Price Behavior in an Inflationary Environment:

Evidence from Supermarket Data

Carlos Felipe Jaramillo and Daniel Cerquera**

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Abstract

This paper analyzes several important aspects of price behavior using disaggregated weekly data on prices of supermarket products in Colombia between 1991 and 1994. The analysis shows that despite high and persistent rates of inflation in the economy, price quotations persist on average for two months. The large proportion of observations for which stores opt not to change prices highlight the importance of menu costs, even in an economy accustomed to persistent double-digit inflation. Despite the seemingly high levels of rigidity, the degree of real price erosion found before prices change are lower than those found in other inflationary economies. Price declines are not uncommon, and downward rigidity does not seem to be an issue in the Colombian inflationary environment. Aggregate price changes are also found to exert an important effect on relative price variation at the aggregate and commodity level.

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** Carlos Felipe Jaramillo is Viceministry of Public Finance, Ministry of Finance, Colombia, Daniel Cerquera is an economist at Departamento Nacional de Planeación, Colombia

I. Introduction

Microeconomic data has been increasingly used to provide critical evidence on important macroeconomic questions.[1] Price-setting behavior has been studied in order to find answers to questions for which only partial answers exist: What are the welfare costs of inflation? Can changes in inflation affect the distribution of prices? Can government's actively pursue monetary policies that affect output in the short and long run? Are there menu costs that prevent prices from adjusting rapidly to changes in the money supply? Are price-setters reluctant to reduce prices in nominal terms?

This paper takes advantage of a rich panel of weekly supermarket data between June 1991 and February 1994 to present information on several aspects of price setting behavior that bear on the above questions. The data were collected at a time when annual rates of inflation in Colombia ranged from 20.5% to 31.6%, levels for which no previous micro-level studies are known.

The results show that despite the high and persistent rates of inflation, price quotations persist on the average for nearly two months. The large proportion of observations for which stores opt not to change prices suggests that menu costs are relevant even in an economy accustomed to persistent double-digit inflation. Despite the seemingly high levels of rigidity, the degree of real price erosion found before prices change are much lower than those found by Lach and Tsiddon (1992) for Israel. However, average price changes (i.e., the width of (S, s) bands) are similar to those measured in Israel. Price declines are not uncommon, and downward price rigidity does not seem to be an issue despite the inflationary environment of the Colombian economy.

Data from Colombian supermarkets confirm that inflation has an important effect on relative price variation at the aggregate and commodity level. A concave relationship is found, with the association declining for high levels of inflation. A stronger effect on variability is found when the aggregate price level is declining.

The paper is organized as follows. Section II describes the data and Section III analyzes several aspects of the behavior of prices: the duration of price quotations, synchronization of price changes, downward price rigidity, the size of (S,s) bands and the consistency of findings with models of price setting behavior. Section IV presents results on the relationship between price dispersion and inflation. Some conclusions are presented at the end.

II. Description of the Data

The data set consists of prices on 39 supermarket items, collected at five stores in Pereira, a city of about 300,000 inhabitants located in the coffee growing region of Colombia. The

[1] Studies that look at micro-level data to test the relation between inflation and the variability of relative prices across different goods include Lach and Tsiddon (1992), Tommasi (1993), Domberger (1987) and Van Hoomisen (1988). Studies that look at micro pricing setting behavior include Warner and Barsky (1995), Carlton (1986), Cecchetti (1986) and Kashyap (1995).

data were collected by personal visits in stores that collaborated voluntarily with the study. The items surveyed are those with the greatest expenditure shares in the CPI. The collection strategy was designed to ensure that each price was for a particular brand/quality during the entire sampling period, identical across supermarkets. Prices are available on a weekly basis starting in June 11, 1991 and ending in February 4, 1994, for a total sample of 140 weekly observations. With few exceptions, prices for each one of the 39 items is available in every store during most of the period. Items are divided into five categories for analytical purposes: tubers and vegetables, meats and dairy products, grains, other processed foods and non-food items. Statistics are also shown for three roughly equal subsamples of about a year each in which annualized inflation (CPI) rates differed: weeks 1 to 56, weeks 57 to 99 and weeks 100 to 140, with average annualized inflation rates of 26%, 23% and 24%, respectively.

The data set compares favorably with other papers that have dealt with similar issues. Lach and Tsiddon (1992) employed monthly prices for 26 food products collected in 1978-79 and 1981-82, with a varying number of stores.[2] The annual inflation rate in their sample was very high, fluctuating between 80% and 115%. Tommasi (1993) used prices of 46 weekly observations in 1990 for 15 products in 5 supermarkets in Buenos Aires, with annual inflation oscillating during his sample between 50% and 7000%. The data used in this study covers a time span three times longer than Tommasi's, as well as a wider set of products. Further, store level data has not been used to examine price setting in environments exhibiting moderately high but stable inflation (i.e., between 20% and 30%).

