**Literature on retail gasoline prices (18/07/2016)**

**Bacon (1991)**

Data period/frequency: 1982 to 1990, fortnightly

Data sources: UK city-level retail prices (uses London), Rotterdam wholesale prices

Model: Partial Adjustment Model (Quadratic term to account for asymmetry)

Conclusion: “The differences in the mean lags identified for cost increases and decreases, although statistically significant, are not sufficiently great, at around one week, to lead to decisive rejection of the view that the UK retail gasoline market is highly competitive.”

**Borenstein, Cameron and Gilbert (1997)**

Data period/frequency: 1986 to 1992, semimonthly for retail prices (Fridays)

Data sources: Average of unleaded regular prices in 33 US cities east of the Rocky Mountains, WTI crude oil, spot gasoline, city level terminal prices

Model: ECM

Contribution: Disentangle asymmetry along the supply chain

Conclusion: Some terminal-retail asymmetry but explains less than half of the overall adjustment asymmetry (very little asymmetry between spot gasoline prices and branded terminal prices so asymmetry is also found between crude oil and spot gasoline). Hypothesis on terminal-retail asymmetry: Benabou and Gertner (1993) about consumer search… or oligopoly with imperfect monitoring.

**Eckert (2002) - Retail Price Cycles and Response Asymmetry**

Data period/frequency: 1989 to 1984, weekly

Data sources: avg gasoline price of sample of stations in 1 city in Ontario (Canada), Toronto unbranded rack prices

Model: ECM and probit motivated by theoretical model

Conclusion: “In this article I present a case study of a city in which (a) standard time-series methods suggest that retail gasoline prices respond more rapidly to cost increases than to decreases, and (b) a model of tacit collusion with occasional price wars appears to be inappropriate, owing to the presence of price cycles. To gain a better understanding of the reason for the asymmetry, I formulate an econometric model of price cycles based on an alternating-move duopoly model of pricing. The estimation results using data for Windsor, Ontario, support the suggestion of the theory that new price cycles are more likely to be initiated when retail prices are near cost. As well, the results indicate that retail prices are relatively insensitive to cost over the decreasing phase of the cycle, supporting the suggestion that the magnitude of price decreases is determined primarily by consumer sensitivity to price differentials across stations, as opposed to costs. Together, these findings can explain the observation of an asymmetric response to wholesale price changes. The finding that the relationship between retail and wholesale prices in a price cycle can result in an observed response asymmetry is important because the alternating-move model of price cycles has different implications with respect to the level of competition than does a collusive model such as that of Green and Porter (1984). In the alternating-move model of pricing, which does not permit Markov perfect equilibrium marginal cost pricing, cycle equilibria yield lower profits than equilibria in which firms set prices near the monopoly price and match each other forever. This is because, in a cycle equilibrium, firms continually undercut each other in a battle over market share, repeatedly driving prices near marginal cost. The finding that an asymmetric response may be indicative of relatively aggressive pricing compared with markets in which cycles are not observed is clearly important from the perspective of competition policy.”

**Eckert (2003) - Retail Price Cycles and the Presence of Small Firms**

Data period/frequency: 1989 to 1984, weekly

Data sources: avg gasoline price for 12 cities in Ontario (Canada), Toronto unbranded rack prices

Model: OLS to check extension of Maskin and Tirole (1988)

Conclusion: "In this paper, I extend the alternating-move duopoly model of Maskin and Tirole (1988) to examine the role of the division of retail outlets across firms in determining when price cycles and constant prices will be observed. Within an example, I demonstrate that price cycle equilibria can be constructed for a wide range of relative firm sizes. On the other hand, if the difference between the sizes of the two firms is too large, constant price equilibria cannot exist. These findings broadly support the empirical finding that the rigidity of prices is negatively related to the presence of small chains."

**Eckert, West (2004) - A tale of two cities: Price uniformity and price volatility in gasoline retailing**

Data period/frequency: March 1 to October 25, 2000, daily prices

Data sources: gas stations in Vancouver (426 gas stations) and Ottawa (262 gas stations) Metropolitan areas (website, user reported prices so far from comprehensive observations)

