Price Responses to Seasonal Demand Changes in the Swedish Gasoline Market[1]

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Abstract

This paper investigates the response in prices to demand changes over the seasonal cycle in the Swedish retail gasoline market. In contrast to what has been found for the gasoline market in the United States, we find no support for seasonal price changes compatible with the theories for cyclical variations of intensity of competition. We also study the response in prices to the demand fluctuations induced by tax increases, but neither do they support the theory. Some possible explanations for this difference between the gasoline markets Sweden and the United States are discussed.

Key words: Seasonal cycles; gasoline market.

JEL classification: E320; L130; L710

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1 Introduction

A large theoretical and empirical literature has studied the relationship between cyclical demand and prices or margins. The focus of the literature is on the possible link between cyclical pricing and the business cycle. Prices will tend to be counter-cyclical if increasing volumes have a reducing effect on prices. This will then magnify fluctuations in output. Several theoretical motivations for cyclical changes in prices have been put forward. For an overview of the theories see Rotemberg and Woodford (1999). One family of models has studied the relation between cyclical demand changes and the intensity of competition. Tacit collusion is often modeled as the outcome of a game where agents balance the gains from deviating from the collusive price, thereby gaining a short run profit, against the gains from maintaining collusion in future periods. If demand fluctuates, the gain from deviating is high in periods of high demand. Collusion may still be sustainable if the collusive price is allowed to vary with demand. A lower price in high demand states reduces the gains from deviating, since it reduces the gain from each unit sold in these states. This gives rise to a cyclical price pattern over the business or seasonal cycle. The first paper that formally models this idea is Rotemberg and Saloner (1986). They provide a model of collusion over varying demand states, which predicts that an increase in current demand over future demand will have a negative effect on prices. The demand states are assumed to be identically and independently distributed over time, making expected future demand equal in all periods. A realization of an unusually high demand state makes it more profitable to deviate, given the price of the competitors, since current demand is higher than normal, but expected future demand remains unchanged. Hence, in order to equalize the profit from deviating and the profit from sticking to the implicit agreement, the price must move in the opposite direction to demand.

Other papers have employed Rotemberg and Saloner's basic idea, but with different assumptions for the evolution of demand. Kandori (1991) assumes changes in demand to be serially correlated. Bagwell and Staiger (1997), assume that demand vary randomly between fast and slow growth phases. Demand for gasoline in Sweden follows a similar seasonal pattern for all years in the period studied. This is not consistent with the assumptions in the models above. Haltiwanger and Harrington provide a model for a deterministic demand cycle, which is more appropriate for the Swedish gasoline market.

Their model is quite different from that of Rotemberg and Saloner, but both models build on the idea that the collusive price depends on the relation between current and future demand. Demand is assumed to rise in each period until reaching the peak level, then it falls in each period until it reaches the lowest level of demand. This is the only restriction Haltiwanger and Harrington impose on the demand cycle; there are no other restrictions on the speed or duration of the changes in demand over the cycle. The model gives different predictions for different discount factors. Firms will collude at the monopoly price level in all periods if the discount factor is sufficiently high and price at the marginal cost level in all periods if the discount factor is sufficiently low. The most interesting analysis is in intermediate case. Firms will then collude, but the sustainable collusive price will vary over the cycle, with prices below the monopoly price in at least one period and above the marginal cost in at least one period.

Haltiwanger and Harrington's model provide two testable predictions. Controlling for the level of demand, prices will be higher when demand is increasing than when it is decreasing. The second prediction is that. If the discount factor is high enough, so that prices exceed marginal costs, profits will weakly lead the cycle. The Swedish gasoline retail market is well suited for testing the theory, since variations in demand follow a deterministic seasonal cycle over the year. Although this paper only tests one specific model for a seasonal cycle, it can also be viewed as a test of the more general idea that changes in demand may affect the intensity of competition. In this way, the test is also relevant for the question of pricing over the business cycle.