III. The Behavior of Prices

This section is dedicated to characterizing the behavior of prices. This issue is important because it is linked to the welfare costs of inflation and to the potential effects of monetary policy on output. The analysis will focus on four key aspects of price behavior that have a bearing on these issues: the duration of price quotations, the synchronization of price changes, the degree of downward price rigidity and the size of (S, s) bands. A final section assesses existing price setting models with the empirical evidence.

a. Duration of price quotations

Table 1 presents summary statistics on the direction and size of price changes and on the duration of price quotations for each product.[3] A striking finding is that prices are quite stable for most products in the sense that during 81.5% of the weeks in the sample, stores opted not to change prices.[4] This is strong evidence of the existence of menu costs that lead to price stickiness at the weekly frequency. The degree of price stickiness, measured by the percentage of unchanged weekly price observations, ranges between 82% and 87% for meat and dairy, grains, other processed foods and non-food items. Tubers and vegetables exhibit the least stickiness with only 56% of price changes at zero. The most

[2] The median monthly observation contained prices for 25 stores.
[3] The effects of temporary sales and other unusual price changes was purged from the data to avoid biases.
[4] Tommassi finds a comparable figure of 47% for his sample of Buenos Aires supermarkets.

sticky at the product level, with over 91% of observations reflecting unchanging prices, are milk, sliced bread, eggs, beef, pork and coffee. On the other hand, the most flexible prices are those of tomato, potatoes, onions, fish, chicken, cassava and beans.

A different way to look at price rigidity is to measure the duration of prices. The "duration" of a price quotation is defined here as the number of weeks that elapsed between two different prices, provided that there are no missing values in between. The average duration of price quotations is 8.1 weeks (approximately two months). Lach and Tsiddon (1992) find a duration for prices in Israel of 1.6 months when annual inflation was roughly 115% and a duration of 1.9 months for inflation at 80%. The data for Colombia reveal a similar rate of duration, despite a much lower average rate of inflation (25%), suggesting the presence of fixed adjustment costs that are independent of inflation levels.

Price quotations are more persistent for meat and dairy items, grains and other processed foods, with duration averaging over 9 weeks. At the other extreme, price quotations for tubers and vegetables do not last more than 2.5 weeks. Interestingly, prices of non-food items are not among the most durable, with an average duration of 7.3 weeks. The most persistent price quotations, with duration of over 14 weeks are those of milk, sliced bread, eggs, beef, corn starch and coffee. The least persistent (i.e., under 2.4 weeks) are those of tomato, potatoes, onion, fish, chicken and cassava.

It is worth noting that the data do not reveal a strong relationship between the duration of price quotations (i.e., the degree of stickiness) and the level of inflation (Table 2). Average durations are 9.8 weeks for the high inflation subperiod (week 1-56) and 7.7 and 8.9, respectively, for the week 57-99 and 100-140 subperiods. These apparent differences are not statistically significant. Lach and Tsiddon's (1992) finding that higher inflation periods are associated with a lower duration is not confirmed with our data. This may be related to the relatively narrow range of inflation fluctuations in the Colombian sample, but it reinforces our suspicions of the presence of fixed adjustment costs, independent of inflation levels.

Table 2 also presents estimates of the average rate of price erosion before prices are readjusted. Since the average weekly inflation (CPI) rate was 0.40% during the sample period, the real price of each product eroded by 3.2% before the price was changed. Average price erosion was largest for the high inflation subperiod (weeks 1-56), when prices had to decline 4.3% before readjustment. The smallest degree of price erosion was detected in weeks 57-99, when real prices eroded by 2.6%. In keeping with price duration results, erosion of real prices between changes was greatest (between 3.4% and 4.3%) for meat and dairy, grains, other processed foods and non-food items. By contrast, tubers and vegetables displayed the least degree of erosion (1.0%), suggesting that fixed adjustment costs vary across items.

The degree of price erosion seems much lower in Colombia than in Israel, where declines in real prices of 8.5%-11% were detected between 1978 and 1982.[5] Cecchetti (1986) finds real price erosion rates as much as 25 percent of U.S. magazine prices. Lower tolerance to real price erosion in Colombian may be indicating that agents have developed highly efficient price-change technologies, a likely result of persistent double digit inflation rates since 1972.

Are there significant differences in price-setting behavior across stores? One way to answer this question is to see if the duration of price quotations differs. Table 3 shows that for the total sample, prices in stores #1 and #2 last for about 11 weeks, while those in store #3 only persist for 6.9 weeks. Stores #4 and #5 exhibit intermediate duration. These results roughly hold across subsamples, with store #3 always changing prices more often and store #2 keeping prices stable for the longest periods. However, none of the apparent differences in mean duration rates are statistically significant.

b. Synchronization of price changes

A strand of the literature has explored the potential effects of monetary policy under staggering of price and wage changes (Fisher, 1977; Taylor, 1979; Caplin and Spulber, 1987). Our data permits some insight into the degree of synchronization of price changes across stores. Following Lach and Tsiddon, a rough measure of synchronization is the share of stores that changed prices each week for a particular item.[6] Table 4 shows the five store average shares per item. The results indicate that on average 34% of the stores change their prices per week during the entire sample period. This is consistent with the presence of substantial staggering, as was also found in the Israel and Argentina studies.