Conclusion: “The purpose of this paper is to begin the search for explanations for different patterns of pricing behavior in retail gasoline markets in Canada by examining market structure and conduct in different retail gasoline markets. (…) While in Vancouver, retail prices display uniformity, rigidity, and a tendency toward endings of nine-tenths of a cent, prices within the Ottawa area are dispersed and follow a cyclical pattern. The degree of price uniformity also varies within the metropolitan area. Localized competition in each metropolitan area is at least partly responsible for the observed differences in pricing patterns in Vancouver and Ottawa. These patterns are consistent with an economic theory in which firms in Vancouver are tacitly colluding, while firms in Ottawa are engaged in an ongoing battle over market share. The absence of evidence consistent with tacit-collusion in Ottawa is argued to be the result of the presence of Suncor, an integrated refiner owning the retail chain Sunoco and 50% of the Pioneer chain. In Vancouver, the switch from cyclic prices to rigidity and uniformity coincides with BP Amoco’s acquisition of ARCO, a firm with a reputation for undercutting other major brands. The behavior of Suncor and ARCO highlight the importance of ‘‘maverick firms’’ in determining the sustainability of tacitly collusive behavior. (…) One issue that has not been explored in this paper is the role that location plays in determining whether or not particular outlets follow the market mode price. A station may be expected to be less likely to set the same price as the majority of firms in the market if it is in an isolated location, and more likely if it is located near other stations charging the mode price.”

**Eckert, West (2004) - Retail Price Cycles across spatially dispersed gasoline stations**

Data period/frequency: July 27 to December 31, 1999, daily prices

Data sources: 404 stations across 8 regions in the Vancouver Metropolitan Area (Canada). Same website, user reported prices hence not comprehensive

Conclusion: “The ideal data set for a study of retail gasoline pricing behavior in a city or metropolitan area with a high degree of price volatility would contain multiple observations per day on prices for every station within the entire geographic area. (…)The price cycles examined have several features that could not be identified by the sorts of data sets that were previously used to study price volatility. The initiation of price restorations occurs almost exclusively on Tuesdays and Wednesdays, which suggests that demand factors may be more important in driving volatility than previously believed and that the proximity to wholesale costs is less important. Such an observation could not be made using weekly data. Furthermore, prices in a price cycle have a spatial pattern, increasing uniformly throughout a metropolitan area but decreasing at different rates in different regions. This finding suggests that explanations for gasoline pricing that presume that commuting by consumers eliminates spatial product differentiation are incorrect and that the incentives to undercut a rival are in fact determined by local market characteristics. Also, the data do not reject the hypothesis that price reductions during the cycle are initiated in areas with many ARCO/Tempo stations and spread to other regions over time. Again, such a finding would not have been identified with weekly averaged data or with station-specific high-frequency data that sample only a small set of stations. Finally, we consider the ability of a weekly survey of prices at a sample of stations to accurately measure weekly price levels in a market. We find that because of the strong relationship between the timing of price increases and the days of the week, prices are lowest on Tuesday mornings, precisely when these surveys are conducted. Therefore, such surveys can give a misleading picture of the competitiveness and profitability of price cycle markets and could therefore lead to inappropriate policy conclusions.

**Hastings (2004) - Vertical relationships and competition in retail gasoline markets**

Data period/frequency: February to December 1997, monthly prices

Data sources: gas station level, Los Angeles (510 gas stations) and San Diego (119) Metropolitan Area

Conclusion: “The analysis shows that the presence of independent retailers acts to decrease local retail prices. This effect is separately identified from any potentially confounding covariates at the station level, or the city level over time. The analysis does not find evidence that increases in the market share of company-op stations leads to higher prices. (...)The empirical results are consistent with a model of differentiated products with consumer brand loyalty. This model predicts that, when independents are replaced by branded integrated stations, price competition in the market is softened, resulting in higher local market prices

**Baron, Taylor and Umbeck (2004) – Number of Sellers, Average Prices and Price Dispersion**

Data period/frequency: February to December 1997, monthly prices

Data sources: gas station level, Los Angeles (510 gas stations) and San Diego (119) Metropolitan Area

Conclusion: "The results presented in the previous section provide convincing evidence that the number of competitors is indeed consistently linked to both price levels and price dispersion. Using station-level data collected from every gasoline station in four large metropolitan areas, our results indicate that a higher number of stations within a particular geographic market area is associated with both a lower average price and a lower level of price dispersion. These results are consistent with standard models of monopolistic competition. With regard to average price levels, these findings are also consistent with the sequential-search-across-heterogeneous-sellers approach of Carlson and McAfee (1983), but not the approach of Varian (1980) that divides the market into informed and uninformed buyers. However, with regard to price dispersion, the finding that an increase in the number of sellers is associated with a reduction in the variance in prices is at odds with both search-theoretic approaches. The fact that our empirical findings are more in line with the monopolistic competition models than with well-known search-theoretic models is disconcerting given that gasoline markets appear to satisfy the key search-theoretic assumption that not all consumers know the prices charged by all sellers. Further, in related work examining the prices of different drugs, Sorensen (2000) finds strong support for the proposition that more frequently purchased prescription drugs exhibit lower markups and less dispersion, and Sorensen attributes this finding to the effect of lower search costs (or equivalently greater gains to search). However, Sorensen does not formally model these predictions, and our discussion suggests that existing search-theoretic models’ predicted effects of lower search costs on the average price and price dispersion are not fully consistent with either our results or those of Sorensen. Thus, theoretical work that modifies existing search models appears fruitful.