Rosenbaum and Sukharomana (2001) have found support for Haltiwanger and Harrington's model for business cycle variations for the Portland cement[1] industry in the United States. A study of particular interest for this paper is Borenstein and Shepard (1996). They study the response in prices to seasonal demand changes in the United States, i. e. the same issue as we study for Sweden. They find support for the theory of Haltiwanger and Harrington. Volumes lead margins. The margin is higher in periods when demand is expected to increase than when it is expected to decrease, for periods with approximately the same demand.

There is a relatively large literature studying price setting on the gasoline market. The results from these studies can be used to control for variables other than changes in demand that affect the pricing decision. The short-run price dynamics of the Swedish

[1] Portland cement is a kind of cement, predominantly used in construction.

gasoline retail market has been studied by Asplund, Eriksson and Friberg (2000). The main results were that cost changes were gradually passed through and that the price adjustment to cost increases and cost decreases was asymmetric in the short run, but symmetric in the long run. Similar results have been found for British data, see Bacon (1991), and for American data, see Borenstein, Cameron and Gilbert (1997).

The reminder of the paper is organized as follows. Section 2 describes the data. In section 3, we estimate the response in prices to seasonal demand changes. In section 4, we discuss the price response to demand fluctuations induced by large tax increases. Section 5 concludes by discussing possible explanations for the differences in results for the Swedish and the American gasoline market.

2 Data description

We study the seasonal pattern of margins for the Swedish gasoline chains for the period 1980-1996.[2] Demand for gasoline increases in the spring, peaks in the summer, declines in the fall and passes a trough in the winter. Sales are, on average, 42% higher in July than in January. The seven largest firms have a total market share of 95%, but no single firm has a market share exceeding 25%. The total value of gasoline sales is about 3% of GDP in Sweden. Taxes account for a large fraction of the price of gasoline. During the period studied taxes constitute on average about 55% of the retail price of gasoline, varying from 40% to 71%.

The gasoline price is the VAT-excluded list price for premium leaded gasoline. The price is usually the same for all firms, and a large dispersion among firms in prices is very uncommon. We use the price for one of the firms, Shell, referred to as the firm below. The results are not sensitive to what firm is chosen. Gasoline is, at least physically, a relatively undifferentiated good. Consumers have a low inventory capacity, which puts a limit on the extent to which sales can increase when the price is unusually low, e. g. before a tax increase or during a price war.

The chain between the international spot market price and the retail price is simpler in Sweden than in the United States. In Sweden, the retail price is directly linked to the Rotterdam spot market price. Some firms buy gasoline at the Rotterdam spot market, whereas firms with their own gasoline production use the Rotterdam spot price as the

[2] Halitiwanger and Harington assume constant marginal costs. As taxes and world market prices for gasoline vary, we look at the margin instead of prices, where margin is defined as retail price minus taxes and world market price.

transfer price. Firms either own the gasoline retail stations or set the price for their franchisees. The chain between the international market and the gasoline retail market consists of several links in the United States. Cost changes are gradually passed through from the international to the regional and local markets and hence, expected marginal cost changes must be included in the estimation of the margin in the United States. The market structure in are also different in that a large fraction of gasoline sales is unbranded and sold by independent retailers in the United States.

The margin, *MARGIN*, is defined as the retail price, *RP*, minus the per liter tax, *TAX*, and the cost for buying gasoline at the Rotterdam spot market, *MC*. *MARGIN* is measured in SEK*100, not as the percent mark-up. The Rotterdam gasoline price is denoted in USD, and is multiplied by the SEK/USD exchange rate in order to obtain *MC* in SEK*100. The retail price, *RP*, the Rotterdam gasoline price and the SEK/USD exchange rate are available on a daily basis. *MONTHVOL* and *YEARVOL* are the monthly and yearly volumes sold in Sweden. We use price and cost data as of the fifteenth day of each month in the regressions, since we only have access to monthly data on quantities. Table 1 shows the descriptive statistics for the variables.