Another definition of synchronization involves asking if each store makes many price changes simultaneously. For instance, the existence of economies of scale to changing prices may lead supermarkets to lump price changes together—i.e., to change the prices of many goods in the same week. This may be the case if there are substantial fixed labor and relabeling costs associated with price adjustments. If such were the case, we would expect to see each supermarket changing many prices in one week, followed by several weeks with no price changes. Figure 1 presents the evidence on this issue, plotting histograms for the number of prices that are changed each week. All stores report weeks during which only two to four price changes occurred, along with weeks in which ten or more changes were registered. While the analysis cannot be conclusive, it does not yield convincing evidence of economies of scale in price changes.

[5] This is another way of saying that despite much higher inflation rates in Israel, the duration of price quotations was roughly similar in both countries.

[6] While the small number of stores in the Pereira data set is not ideal, the high frequency nature of our observations allows for more accurate estimation of synchronized price changes than those presented by Lach and Tsiddon (1992).

c. Downward price rigidity

Descriptive statistics of the weekly price changes reveal that although inflation was positive in every month of the sample period, there are many instances in which prices were reduced in nominal terms. Of the 20% of price change observations that were not zero, a full 40% were negative—i.e., 8% of the entire sample (see Table 1). This proportion remains unchanged across subperiods. (Table 5). This finding contrasts with negative changes that account for only 5% of price changes in Israel (Lach and Tsidon) and seems comparable with the 35% found for Argentina by Tommassi. Prices of tubers and vegetables display a greater proportion of negative price changes—49% of non-zero changes. By contrast, prices of meat and dairy exhibit the lowest proportion (31%). A few items record more price declines than increases, including cassava, tomato, lentils, coffee and hand soap. The products displaying the smallest proportion of price declines (i.e., the most rigid downward) are beef, milk, sliced bread, pork and eggs, although even for these items between 17 and 27% of price changes are negative.

The degree of overall stickiness seems to vary slightly across subperiods. In the higher inflation subperiod (Weeks 1-56), the proportion of unchanged prices is higher (83%) than in the remaining subperiods (79% and 80%, respectively). In the higher inflation environment, prices of non-food items display the most rigidity. However, in the lower inflation subperiods, grains and other processed foods exhibit the least price flexibility.

The behavior of the moments of the cross-sectional distribution of price changes has been used as the basis for a test of downward nominal rigidities by Rae (1993) and Hall and Yates (1998). If there is downward rigidity in prices, the skewness of price changes should be negatively related to the mean inflation rate across goods and variations in the mean price change should lead to changes in the skewness of the distribution. The intuition is that at higher inflation rates, price change distributions should be unhindered by nominal rigidities, thus displaying distributions that on average should be symmetric. However, as inflation approaches zero, the lower tail of the distribution should display truncation at zero, leading to distributions that display a positive skew.

To conduct the above test, it is necessary to define a measure of aggregate inflation (DPt) for the 39-commodity basket across five stores:

$$DP_t = \sum_{i=1}^{35} \sum_{j=1}^{5} w_{ij} \, DP^j_{it} \quad .$$

where w_{ij} is the expenditure weight of product i at store j, DP^j_{it} is the inflation rate for product i in store j. Similarly, a measure of the skewness of price changes is defined:

$$Sk_t = \frac{\sum w_{ij} \, (DP^j_{it} - DP_t)^3}{(\sum w_i \, (DP^j_{it} - DP_t)^2)^{(3/2)}} \quad .$$

Statistical tests on the time series relationship between DP and Sk do not suggest the presence of nominal price rigidities (Table 6). Correlation coefficients find a significantly positive relationship between these two variables at the weekly and monthly price change frequency, for both weighted and unweighted versions. [7] Granger-causality tests of the hypothesis that mean inflation should cause the skewness of the price change distribution offer little support for the existence of downward nominal price rigidities.[8] Only for the case of weekly price differences we find evidence of DP causing skewness, although the sign on the coefficients is positive, contradicting the rigidity hypothesis.

The above tests actually suggest that supply shocks may account for inflationary shocks. This is a relationship that Ball and Mankiw (1995) interpret as driven by aggregate supply shocks. However, it could also be explained by economywide shocks with different speeds of adjustment across sectors or differential menu costs across agents.

d. The size of (S, s) bands

(S, s) policies have been used to describe agents price setting behavior under menu costs (Sheshinski and Weiss, 1977). As illustrated by Lach and Tsiddon (1992), the change in price of item i at store j is approximately equal to the (S, s) band (= S – s). Hence, averaging all (non-zero) price changes provides an estimate of the average width of the (S, s) band. However, since the share of negative price changes is much greater in Colombia as compared to Israel (40% vs. 5%, respectively), we also estimated bands for positive and negative price changes. These averages are presented in Table 7. The (S, s) adjustment band for positive price changes was on average 9.8% for the entire sample, surprisingly similar to the 9.1%-11.5% range found by Lach and Tsiddon for Israel in a period of higher inflation. Once again, this suggests the presence of fixed menu costs that do not vary with inflation levels. On the other hand, the average band for negative price changes was –7.9%.