**Noel (2007) - Edgeworth price cycles, cost-based pricing and sticky pricing in retail gasoline markets**

Data period/frequency: January 1989 to December 1999, weekly

Data sources: : avg gasoline price for 19 cities in Canada

Conclusion: “In this article, I present evidence that retail price cycles, similar to the theoretical Edgeworth Cycles in appearance and behavior, are a real and prevalent phenomenon in Canadian retail gasoline markets. I identify repeated, asymmetric price cycling behavior in 43% of periods in the sample, sticky pricing in 30%,and cost-based pricing in 27%.The theories of Edgeworth Cycles further suggest that a greater penetration of small firms should lead to more cycling activity and less sticky pricing. Moreover, the duration of the relenting phase of the cycle should be unaffected, the duration of the undercutting phase shortened and therefore the cycles should be more rapid and less asymmetric. Allowing the horizontal and vertical dimensions of the cycle to vary with a small firm concentration variable, I confirm each of these relationships. My results are robust when controlling for market size and outlet density and when using alternate measures of concentration.”

**Noel (2007) - Edgeworth price cycles, evidence from the Toronto retail gasoline market**

Data period/frequency: 2001, twelve-hourly (131 consecutive days)

Data sources: 22 gas stations in Toronto

Conclusion: “In this paper, I present a new dataset to examine pricing dynamics in the Toronto retail gasoline market. I find evidence consistent with the presence of Edgeworth Cycles, a theoretical construct seemingly implausible in real world practice. The asymmetric shape of the empirical cycle is clear. Consistent with the theory, I find that larger firms are more likely than smaller firms to initiate new rounds of relenting phases and the opposite is true for undercutting phases. The magnitude of relenting phase price increase is sensitive to changes in cycle position and expected future costs. Reactions of following firms are very fast, and the larger the firm the faster is the reaction. The cycles also appear highly synchronous across stations. These results are inconsistent with competing explanations for the cycle such as covert collusion and inventory or demand cycles.”

**Deltas (2008) - Retail gasoline price dynamics and local market power**

Data period/frequency: January 1998 to December 2002, monthly

Data sources: avg unleaded regular gasoline price in 48 states in the US (and rack prices)

Model: ECM

Conclusion: “This paper shows that the response of the retail gasoline prices to wholesale price changes is asymmetric. Increases in the wholesale price are passed through faster than decreases. Furthermore, both the speed of adjustment and the degree of asymmetry depend on the average retail-wholesale margin of a state. States with large average margins tend to have more asymmetric and slower adjustment than states with small margins. This behavior is consistent with a link between local market power and price stickiness and response asymmetry to changes in costs.”

**Hosken, McMillan , Taylor (2008) - Retail gasoline prices: What do we know?**

Data period/frequency: 1997-1999, weekly

Data sources: avg weekly retail prices for 272 stations in Norther Virginia (around Washington DC)

Conclusion: “Our main finding is that gasoline stations do not appear to follow simple static pricing rules. Gasoline stations do not charge constant margins, nor do they simply maintain the same relative position in the pricing distribution. We find from week-to-week, gas stations are more likely than not to change their relative position in the pricing distribution. There is also heterogeneity in stations' pricing behavior over time. Stations that charge very high prices or very low prices in one week are much more likely to charge high or low prices in subsequent weeks. There is also an interesting asymmetry in this behavior: low-priced stations are much more likely to remain low priced than high priced stations are to remain high. While most week-to-week changes in pricing position are small, a significant number of stations make large changes in their pricing.

We believe our most interesting finding is that retail margins change sizably over time. For example, for a six month period the implied retail markup is roughly 19 cpg for 6 months and then falls to about 10 cpg for 3 months. The evidence suggests the entire distribution is shifting over time, not just the median or mean. (…) More generally, many of our results can be interpreted as adding to mounting evidence, e.g., Eckert and West (2004a,b), Noel (2007a,b) and Slade (1992), that localized retail gasoline competition appears to be characterized by regime shifts in pricing.”