[TABLE 1 ABOUT HERE]

MARGIN, *MC*, *TAX* and *RP* are measured in nominal SEK*100 and *MONTHVOL* and *YEARVOL* in 1000 m^3. *TAX* and sold volumes are reported in the annual reports from the Swedish Petroleum Institute. Platt's, a firm collecting prices in the oil market, is the source for *MC*. There is a positive trend in *MARGIN*, *TAX* and *RP* for the period studied, which is expected since these variables are nominal, but there is no trend in *MC* due to falling real prices on oil. The variance in *YEARVOL* is rather low with the highest value being only 26 percent higher than the lowest value. The highest yearly volumes are from the end of the eighties. Most of the variation in *MONTHVOL* is explained by seasonal variation. There is no systematic seasonal variation in the use of rebates, but there is some seasonal variation in transportation costs to the northern parts of Sweden, which is not accounted for in the measure of *MC*. According to the firm, this variation is not passed through to the prices and hence not to *MARGIN*. These cost changes is below 1 SEK*100. The results in the next section are not sensitive to this measurement error and remain almost unchanged if *MARGIN* is decreased by 1 SEK*100 during the winter months.

[DIAGRAM 1 ABOUT HERE]

Diagram 1 shows the development of average normalized[3] margin and average normalized *MONTHVOL*. Both *MONTHVOL* and profits (measured as *MARGIN***MONTHVOL*) peak in July, which is consistent with Haltiwanger and Harrington's prediction that profits weakly lead demand. However, the prediction that, for a given demand, prices should be higher, when demand is expected to increase finds no support in the diagram. If anything, the opposite seems to be the case. The development of normalized margin is quite different from Borenstein and Shepard's data for the gasoline market in the United States. The most important difference seen in the diagram is that, for a given level of demand, normalized margin tends to be high when demand is expected to increase. Demand in, for example, May and September is approximately of the same magnitude, but the margin is much lower in May. For the United States the opposite is the case.

3 Econometric Analysis

Already by looking at Diagram 1, one may suspect that it will be hard to find support for Haltiwanger and Harrington's model in the data. In this section we will present the results from some econometric specifications which formally test the theory. None of them support the theory, however.

The reported regressions follow Borenstein and Shepard's approach as closely as possible in order to facilitate comparisons with their results for the gasoline market in the United States. Alternative specifications have also been estimated, and the results for these specifications are very much in line with those reported.

RP, *MC* and *TAX* are cointegrated. The null hypothesis of unit root cannot be rejected at the 10 percent level for any of the variables. A Johansen cointegration test including a constant and a linear trend rejects the null hypothesis of no cointegration at the 5 percent level.[4]

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[3] Volumes and margins are normalized by removing the effects of tax increases, short run price dynamics, GDP and, for margin, a linear time trend.

[4] The inclusion of a linear trend in the cointegrating relationship is supported by the Akaike information criterion.

The cointegrating relationship:

$$RP = \alpha + \beta_1 TIME + \beta_2 MC + \beta_3 TAX \qquad (1)$$

We specify an error correction model in which deviations from the cointegration relationship as well as a number of variables important for the short run dynamics are included. For the short run dynamics, we distinguish between positive and negative changes in MC, since the response in prices in previous studies of gasoline has often been shown to be asymmetric. The last four variables are the error correction term. The constant in the cointegrating relationship is implicitly included in α.

$$RP - RP_{-1} = \alpha + \beta_1 MONTHVOL + \beta_2 \mathrm{E}(MONTHVOL) + \beta_3(\Delta MC|\Delta MC>0) + \beta_4(\Delta MC|\Delta MC>0)_{-1} + \beta_5(\Delta MC|\Delta MC<0) + \beta_6(\Delta MC|\Delta MC<0)_{-1} + \beta_7 \Delta TAX + \beta_8 \Delta TAX_{-1} + \beta_9(\Delta RP|\Delta RP>0)_{-1} + \beta_{10}(\Delta RP|\Delta RP<0)_{-1} + \beta_{11} TIME + \beta_{12} RP_{-1} + \beta_{13} MC_{-1} + \beta_{14} TAX_{-1} \qquad (2)$$