Is higher inflation associated with larger (S, s) bands? The positive change band was higher for weeks 1-56 (10.55%) than for weeks 57-99 (9.1%) and weeks 100-140 (10.2%) (Table 8). However, these differences are not statistically significant. The negative change band does not exhibit substantial changes across periods. Tubers and vegetables display the largest positive bandwidth for all subperiods analyzed; grains and other processed foods display the shortest.

The width of (S, s) bands is highest for non-food items (9.2%) and meat and dairy (8.9%), and lowest for grains (7.9%) and for other processed foods items (8.1%). Once again, non-food products do not exhibit an extreme behavior. Items for which (S, s) bands are particularly large include onion, tomato, beans and fish. The narrowest bands are detected for rice and vegetable oil.

[7] Weights are taken from the Colombian CPI.

[8] Before conducting the bivariate Granger tests, the integration properties of the data were examined. Both DP and Sk series appeared to be I(0) using Augmented Dickey Fuller and Phillips-Perron tests.

The basic (S, s) model assumes that price changes are a constant proportion, reflecting fixed menu costs. It is thus worth asking: to what extent are our price changes consistent with this key assumption? Analysis of the distribution of non-zero price changes per item does not reveal favorable results. The Sheshinski-Weiss model would indicate a non-normal distribution, with much of the observations lumped around ± s as illustrated in Figure 2. However, detailed examination revealed that most of the product-specific price change distributions do not differ substantially from the usual bell shape. Hence, there does not seem any strong tendency for changes to lump around specific values, indicating that the assumption of fixed and stable proportional menu costs may be unwarranted.

e. Assessing pricing models

Summarizing our results so far: (1) prices are adjusted infrequently (about every two months on average), by differing amounts; (2) Price declines are not uncommon, and downward price rigidity does not seem to be an issue.

These simple findings rule out a number of price setting models. Models that posit cost-free price changes seem inconsistent with the degree of rigidity present in our data. However, simple indexation is also ruled out, a surprising fact given persistent double-digit inflation since the early 1970s and the overall sense by local economists that "Colombia is a highly indexed economy."

Fischer (1977) and Taylor (1979), among others, have developed models that assume that there are fixed intervals between price changes—also known as time-dependent price change rules. Our data does not seem consistent with this assumption. Figure 3 plots the frequency of price change intervals for a typical item (corn flour). The spacing of changes seems highly irregular in all stores and does not suggest the existence of time-specific patterns.

The alternative to time-dependent rules is to assume that firms adjust nominal prices when real prices fall below a prespecified lower limit, as prescribed by state-dependent models of price setting. This is the case of the Sheshinski-Weiss model and others that imply that the real price should fluctuate between a band that varies over time. As we have argued above, models that rely on a constant fixed cost of changing prices fail to describe the Pereira data. The size of changes varies tremendously and both small or large price changes are observed in most goods.

The model of Caballero and Engel (1994) posits a random cost of changing prices. In this model, firms have a continuous probability of adjusting their prices and the probability of adjusting rises as the distance between the optimal price and the actual price increases. This policy generates both large and small changes, although the former should be more common. This is because large divergences between the actual price and the desired price are much less likely to be optimal than small divergences.

One simple way to test the Caballero and Engel model is to see if the distribution of price changes is fat-tailed (i.e., excess kurtosis). Table 9 displays normalized kurtosis statistics

for each item in our sample. 26 of the 39 items display distributions that exhibit positive kurtosis, although only eight casesare significantly different from zero at the 95% confidence level. A closer examination of these distributions do not reveal strong-evidence of fat tails. Excess kurtosis seems to be more related to the large amount of small price change variations (high peakedness). Therefore, our data does not seem to support the implications of the Caballero and Engel model.

In sum, we conclude that none of the existing models of price setting behavior seem entirely consistent with the evidence from Colombia.

IV. Inflation and Relative Price Variability

Many empirical studies have found that the dispersion of prices is positively correlated with the rate of inflation.[9] This has been often interpreted as evidence of the welfare costs that high inflation imposes, since it suggests that agents will face greater relative price uncertainty in inflationary environments. In this section, this hypothesis is tested with the data from Colombian supermarkets.

The usual approach to testing the relationship between inflation and relative price variability is by means of simple linear regressions between a measure of relative price variability and inflation. Relative price variability is usually measured as a weighted variance:

$$VP_t = \sum_{i=1}^{n} w_{ij} (DP^j_{it} - DP_t)^2$$

where w_{ij} is the expenditure weight of product i at store j, DP^j_{it} is the inflation rate for product i in store j, and n is the number of products considered. DP_t is a measure of average aggregate inflation, as defined in the previous section.

For the case of the supermarket data available for Colombia, it is also possible to define commodity-specific variability measures:

$$VP^j_t = \sum_{i=1}^{n} w_i (DP^j_{it} - DP_{it})^2$$

where DP_{it} is product i's weekly average inflation rate (across stores) and equals $(1/N_{it}) \sum DP^j_{it}$. This dimension of price dispersion has been seldom explored in the literature since it requires high frequency store level data for identical items.[10]

[9] Some of the studies that elaborate this point include Parks (1978), Taylor (1981), Domberger (1987) and Jaramillo (1999). Comprehensive reviews of this literature appear in Fischer (1981), Marquez and Vining (1984) and Driffill, Mizon, and Ulph (1990).