**Lewis (2008) – Price dispersion and competition with differentiated sellers**

Data period/frequency: 2000 -2001, weekly (Monday)

Data sources: retail regular unleaded gasoline prices for 327 stations in the San Diego area

Conclusion: “Price dispersion is prevalent in retail gasoline markets even after controlling for differences in stations’ average price levels. In addition, station prices move frequently relative to each other over time. These findings imply that consumers may have imperfect price information and that consumer search could be an important aspect of competition in these markets. The level of price dispersion that is observed is sensitive to both the number of local competitors and the nature of local competitors. Price dispersion is larger for high-brand stations when they have a higher number of competing low-brand stations nearby. In contrast, price dispersion is lower for both high-brand and low-brand stations when there are more competitors of their own type in the local market. These findings contrast with those of earlier studies which generally do not account for differences among sellers when examining the effects of competitor density on price dispersion. The results suggest that price dispersion is sensitive to the composition of station types in the local market. Such compositional effects could arise if consumers with different search/travel costs segment themselves among different types of sellers. Though virtually all theoretical models of price dispersion concentrate on homogeneous sellers, these findings suggest that models incorporating seller differentiation would have important applications.

Using a more localized measure of price dispersion also seems to affect the general relationship between seller density and dispersion. Barron et al. [2004] use a citywide average price as a benchmark for calculating gasoline price dispersion and find a negative relationship between seller density and dispersion (similar to my citywide dispersion results). However, when dispersion is measured within localized submarkets, this relationship becomes positive and significant. Since consumers often observe prices and purchase from a small set of stations in their area, localized price variation may more accurately reflect the price dispersion consumers encounter. Therefore, results describing the extent of local price dispersion and its relationship to seller density help to improve the current understanding price dispersion in retail gasoline and other differentiated product markets.”

**Verlinda (2008) – Do rockets ride faster and feathrs fall slower in an atmosphere of local market power? Evidence from the retail gasoline market**

Data period/frequency: September 2002 to May 2003, weekly (Sunday)

Data sources: gas station prices in Southern California (South Orange County region)

Model: ARDL

Conclusion: “Using a highly detailed station-level data set, I establish in this paper that price-response asymmetry is a dominant feature of the data. I then show that stations with specific site and local-market characteristics are associated with higher price-response asymmetry than stations without (or with lower levels of) these characteristics. To the extent that these characteristics increase each station’s potential local market power, the results suggest that market power may augment price-response asymmetry. (…) In order to identify elasticities in the retail gasoline industry using a structural demand model, the research may be forced to obtain accurate, station-level quantity data.”

**Lewis (2009) – Temporary Wholesale Gasoline Price Spikes have Long-lasting Retail Effects: The Aftermath of Hurricane Rita**

Data period/frequency: 2005, daily

Data sources: daily retail prices for 85 cities (Midwest, Mid-Atlantic and Southern US states)

Conclusion: “Retail prices remained significantly higher after Hurricane Rita in cities experiencing a larger initial wholesale price spike and in cities that are not known to exhibit retail price cycles. Due to the descriptive nature of the empirical analysis, the source of these relationships is not empirically identified here. Nonetheless, these patterns are valuable in understanding what factors may be related to existence of large temporary geographic differences in retail prices (and margins). This is particularly true given the relative lack of understanding of the market attributes that generate Edgeworth price cycles and of the impact of Edgeworth cycles on competition and market power.”

**Lewis and Marval (2011) - When do consumers search?**

Data period/frequency: September 15, 2006 to January 15, 2007, daily

Data sources: Extrema of local price distributions (US price comparison websites)

Conclusion: “Increased consumer search means that retailers face more elastic demand for their gasoline, and compete more vigorously with one another. Thus price increases yield higher search, which, in turn, is associated with lower retail margins. When wholesale gasoline prices fall, retailers face less competitive pressure to pass along those prices to consumers, and margins rise. Price dispersion responds in similar fashion. As the price of gasoline rises, the dispersion of consumer prices falls as gasoline stations find the penalty for deviation from the market norm has increased. In contrast, when prices fall, dispersion increases—the penalty for failing to pass along price declines is diminished. Our paper provides a direct measure of search for an important product, gasoline, and links that search to characteristics of offer prices. The Internet now offers prices for a wide variety of firms and products. We expect analysis of traffic statistics for price aggregators analogous to GasBuddy.com to be a rich source of search data, and look forward to better understanding of the constraints firms face and the resulting prices they set in response to the search that can be measures from such data.”