By rewriting equation 2 we get an expression for *MARGIN*, which is the variable of interest.

$$MARGIN = \alpha + \beta_1 MONTHVOL + \beta_2 \mathrm{E}(MONTHVOL) + \beta_3(\Delta MC|\Delta MC>0) + \beta_4(\Delta MC|\Delta MC>0)_{-1} + \beta_5(\Delta MC|\Delta MC<0) + \beta_6(\Delta MC|\Delta MC<0)_{-1} + \beta_7 \Delta TAX + \beta_8 \Delta TAX_{-1} + \beta_9(\Delta RP|\Delta RP>0)_{-1} + \beta_{10}(\Delta RP|\Delta RP<0)_{-1} + \beta_{11} TIME + (\beta_{12}+1) RP_{-1} + (\beta_{13}-1) MC_{-1} + (\beta_{14}-1) TAX_{-1} \qquad (3)$$

The only forward-looking variables in the regression are the expected changes in volume of sales. The marginal cost is a random walk, so there is no need to include any measure of expected change in marginal cost.

Expected instead of actual volume of sales is used to circumvent the potential simultaneity problem caused by both *MARGIN* and actual sales being dependent on the price. This may not be a very serious problem, however, since short-run demand elasticity is known to be very low.

[TABLE 2 ABOUT HERE]

The regression for estimating the expected volumes sold, E(*MONTHVOL*), is shown in Table 2. An adjusted R^2 of 0.88 indicates that most of the variation in volumes sold is due to changes in demand. Price changes in response to tax changes are known in advance and are often of a larger magnitude than other price changes. The tax changes therefore affect demand in the period they occur and in the periods immediately before and after the tax change. (See the next section for further discussion.) A dummy for tax changes larger than 15 SEK*100 is included in the regression. Smaller tax changes do not affect demand, see Table 4 below.[5] A linear trend was included in preliminary regressions, but turned out to be insignificant and did not affect any results.

[TABLE 3 ABOUT HERE]

The results for the regression of equation (3) are shown in Table 3. The first column shows the OLS regression with *MONTHVOL* among the independent variables. In the second column, where the 2SLS regression is shown, *MONTHVOL* is replaced by expected monthly volumes obtained from the regression in Table 2. The signs on the estimated coefficients of *RP*, *MC* and *TAX* are the same as in Borenstein and Shepard and the magnitude of the estimates are almost the same, but slightly higher in Sweden. *TIME* is not included in Borenstein and Shepard's regressions, since they use a panel with period dummies.

The estimate of ΔMC_{t-1} is significantly negative for both positive and negative changes in *MC* and the estimate of ΔMC_{t-1} is significantly positive for negative changes in *MC* at the ten percent level. Asplund, Eriksson and Friberg (1997) find that part of the price adjustment occurs the period after the change in *MC*. A cost increase will lead to a falling margin in the current month, since only part of the adjustment takes place immediately. In the following month, the margin will increase as some of the price adjustment takes place in this month. This explains the positive sign on ΔMC_{t-1}. The pattern of the response to marginal cost changes is the same in the United States. An augmented Dickey – Fuller test strongly rejects the null hypothesis of a unit root in the residuals.

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[5] Using a cut of point of 25*100 SEK results in only very small changes in the results. Other alternatives would be to include the magnitude of tax changes or including all tax changes. The results are not sensitive to which of these specifications is chosen.

The variable of interest for testing Haltiwanger and Harrington's model is E(*MONTHVOL*) The punishment of a price war after deviating from an implicit collusive agreement is harder when E(*MONTHVOL*) is high. A hard punishment facilitates implicit collusion, i. e. a high price. The theory would be supported by a significant positive estimate of the effect of E(*MONTHVOL*) on *MARGIN*, but as seen in Table 3, this is not the case.

The results shown in this section are not sensitive to changes in the specification. A regression closely following the specification in Asplund, Eriksson and Friberg has also been estimated, as well as a regression on real variables. None of the alternative specifications supports Haltiwanger and Harrington's model.