[10] Studies that have looked at this dimension include Lach and Tsiddon (1992), Tommasi (1993), Domberger (1987) and Van Hoomisen (1988).

Regressions were run for both weighted and unweigthted versions of inflation and relative price variability. The discussion that follows concentrates only on the unweighted versions, since results for weighted data did not vary greatly.

Regression results using the overall measure of relative price variability versus the implied inflation rate from the 39-item commodity basket appear in Table 10. The simple regression linking overall inflation to VP indicates a strong association between these variables. Following Parks (1978) and Tommasi (1993), specifications using the absolute value of inflation are reported, since substantial price decreases were found to be associated to greater levels of relative price variability. Regression (2) confirms this finding. The inclusion of a quadratic term suggests that the relation between inflation and VP is concave, as found by Tommasi for the case of Argentina. Regression (3) tests for differing slope levels of the regression for positive and negative levels of weekly inflation. As found by Parks (1978) for the case of Holland and Jaramillo (1999) with PPI data for the United States, the slope is steeper for negative values of inflation.

For the commodity-specific variability indexes, regressions are run against the actual weekly inflation rate of each product across stores. Results indicate clearly that inflation has a positive effect on price variability at the product level, confirming findings by Van Hoomisen (1988) and Tommasi (1993). Table 11 displays regressions for the specification allowing for a different slope coefficient for negative values of commodity inflation. The relationship between absolute inflation and VPi is significant for each one of the supermarket items in the sample. Further, 15 items in the sample displayed a significantly different (at the 10% level) slope coefficient for negative values of inflation.

Table 12 displays regressions including a quadratic term for inflation. This term is significantly negative for 34 items in the sample, indicating a strong tendency for the relationship to exhibit a concave functional form.

V. Summary and Conclusions

This paper analyzes several important aspects of price behavior that bear on important macroeconomic questions using disaggregated weekly data on prices of supermarket products in Colombia. Despite high and persistent rates of inflation, price quotations persist on the average for two months. The large proportion of observations for which stores opt not to change prices suggests that menu costs are important, even in an economy accustomed to persistent double-digit inflation.

Despite the seemingly high levels of price rigidity, the degrees of real price erosion found before price changes are much lower than those found by Lach and Tsiddon (1992) for Israel. However, the duration of price quotations is very similar (approximately two months) in Colombia and Israel, despite a much lower average rate of inflation in the former. This result suggests that there may be fixed costs of price adjustment that all price setters face, independent of inflation levels.

The data suggest a very low degree of price change synchronization across stores. On average, 34% of stores change their prices of each good per week. Additionally, the evidence does not indicate the presence of economies of scale in price change activities. Price declines are not uncommon, and downward price rigidity does not seem to be an issue despite persistent double-digit inflation in the Colombian economy. Of the 20% of price change observations that were not zero, a full 40% were negative—i.e., 8% of the entire sample. Statistical tests on the time series relationship between inflation and the skewness of price changes confirm the absence of nominal price rigidities

The (S, s) band was on average 10.5% for positive price changes, similar to the 9.1%-9.83.% range found by Lach and Tsiddon for Israel in a period of greater inflation. However, there does not seem any strong tendency for changes to lump around specific values, indicating that the assumption of fixed and stable proportional menu costs of stationary (S, s) models is unwarranted.

An analysis of the characteristics of price setting behavior suggests that none of the most often cited models of price setting behavior seem entirely consistent with the evidence from Colombia.

Supermarket level data confirms that inflation has an important effect on relative price variation at the aggregate and commodity level. A concave relationship is found, with the association declining for high levels of inflation. A stronger effect on variability is found for negative inflation.

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Table 1
Descriptive Statistics - Weekly Price Changes
Pereira, 5 Store Average, June 1991 to February 1994