**Lewis and Noel (2011) – The speed of gasoline price response in markets with and without Edgeworth cycles**

Data period/frequency: January 1, 2004 to August 28, 2005, daily

Data sources: average retail prices for 90 cities in the Midwestern US

Conclusion: “Our empirical analysis reveals that prices respond much more quickly to cost shocks in markets with Edgeworth price cycles. The environment of constantly changing prices characteristic of an Edgeworth cycle equilibrium enables cost changes to be fully passed through in one-third the time it takes in a typical non-cycling market. We confirm that the existence of cycles generates faster pass-through by studying how it relates to the speed of price response in each city after controlling for various measures of market structure. Prices in cities with cycles respond much more quickly even when compared to cities with similar market characteristics. We interpret these findings as further evidence that prices respond more rapidly to cost shocks as a result of the presence of the price cycle rather than as a result of other market characteristics correlated with the presence of price cycles. They confirm the intuition that the constant price movement generated by the price cycle more quickly incorporates changes in cost.

We believe this is one of the first concrete results identifying specifically how the existence of Edgeworth price cycles affects the performance and overall competitiveness of a market. It is also one of the first studies within the sticky price literature to clearly identify a particular market characteristic responsible for such large differences in the speed with which prices respond to cost changes. The inefficiencies generated by slow price pass-through are largely eliminated when cycles are present.”

**Lewis (2011) – Asymmetric Price Adjustment and Consumer Search: An examination of the retail gasoline market**

Data period/frequency: January 2000 to December 2001, weekly (Monday)

Data sources: 369 gas station in the San Diego area (IS) i.e. roughly 50% of all stations in county

Conclusion: “Following the predictions of the reference price search model, I show that prices respond faster to cost changes during periods when margins are high. This fact has not been previously established in the empirical literature, and it is inconsistent with other consumer search models that have been proposed to explain asymmetric price adjustment. Using station level price data I also show that even the lowest prices in the market adjust asymmetrically, and that dispersion in prices even amongst local competitors increases during periods of high margins. These patterns are consistent with the reference price search model but are not well explained by collusive models of asymmetric adjustment. Together the evidence suggests that consumers’ imperfect knowledge of current price levels may have a significant influence on prices in retail gasoline markets. The reference price search model also highlights an important inefficiency in this market. Incorrect consumer expectations can lead to periods in which prices are well above their full information competitive level. If all consumers were searching and were informed about the prices in the market, the reduction in equilibrium prices would be much larger than the sum of consumers’ search costs. However, given that consumers have limited information, all firms charge higher prices and an individual consumer cannot significantly gain by searching to acquire price information. The data reveal the presence of this inefficiency. Even when retail prices are well above wholesale costs, there is relatively little variation in prices across stations. Therefore, one consumer would not gain much by choosing to search, even though firms would significantly lower their prices if all consumers were searching. The basic theoretical insights and empirical contributions of this paper should help further the understanding of asymmetric price adjustment in other markets as well. Although the reference price search model was motivated by search behavior in the gasoline market, it is general enough to apply to other goods with similar consumer search characteristics. More importantly, the empirical tests used to compare predictions of the theoretical models to observed behavior can also be used to help identify the causes of asymmetric adjustment in other markets.

**Chandra and Tappata (2011) – Consumer search and dynamic price dispersion: an application to gasoline markets**

Data period/frequency: January 2006 to May 2007, daily

Data sources: 25,000 gas stations in four states: California, Florida, Texas and New Jersey

Conclusion: “Studies that link price dispersion and costly consumer search usually address two questions: to what extent is observed price dispersion consistent with pricing strategies from costly consumer search models? And what is the equilibrium relationship between price dispersion and search costs, production costs, and the number of firms in the market? The focus in the literature has primarily been on the latter question, and in this article we shift the attention to the former. We argue that identifying the role of consumer search in explaining price dispersion requires a careful examination of temporal dispersion, a dimension in which predictions from consumer search models and other models are orthogonal. Using a novel test of rank reversals and price spreads among station pairs, we find that the temporal price dispersion at the market level is consistently higher than for stations at the same street intersection. This is consistent with the theory of consumer search, as the dispersion in the latter group is driven only by product differentiation.

We use a unique high-frequency panel data set to examine equilibrium price dispersion in the U.S. retail gasoline industry. Our results imply that consumers could save as much as 5% by price shopping within a 1 mile radius. The fact that search costs deter consumers from price shopping is reinforced by the result that grades of gasoline associated with higher search costs involve greater price dispersion and are less competitive. Premium gasoline has 13% more price dispersion than mid-grade, which itself has 30% more price dispersion than regular gasoline. To the extent that search costs act as a friction, sources that alleviate imperfect information will reduce prices and price dispersion. Centralized sources of information regarding gas prices would achieve this. Existing websites where users periodically list stations’ gas prices may be one step in this direction.53 Moreover, our results indicate that price dispersion decreases when the aggregate level of prices rises, implying that there are less gains to searching at such times. Therefore, employing a policy of greater search during periods of peak pricing may be suboptimal. Increased information along these lines may help consumers to make better decisions regarding their search strategies.