4 The response in quantities and margins to tax increases

Tax changes are decided by the Swedish parliament and hence known in advance by the firms and the consumers. Tax increases induce demand fluctuations since consumers buy more gasoline immediately before and less immediately after a tax increase. These changes in demand in connection with tax increases give another opportunity to study price responses to changes in demand. Table 4 displays deviations from expected sales for periods around tax increases. Expected sales are obtained from a regression with season and GDP as independent variables (the same regression as in Table 2 but without $TAXINC_{t-1}$, $TAXINC$ and $TAXINC_{t+1}$ among the independent variables). Tax changes always occur on the first day of the month. Period *t* is the first month after a tax increase. The month after a tax increase, sold quantities fall on average 44000 m^3, or about 10%, below what would be expected if there were no tax increase. After the largest tax increases, the fall is about 25%. In the preceding period (i.e. $t-1$) and the second period following a tax increase (i.e. $t+1$) sales are, on average, increased. There is no clear pattern for more distant periods. The increase in sold volumes in the period preceding the tax increase is expected, as gasoline is relatively cheap before the tax increase. The increase in the second period after the tax increase may be explained by the inventory technology (e. g. it might take somewhat more than a month for many consumers before they must buy gasoline for the first time after a tax increase).

[TABLE 4 ABOUT HERE]

The price is always increased by the same amount as the tax increase at the date the tax change occurs, so there is no change in margins the day the tax increase occurs. Hence, any change in margin in response to changes in demand surrounding the tax increase must come through price adjustments before and after the price change. The margin is measured the fifteenth day of each month. The change in margins as shown in Table 5 is the difference in margins between the fifteenth day of the present month and fifteenth day of the preceding month.

[TABLE 5 ABOUT HERE]

One problem with the interpretation of changes in margins is that substantial tax increases may change the optimal margin if, for example, demand elasticity changes. This is probably a minor problem for smaller tax changes. Another problem is that the number of observations is small.

This said, the responses of margins can be compared with the predictions from theory. In period *t-1* demand will be high during the remaining fifteen days of the month. Demand falls in the month of a tax increase. The prediction of the theory is that it would be tempting to cut prices and get a short-run profit since, the short-run profit is higher than usual in the current period and punishment is less severe as demand is low during the punishment phase. According to the theory, the margins must fall in *t-1*, thereby decreasing the profits from deviating, for collusion to remain sustainable. Demand is unusually low in period *t* and expected to increase, so the theory predicts an increase in the margin by a reasoning analogous to the period *t-1*. As seen in Table 5, these predictions are not supported by data, if anything, the opposite seems to be the case. A binomial test for the sign of changes in margins for period *t-1* is insignificant. For period *t*, the opposite of what is predicted by the theory, a decrease in margins, is significant at the 10% level.

5 Conclusions

Our econometrical analysis provided no support for Haltiwanger and Harrington's model. Expected increases in demand did not have a significant positive effect on current margins. Nor did the changes in demand in periods close to tax increases follow the pattern predicted by theories of demand driven changes in the intensity of competition. We conclude by discussing whether this lack of support for theory in the Swedish market can be explained by some difference between the Swedish and the American gasoline market.

The Swedish and the American market are alike in many respects. Demand follows a similar pattern and the physical features of the product are the same, e.g. minor physical differences between brands and low inventory capacity among consumers. Hence, we have to look at other differences between the markets in order to explain the different price pattern over the seasonal cycle. The most striking difference is in market structure. In Sweden, 95 percent of the gasoline is sold by the seven largest firms. In the United States, the market is much less concentrated with a large fraction of the sales supplied by independently operated stations. The higher market concentration reduces the number of customers one firm can get by reducing its price. It also decreases the costs of monitoring the prices of the competitors. Borenstein and Shepard find their support for the theory somewhat surprising, given that the American gasoline industry is not the tight oligopoly setting supposed by the formal theory. The Swedish gasoline market is a typical oligopoly, but we find no support for the theory in this market. The decision rules derived from Haltiwanger and Harrington is fairly simple. Monitoring of competitors is easy in the gasoline market, as the price is publicly announced. When monitoring of competitors is easy and the number of firms is low, firms may be able to follow more complicated decision rules. It is not in all markets that theories of varying degree of competition in different demand states are applicable. If the number of firms is too large, the market will be close to perfect competition and if the number is too small they will always collude on the monopoly price. Given the inelastic demand for gasoline, it is obvious that the price is below the monopoly price, but it seems that there are some other mechanism not modeled in the models of implicit collusion that keep the price down. One candidate for such a mechanism is entry deterrence. In the long run it would not be possible to set the short run monopoly price, as it would induce entry of new firms. The results in this paper suggest that it is not only the number of firms that is of importance, but also the costs for monitoring the prices of other firms.