	Zero Changes (%)	Non Zero Changes (%)		Average Change (%)	Average Duration (weeks)
		Up	Down		
1. Tubers, fruits and vegetables	56,32	50,79	49,21	0,57	2,4
Cassava	58,80	48,85	51,15	0,65	2,4
Plantains	70,69	53,65	46,35	0,51	3,4
Tomato	45,16	49,00	51,00	0,55	1,8
Onion	54,87	50,00	50,00	0,33	2,2
Potatoes	52,09	52,47	47,53	0,80	2,1
2. Meat and dairy	82,80	68,46	31,54	3,95	10,7
Pork	93,03	75,00	25,00	4,33	14,3
Chicken	58,59	54,65	45,35	0,68	2,4
Fish	54,97	53,25	46,75	-0,52	2,2
Beef	93,29	82,61	17,39	5,46	14,9
Eggs	93,61	72,73	27,27	6,17	15,7
Cheese	89,91	64,91	35,09	4,40	9,9
Margerine	83,99	63,27	36,73	2,11	6,2
Milk	94,99	81,25	18,75	8,99	20,0
3. Grains and grain products	84,34	59,00	41,00	1,98	8,6
Rice	79,57	64,58	35,42	1,25	4,9
Lentils	83,54	33,64	66,36	-1,99	6,1
Beans	61,04	54,64	45,36	2,37	2,6
Crackers	84,16	58,49	41,51	1,75	6,3
Sliced Bread	93,76	75,76	24,24	4,31	16,0
Pasta	90,87	63,33	36,67	2,47	11,0
Corn flour	90,24	65,15	34,85	3,14	10,2
Corn starch	91,53	56,36	43,64	2,57	11,8
4. Other processed foods	87,31	59,49	40,51	2,31	9,5
Sugar	82,24	71,43	28,57	2,26	5,6
Vegetable oil	83,01	55,26	44,74	1,04	5,9
Beer	77,46	60,15	39,85	1,62	4,4
Fruit juice	89,95	57,58	42,42	2,39	10,0
Ketchup	90,72	63,49	36,51	2,84	10,8
Guava paste	94,52	62,50	37,50	4,72	18,3
Coffee	91,05	48,39	51,61	0,90	11,2
Cocoa	89,54	57,14	42,86	2,75	9,6
5. Non-food items	86,16	57,68	42,32	1,95	7,3
Schnapps	88,01	69,62	30,38	3,24	8,3
Batteries	85,89	58,06	41,94	2,60	7,1
Shampoo	84,98	57,00	43,00	2,03	6,7
Toothpaste	83,39	54,21	45,79	0,77	6,0
Toilet paper	89,15	52,94	47,06	2,93	9,2
Hand soap	88,24	48,05	51,95	1,17	8,5
Washing soap	85,78	60,00	40,00	1,46	7,0
Cigarettes	84,13	62,65	37,35	1,71	6,3
Deodorant	85,74	61,04	38,96	1,69	7,0
Detergent	86,33	53,26	46,74	1,90	7,3
Total average	81,51	59,65	40,35	2,26	8,09

Table 2
Duration of Price Quotations and Price Erosion by Subperiods
Pereira, 5 Store Averages, June 1991 to February 1994