**Gautier and Le Saout (2012) – The Dynamics of Gasoline Prices: Evidence from Daily French Micro Data**

Data period/frequency: January 2007 to June 2009, daily

Data sources: all gas stations (c. 10,000) in France

Conclusion: “In this paper, we examine the degree of price rigidity in French gas stations using a data set containing millions of price quotes collected at a daily frequency on the period between January 2007 and June 2009.We first provide some new findings on the price setting behaviour of gas stations. Gasoline prices are modified frequently and firms are more likely to change their prices on Tuesdays and Fridays than on Saturdays, Sundays or Mondays. Price decreases are as frequent as price increases. The average size of price changes is larger than the average wholesale price change. Moreover, the distribution of price changes shows a small proportion of small price changes. This pattern of the distribution of price changes is consistent with predictions of a menu-cost model and contrasts with most empirical studies using individual CPI price quotes. Finally, supermarkets change their prices more often but by larger amounts than other traditional gas stations. In this paper, we assess the degree of pass-through of costs to gasoline prices using price rigidity models. Our baseline model is a time-varying () model which allows us to be rather flexible to replicate the infrequency of price changes and the distributions of price changes. We find that the degree of pass-through of wholesale market prices to retail gasoline prices is lower than 1 for most gas stations. This pass-through is on average 0.77 for diesel prices and 067 for unleaded petrol prices. This pass-through is somewhat larger in supermarkets than in other gas stations. Moreover, competition and local variables play a significant role to explain differences in degrees of pass-through among firms. Lastly we find that thresholds triggering price changes are rather large on average but vary substantially over time. Finally, we simulate the aggregate response to shocks of gasoline retail prices. We find that the adjustment of fuel prices to market wholesale price shocks is quick. We also compare response obtained with alternative models of price rigidity: the longest response is obtained with the Calvo model where the delay for a full response is close to 3 weeks. We test for the asymmetry in the response of retail gasoline prices to market wholesale price shock. We assess whether thresholds triggering price increases and decreases are different. A larger threshold for price decrease implies that firms react more slowly to a decrease in costs. A small proportion of gas stations show some asymmetry in their price setting behaviour and when it is the case, the asymmetry is small. All in all, in our simulation exercises, the speed of reaction of retail prices to a comparable positive or negative wholesale price shock is the same.

**Houde (2012) – Spatial Differentiation and Vertical Mergers in Retail Markets for Gasoline**

Data period/frequency: 1991 to 2001, bimonthly

Data sources: Every gas station (429) in Quebec city market

Conclusion: “The distribution of gasoline sales within the market is shown to be poorly correlated with the distribution of local population, and significantly more so with the distribution of work commuters. This directly translates into a small and positive estimate of the transportation cost parameter in the traditional model, which implies very little spatial differentiation. Since the degree of substitutability between locations feeds directly into predictions of mark-ups and prices, the results from the multi-address model differ sharply in terms of the evaluation of market power. Importantly, the estimated markups coming from the model match very well the observed profit margins over the spot wholesale price for gasoline. The demand specification is also validated by comparing the pricing implications of the model with the estimated impact of a consummated merger between Ultramar and Sunoco. The difference-in-difference estimate roughly equates the average price increase predicted by the counterfactual simulation of the merger. This result is important as it provides support for the merger simulation methodology. The comparative analysis also highlights the relative strengths of reduced-form and structural methods. While the treatment effect estimates are shown to be sensitive to definition of control group and sample size, it also serves as a useful and transparent point of comparison to validate the assumptions of structural models. In the present context, the main failure of the merger simulation is the inability of the model to predict a sizable price reaction from competing firms post merger. This problem is linked with the distributional assumption of consumer tastes, which tends to underestimate the elasticity of substitution between close competitors despite a large estimated transportation cost. This issue is common to most empirical models of product differentiation that introduce idiosyncratic utility shocks. Further research is therefore needed to relax these assumptions, while keeping the tractability of the framework developed by Berry, Levinsohn, and Pakes (1995).”

“This is not to say that the reduced-form and the structural estimates fully agree. At least in one subsample (i.e., 95/98), the retrospective analysis suggests a much larger indirect price effect than the merger simulation. The observed merger effect also does not diminish in distance as fast as what the model predicts. The merger simulation results show that the net effect should go from 0.38 to 0.09 cpl in the largest neighborhood, while the difference-in-difference model suggests a decline from 0.43 to 0.26 (i.e., columns 1–5). These differences are explained in part by the fact that the simulated reaction of competitors is small, due to the distributional assumption on consumers’ idiosyncratic tastes.”

