may have some impact on restoration behaviour, spatial considerations also matter:
  - Leaders tend to be major brand stations in highly visible locations like near a mall or the downtown core
  - One (of 10) independent appears to be an undercutter, but other independents not as likely to undercut prices

A Theoretical Alternative to Edgeworth Price Cycles

Oligopolistic sticky prices: rockets and feathers

- Retail prices follow cycles because they respond more quickly to upstream price increases (rockets on the way up) than to upstream price drops (feathers on the way down)
- In the Atkinson data, the retail price swings don't seem to be driven my rack prices (which remained relatively stable over the course of some of the retail cycles)