	Total Sample			Week 1-56			Week 57-99			Week 100-140		
	Average Change (%)	Duration (weeks)	Real Price Erosion (%)	Average Change (%)	Duration (weeks)	Real Price Erosion (%)	Average Change (%)	Duration (weeks)	Real Price Erosion (%)	Average Change (%)	Duration (weeks)	Real Price Erosion (%)
1. Tubers and vegetables	0,57	2,4	1,0	-0,34	2,8	1,2	0,56	2,4	0,8	1,42	2,1	0,9
Cassava	0,65	2,4	1,0	3,03	2,8	1,2	-0,52	2,3	0,8	-0,35	2,2	0,9
Plantains	0,51	3,4	1,4	-0,15	3,7	1,6	0,94	3,7	1,3	0,80	2,9	1,2
Tomato	0,55	1,8	0,7	-4,27	2,3	1,0	3,06	1,7	0,6	2,35	1,6	0,7
Onion	0,33	2,2	0,9	-1,86	2,4	1,1	-0,32	2,3	0,8	2,91	1,9	0,8
Potatoes	0,80	2,1	0,8	1,55	2,6	1,2	-0,36	2,0	0,7	1,37	1,8	0,7
2. Meat and dairy	3,95	10,7	4,3	3,64	11,0	4,8	2,62	12,1	4,1	4,50	13,7	5,6
Pork	4,33	14,3	5,7	8,82	16,5	7,3	2,14	10,8	3,7	3,02	18,3	7,5
Chicken	0,68	2,4	1,0	0,23	2,0	0,9	0,75	2,6	0,9	1,43	3,0	1,2
Fish	-0,52	2,2	0,9	-10,62	1,2	0,5	-0,11	2,8	0,9	3,96	2,2	0,9
Beef	5,46	14,9	6,0	6,81	8,2	3,6	-1,94	35,3	12,0	5,46	29,3	12,0
Eggs	6,17	15,7	6,3	8,19	16,8	7,4	2,54	12,6	4,3	8,84	18,6	7,6
Cheese	4,40	9,9	4,0	3,78	17,1	7,5	7,26	9,8	3,3	2,76	6,8	2,8
Margerine	2,11	6,2	2,5	2,02	7,8	3,4	0,80	5,2	1,8	3,64	5,8	2,4
Milk	8,99	20,0	8,0	9,92	18,5	8,1	9,49	17,7	6,0	6,86	25,6	10,5
3. Grains and grain products	1,98	8,6	3,4	1,40	8,4	3,7	2,43	7,9	2,7	1,81	11,9	4,9
Rice	1,25	4,9	2,0	2,14	4,9	2,2	0,29	5,9	2,0	1,05	4,3	1,7
Lentils	-1,99	6,1	2,4	-5,53	6,5	2,8	1,40	5,2	1,8	-1,79	6,7	2,7
Beans	2,37	2,6	1,0	1,70	3,9	1,7	0,77	2,6	0,9	3,81	2,0	0,8
Crackers	1,75	6,3	2,5	2,38	7,0	3,1	1,59	4,8	1,6	1,11	7,7	3,1
Sliced Bread	4,31	16,0	6,4	3,59	14,4	6,3	4,79	16,9	5,7	4,90	17,6	7,2
Pasta	2,47	11,0	4,4	3,11	9,4	4,1	2,83	11,8	4,0	0,86	12,9	5,3
Corn flour	3,14	10,2	4,1	2,47	10,6	4,7	4,06	6,6	2,2	1,70	22,3	9,2
Corn starch	2,57	11,8	4,7	1,38	10,6	4,7	3,75	9,0	3,1	2,85	21,7	8,9
4. Other processed foods	2,31	9,5	3,8	3,22	11,8	5,2	0,38	8,9	3,0	1,91	8,2	3,4
Sugar	2,26	5,6	2,3	2,60	5,5	2,4	1,69	5,5	1,9	2,42	6,0	2,5
Vegetable oil	1,04	5,9	2,4	-0,76	6,6	2,9	1,88	5,7	2,0	2,12	5,3	2,2
Beer	1,62	4,4	1,8	2,60	5,0	2,2	0,99	2,5	0,8	1,31	10,2	4,2
Fruit juice	2,39	10,0	4,0	1,86	13,9	6,1	3,96	9,8	3,3	1,51	7,4	3,0
Ketchup	2,84	10,8	4,3	3,81	12,0	5,3	2,51	9,5	3,2	2,11	10,8	4,4
Guava paste	4,72	18,3	7,3	10,56	19,4	8,5	-7,54	19,8	6,7	0,00	9,5	3,9
Coffee	0,90	11,2	4,5	3,34	19,5	8,6	-5,16	10,2	3,5	4,34	7,6	3,1
Cocoa	2,75	9,6	3,8	1,78	12,2	5,4	4,70	8,0	2,7	1,43	8,8	3,6
5. Non-food items	1,95	7,3	2,9	3,26	11,7	5,1	2,05	5,9	2,0	1,14	6,8	2,8
Schnapps	3,24	8,3	3,3	3,26	10,7	4,7	4,87	6,1	2,1	0,50	9,6	3,9
Batteries	2,60	7,1	2,8	6,33	10,5	4,6	1,23	5,2	1,8	1,24	6,5	2,7
Shampoo	2,03	6,7	2,7	2,16	12,8	5,6	2,06	4,2	1,4	1,88	6,7	2,7
Toothpaste	0,77	6,0	2,4	4,99	10,6	4,7	-1,90	3,8	1,3	1,86	6,1	2,5
Toilet paper	2,93	9,2	3,7	2,79	13,9	6,1	6,77	9,2	3,1	0,57	6,3	2,6
Hand soap	1,17	8,5	3,4	-0,66	11,2	4,9	2,61	9,5	3,2	1,44	6,0	2,5
Washing soap	1,46	7,0	2,8	2,49	8,8	3,9	1,22	4,9	1,7	0,58	8,5	3,5
Cigarettes	1,71	6,3	2,5	3,54	7,8	3,4	0,81	4,3	1,5	1,11	8,1	3,3
Deodorant	1,69	7,0	2,8	2,92	11,4	5,0	2,36	5,6	1,9	0,23	5,7	2,3
Detergent	1,90	7,3	2,9	4,76	19,2	8,5	0,47	6,6	2,3	1,95	4,3	1,8
Total average	2,26	8,1	3,2	2,49	9,8	4,3	1,71	7,7	2,6	2,16	8,9	3,7

Table 3
Duration of Price Quotations
Pereira, 5 Store Averages, June 1991 to February 1994