**Lewis (2012) – Price leadership and coordination in retail gasoline markets with price cycles**

Data period/frequency: October 2004 to July 2010, daily

Data sources: average retail prices for 280 cities across the US, gas station level prices within 165 cities over July 2008 – July 2010

Conclusion: “This paper provides the most complete and detailed cross-market investigation to date on price restorations in U.S. retail gasoline markets with price cycles. It reveals new evidence of an unusually high level of coordination both within firms and amongst competing stations. During a typical restoration, prices at nearly all stations jump within a 24 hour period and a large majority of these prices jump to the exact same price level. The evidence suggests that a particular firm acts as a price leader for the city, initiating the restoration and unifying prices at its stations to signal to competitors what the new price level should be. Two specific retail chains appear to be responsible for leading price restorations in most cycling retail gasoline markets in the United States. These firms own and operate a large number of stations, which gives them the ability to directly control and coordinate prices at many stations within each market. Cycles occur in nearly every city in which these two firms operate a significant share of retail stations, and cycles are absent from almost every city in which these firms have little or no market presence. The pricing strategies observed and the strong geographical correspondence between cycles and the presence of these retailers suggest that the role they play during price restorations could be important to the existence of cycles. Unfortunately, having large retail chains does not appear to guarantee cycles. A number of other retailers, such as Circle K and The Pantry (Kangaroo Express), also own and operate a large number of stations in multiple markets where cycles do not occur. It is not clear whether Speedway and Quik Trip are unique in some way, or whether they have simply chosen to act as price leaders in markets where cycles were already occurring. Future research exploiting variation over time in market structure and the presence of cycles across markets could potentially reveal a more concrete link between market structure and the existence of price cycles. Regrettably, there do not appear to be any U.S. cities in which price cycles have started or stopped within the last 5 years, so this type of variation may be difficult to find.

**Noel (2015) – Do Edgeworth price cycles lead to higher or lower prices?**

Data period/frequency: February 15, 2006 to February 14, 2008, daily (and 4 times a day)

Data sources: gas stations level prices in cities of Windows and Toronto (Canada)

Conclusion: “In this article, I exploit a sharp natural experiment to identify the causal effects of price cycles on retail price levels and margins. I focus on a refinery fire which took place at the Nanticoke refinery in southern Ontario on February 15, 2007. The fire caused the retail price cycles that had persisted in several nearby cities for decades to suddenly stop. In other cities further afield, the fire did not change the equilibrium type — cities with cycles continued to have cycles, and cities without continued without. I find the cessation of Edgeworth price cycles, all else equal, led to a price increase of 1.06 to 1.31 Canadian cents per liter, or 3.7 to 4.5 U.S. cents per gallon. In other words, the presence of Edgeworth price cycles lowered prices. A key advantage of this study over past efforts is its sharp natural experiment design and short panel setting to causally identify effects. The challenge in the literature has been that cycles tend to persist for decades, often predating the start of sufficiently fine data able to observe them. As a result, most previous studies relied on cross-sectional comparisons across cities and all were subject to concerns of potential omitted variables bias, especially with respect to market structure. In this article, identification is enhanced because I observe a clear discontinuity in the permanent equilibrium type in the treatment cities. I compare prices in the same cities under the same market conditions, once with regular cycles and once permanently without, and all within months of each other. I use a panel that also controls for changes in prices and margins in unaffected cities to remove potential confounding factors and zero in on the causal effect of interest. The results have important policy implications. Competition authorities are generally wary of the cycles. But absent Edgeworth price cycles as a whole actually being harmful to consumers, there is no consumer gain to be had by attempting to eliminate them or regulate them away. In fact, such efforts run the risk of doing more harm than good.”

**Categories by theme**

**Papers on Edgeworth cycles using gas station level data**

* Eckert, West (2004) A tale of two cities
* Eckert, West (2004) Retail price cycles across spatially dispersed gasoline stations
* Noel (2007) Edgeworth price cycles, evidence from the Toronto retail gasoline market
* Lewis (2011) Asymmetric Price Adjustment and Consumer Search: An examination of the retail gasoline market
* Lewis (2012) Price leadership and coordination in retail gasoline markets with price cycles
* Noel (2015) Do Edgeworth price cycles lead to higher or lower prices?