References

Asplund, Marcus, Eriksson, Rickard and Richard Friberg, 2000, Price Adjustment by a Gasoline retail chain, *Scandinavian Journal of Economics*, 102: 101-121.

Bacon, Robert W., 1991, Rockets and feathers: the asymmetric speed of adjustment of UK retail gasoline prices to cost changes, *Energy Economics*, 13: 211- 218.

Bagwell, Kyle and Robert W. Staiger, 1997, Collusion over the Business Cycle*, RAND Journal of Economics*, 28: 82-106.

Borenstein, Severin, A. and Andrea Shephard, 1996, Dynamic Pricing in Retail Gasoline Markets, *RAND Journal of Economics*, 27: 429-51.

Borenstein, Severin, A., Colin Cameron and Richard Gilbert, 1997, Do gasoline prices respond asymmetrically to crude oil price changes?, *Quarterly Journal of Economics*, 112: 305-339.

Haltiwanger, John and Joseph E. Harrington, 1991, The impact of cyclical demand movements on collusive behavior, *RAND Journal of Economics*, 22: 89-106.

Kandori, M., 1991, 'Correlated Demand Shocks and Price Wars during Booms', *Review of* Economic Studies, 58: 171-80.

David I. Rosenbaum and Supachat Sukharomana, 2001, Oligopolistic pricing over the deterministic market demand cycle: some evidence from the US Portland cement industry, *International Journal of Industrial Organization*, 19: 863-884.

Rotemberg, Julio J. and Garth Saloner, 1986, A Supergame-Theoretic Model of Price Wars During Booms, *American Economic Review*, 76: 390-407.

Rotemberg, J. J. and Woodford, , M., 1999, 'The Cyclical Behavior of Prices and Costs', in

Taylor, J. B., and Woodford, M. (eds), *Handbook of Macroeconomics, Vol.1B*, (Elsevier Science Publishers B.V.).

Swedish Petroleum Institute, Annual Reports 1980-1996.

Table 1: Descriptive statistics

	Mean	*Standard deviation*	*Minimum*	*Maximum*	*Number of obs*
MARGIN	87.30	29.40	7.32	147.76	204
MC	119.95	34.65	66.98	197.30	204
TAX	281.56	97.46	139.2	442	204
RP	488.81	105.69	276	672.8	204
MONTHVOL	448.45	60.16	303	561	204
YEARVOL	5381.18	427.85	4679	5910	204
SEK/USD	6.68	1.17	4.12	9.66	204

Table 2: Estimation of expected volumes sold

Variable	
Constant	-74.6***
	(20.1)
FEB	11.8
	(7.29)
MAR	60.0**
	(7.31)
APR	74.5**
	(7.23)
MAY	91.1**
	(7.27)
JUN	119.6**
	(7.31)
JUL	154.4**
	(7.24)
AUG	126.5**
	(7.27)
SEP	72.6**
	(7.31)
OCT	76.5**
	(7.23)
NOV	43.9**
	(7.29)
DEC	55.6**
	(7.43)
GDP	0.000329**
	(0.00000142)
$TAXINC_{t-1}$	7.14
	(8.92)
TAXINC	-38.8**
	(8.93)
$TAXINC_{t+1}$	68.0**
	(8.94)
Adjusted R^2	0.8790
D-W	2.10
Number of obs	203

Variables starred * and ** indicate significance at the 10% 1% level, respectively. Standard errors in parenthesis.