**Papers on Edgeworth cycles using city-level (or region level) data:**

* Eckert (2002) Retail price cycles and response asymmetry
* Eckert (2003) Retail price cycles and the Presence of Small Firms
* Noel (2007) Edgeworth price cycles, cost-based pricing and sticky pricing in retail gasoline markets
* Lewis (2009) Temporary Wholesale Gasoline Price Spikes have Long-lasting Retail Effects: The Aftermath of Hurricane Rita
* Lewis and Noel (2011) The speed of gasoline price response in markets with and without Edgeworth cycles

**Papes on search and dispersion:**

* Barron, Taylor and Umbeck (2004) Number of Sellers, Average Prices and Price Dispersion
* Hosken, McMillan, Taylor (2008) Retail gasoline prices: What do we know?
* Lewis (2008) Price dispersion and competition with differentiated sellers
* Lewis and Marvel (2011) When do consumers search?
* Chandra and Tappata (2011) Consumers search and dynamic price dispersion: an application to gasoline markets

**Other important papers:**

* Hastings (2004) Vertical relationships and competition in retail gasoline markets
* Verlinda (2008) ?? Do rockets ride faster and feathers fall slower in an atmosphere of local marker power? Evidence from the retail gasoline market
* Gautier and Le Saout (2012) The Dynamics of Gasoline Prices: Evidence from Daily French Micro Data

**Convergences in findings**

**Price dispersion**

Barron, Taylor and Umbeck (2004) were the first to investigate price dispersion in the retail gasoline market, using a data set of c. 3000 gas station prices within four US areas on a single day in 1997. The non observation of price dynamics implies a limited ability to control for the impact of station-specific characteristics on prices, and the necessity to consider both static and dynamic\* theoretical explanations of price dispersion. Under monopolistic competition, price dispersion related to heterogeneity in seller demand or cost should decrease when seller density increases, and so should the average price. Under a search-theoretic approach, the average price can either decrease or increase\*, but seller density and price dispersion should be negatively correlated. This effect can yet be mitigated or reinforced depending whether seller density influences search costs. In particular, Varian (1980) finds that a higher proportion of informed customer can lead to an increase or decrease in the variance of prices, depending on the model's parameters. Barron, Taylor and Umbeck (2004) measure the density of sellers by the number of gas stations within a 1.5-mile radius around each station. Price dispersion is measured by the unexplained variance in prices, namely the squared residuals of the regression of the log of prices on market characteristics, including seller density. An increase in the number of gas stations is found to be associated with a reduction in price dispersion.

\* static price dispersion reflects to the use of heterogeneous pure price strategies, dynamic price dispersion results from price randomization by sellers in equilibrium

\* decrease in Carlson and McAfee (1983) in a case of static price dispersion, increase in Varian (1980) with dynamic price dispersion

Hosken, McMillan and Taylor (2008) provide some insights about price dispersion\* with weekly prices from 272 gas stations around Washington DC between 1997 and 199. They first regress prices on week time indicators, common to all gas stations, and use the residuals to study the persistence of gas station pricing policies. They then add station fixed-effects to the regression so that residuals reflect deviations from each station’s typical price level. Controlling for station fixed-effects accounts for much of the persistence in prices, meaning that a significant amount of dynamic price dispersion is observed once gas station long term pricing policies are taken into account. The data and method employed offer an improvement over Barron, Taylor and Umbeck (2004) as they shed light on dynamics which require to go beyond models of static price dispersion, but they don’t allow to provide an order of magnitude and study variations across markets.

\* they focus on the explanation of gas station mark up levels, the main determinant of which is found to be brand affiliation, and observe many changes in mark up levels on a yearly basis

Lewis (2008) reconciles the two previous approaches by introducing station level fixed-effects to control for differentiation, and investigating the relationship between price dispersion and local market characteristics. Data include price records of 327 gas stations in the San Diego area on each Monday in 2000 and 2001 (91 weeks). The paper finds a negative relationship between seller density and price dispersion, in line with Barron, Taylor and Umbeck (2004), and refine this result by introducing a distinction between high-brand groups, composed by premium branded stations, and low-brand groups, which include discount brand and unbranded stations. The relationship between the density of low-brand sellers and price dispersion is found to be negative, while high-brand sellers have a weakly positive or insignificant impact. Lewis (2008) however observes that a more localized measure of dispersion\* can lead to find a positive relationship between density and price dispersion, which suggests a complex relationship between seller heterogeneity and price dispersion.

Finally, Chandra and Tappata (2011) make two significant contributions to the literature. They introduce a formal test regarding the relationship between price dispersion and consumer search, using distance between competing gas stations as a proxy for consumer information, and then use price dispersion measured at the market level to investigate the relationship between price dispersion and market characteristics.