Table 3: Dependent variable *MARGIN*

Variable	*OLS*	*2SLS*
Constant	50.3**	48.4**
	(10.8)	(10.7)
TIME	0.0112**	0.0109**
	(0.00257)	(0.00258)
RP_{-1}	0.654**	0.661**
	(0.0601)	(0.0599)
MC_{-1}	-0.699**	-0.703**
	(0.0594)	(0.0598)
TAX_{-1}	-0.779**	-0.782**
	(0.0450)	(0.0449)
MONTHVOL	-0.0162	-0.0115
	(0.0160)	(0.0181)
E*(MONTHVOL)*	-0.0172	-0.0199
	(0.0167)	(0.0175)
$(\Delta MC\|\Delta MC>0)$	-0.315**	-0.308**
	(0.101)	(0.101)
$(\Delta MC\|\Delta MC>0)_{-1}$	0.103	0.103
	(0.116)	(0.116)
$(\Delta MC\|\Delta MC<0)$	-0.560**	-0.559**
	(0.0958)	(0.0959)
$(\Delta MC\|\Delta MC<0)_{-1}$	0.210*	0.211*
	(0.125)	(0.127)
ΔTAX	-0.263**	0.0945
	(0.0634)	(0.0987)
ΔTAX_{-1}	-0.154	-0.173
	(0.0950)	(0.123)
$(\Delta RP\|\Delta RP>0)_{-1}$	0.0950	-0.256**
	(0.0985)	(0.0633)
$(\Delta RP\|\Delta RP<0)_{-1}$	-0.167	-0.154
	(0.123)	(0.0952)
Adjusted R^2	0.9104	0.9101
Number of obs	200	200

Variables starred * and ** indicate significance at the 10% and 1% level, respectively. Standard errors in parenthesis.

Table 4: Deviations from expected volume of sales 1000 m^3

Date	*Tax increase*	*t-2*	*t-1*	*t*	*t+1*	*t+2*
930115	112,4	-6	76	-133	52	16
841215	50	37	53	-143	94	-33
900115	38	15	5	-60	70	-96
801015	25,1	1	62	-113	1	38
880415	25	2	71	-118	72	-6
870715	24	-60	77	-36	-29	-11
960115	15	-2	-16	22	31	-58
960915	11	30	0	-18	28	-17
820415	7,1	-1	34	-33	-10	42
840115	6	27	-7	-7	24	
840515	6		34	-21	8	26
910715	4	3	-55	42	-7	-5
940115	3	22	-2	-17	0	37
860115	2	-39	10	18	-8	-36
Average		2	24	-44	23	-8

Table 5: Changes in *MARGIN* SEK*100

Date	*Taxchange*	*t-2*	*t-1*	*t*	*t+1*	*t+2*
930115	112,4	-4,9	6,0	-10,9	-12,5	-3,5
841215	50	-3,0	-4,6	-7,4	-8,5	5,0
900115	38	1,2	-1,6	10,2	2,4	1,2
801015	25,1	14,1	-0,5	-9,4	-9,4	7,9
880415	25	-5,6	1,7	-26,5	8,3	5,8
870715	24	-0,9	-0,6	-9,1	1,0	23,8
960115	15	5,5	-7,9	-0,8	2,1	-3,3
960915	11	5,2	-3,6	0,2	-10,4	4,3
820415	7,1	1,5	20,4	-19,2	-20,7	0,4
840115	6	-4,4	6,7	4,3	-39,8	
840515	6		-2,0	-1,3	-4,7	1,9
910715	4	7,2	-4,3	-8,5	1,1	-0,1
940115	3	24,6	0,4	-7,6	4,0	6,3
860115	2	15,2	24,5	2,8	16,3	0,1
Average		4,3	2,4	-5,9	-5,0	3,8

Diagram 1: Developement of average normalized margin and volume