	Store1	Store 2	Store 3	Store 4	Store 5
1. Tubers and vegetables	2,2	4,7	2,1	2,4	2,3
Cassava	2,3	5,1	2,1	1,5	2,9
Plantains	2,4	8,4	2,7	4,5	3,0
Tomato	1,7	4,7	1,4	1,4	2,0
Onion	1,8	3,4	2,4	2,5	1,6
Potatoes	2,8	1,9	2,1	2,1	1,8
2. Meat and dairy	14,4	10,4	10,2	13,0	14,3
Pork	17,4	10,7	12,1	20,2	15,0
Chicken	2,2	2,8	2,4	2,3	2,5
Fish	2,0		1,8	2,6	
Beef	19,6	9,1	15,2	13,7	27,8
Eggs	10,7	13,7	19,6	17,1	23,2
Cheese	27,0	5,6	6,9	16,6	7,1
Margerine	4,6	14,4	4,1	8,4	7,4
Milk	32,0	16,5	19,6	22,8	17,1
3. Grains and grain products	12,7	15,4	5,4	8,5	8,0
Rice	6,6	4,2	4,2	5,5	
Lentils	9,6	11,2	4,7	4,1	5,3
Beans	2,4	3,1	2,7	1,8	3,0
Crackers	13,7	6,7	4,0	6,1	6,2
Sliced Bread	11,9	22,5		15,1	17,0
Pasta	26,8	22,7	6,0	8,9	9,7
Corn flour	15,4	19,3	5,5	17,0	7,3
Corn starch	14,9	33,5	10,9	9,4	7,6
4. Other processed foods	12,1	13,7	8,8	10,9	11,3
Sugar	6,1	6,3	4,2	8,9	4,8
Vegetable oil	8,7	8,9	6,0	5,7	3,7
Beer	5,0	6,2	3,8	3,8	4,3
Fruit juice	13,9	23,2	5,8	11,3	8,3
Ketchup	27,2	15,2	6,2	12,6	8,1
Guava paste	2,3	30,5	32,0	13,1	34,0
Coffee	13,9	9,8	8,2	19,9	9,9
Cocoa	19,6	9,8	4,3	11,8	16,9
5. Non-food items	10,8	9,6	6,1	8,9	6,2
Schnapps	18,3	11,3	5,0	7,3	8,4
Batteries	7,1	5,8	7,4	10,6	6,2
Shampoo	9,8	10,0	8,7	8,7	3,2
Toothpaste	9,1	5,6	5,3	9,9	3,9
Toilet paper	14,1	7,5	8,7	9,7	8,1
Hand soap	10,0	16,1	6,6	7,6	7,1
Washing soap	6,7	12,1	3,9	12,4	6,9
Cigarettes	15,2	13,9	4,0	3,7	
Deodorant	6,7	4,0	6,8	11,4	5,4
Detergent	11,3	9,5	4,9	7,6	6,6
Total average	11,1	11,2	6,9	9,2	8,7

Table 4
Synchronization of Price Changes
Pereira, 5 Store Averages, June 1991 to February 1994

	Average Synchronization*	Standard Deviation
1. Tubers, fruits and vegetables	0,49	0,19
Cassava	0,47	0,17
Plantains	0,38	0,18
Tomato	0,59	0,19
Onion	0,51	0,20
2. Meat and dairy	0,38	0,20
Chicken	0,55	0,26
Beef	0,26	0,11
Eggs	0,30	0,15
Margerine	0,33	0,18
Milk	0,46	0,33
3. Grains and Grain Products	0,28	0,13
Lentils	0,31	0,14
Crackers	0,30	0,16
Pasta	0,28	0,13
Corn flour	0,26	0,11
Corn starch	0,26	0,10
4. Other processed foods	0,29	0,13
Sugar	0,29	0,14
Vegetable oil	0,33	0,15
Fruit juice	0,27	0,11
Ketchup	0,26	0,09
Coffee	0,29	0,17
Cocoa	0,27	0,12
5. Non-food items	0,30	0,15
Schnapps	0,30	0,16
Batteries	0,31	0,16
Shampoo	0,29	0,13
Toothpaste	0,34	0,17
Toilet paper	0,34	0,19
Hand soap	0,29	0,19
Washing soap	0,27	0,13
Detergent	0,29	0,12
Total average	0,34	0,16

Table 5
Distribution of positive, negative and zero weekly price changes
Pereira, 5 store averages

	Total sample			Week 1-56			Week 57-99			Week 100-140		
	Zero	Non Zero Changes (%)		Zero	Non Zero Changes (%)		Zero	Non Zero Changes (%)		Zero	Non Zero Changes (%)	
	Changes (%)	Up	Down	Changes (%)	Up	Down	Changes (%)	Up	Down	Changes (%)	Up	Down
1. Tubers, fruits and vegetables	56,32	50,79	49,21	62,67	48,98	51,02	55,52	51,63	48,37	50,13	51,78	48,22
Cassava	58,80	48,85	51,15	64,16	54,32	45,68	56,50	49,43	50,57	55,12	43,48	56,52
Plantains	70,69	53,65	46,35	73,09	52,24	47,76	73,13	51,85	48,15	65,37	56,34	43,66
Tomato	45,16	49,00	51,00	55,56	37,04	62,96	40,10	53,91	46,09	37,56	54,69	45,31
Onion	54,87	50,00	50,00	58,70	45,26	54,74	57,07	52,44	47,56	48,21	52,48	47,52
Potatoes	52,09	52,47	47,53	61,85	56,06	43,94	50,79	50,54	49,46	44,39	51,92	48,08
2. Meat and dairy	82,80	68,46	31,54	77,18	71,78	28,22	83,77	60,30	39,70	83,82	66,19	33,81
Pork	93,03	75,00	25,00	93,95	100,00	0,00	90,70	70,00	30,00	94,53	54,55	45,45
Chicken	58,59	54,65	45,35	49,15	53,78	46,22	61,46	54,05	45,95	67,01	56,92	43,08
Fish	54,97	53,25	46,75	16,67	40,00	60,00	63,95	51,61	48,39	53,73	61,29	38,71
Beef	93,29	82,61	17,39	87,73	93,94	6,06	97,17	33,33	66,67	96,59	71,43	28,57
Eggs	93,61	72,73	27,27	94,05	81,25	18,75	92,09	64,71	35,29	94,63	72,73	27,27
Cheese	89,91	64,91	35,09	94,15	66,67	33,33	89,77	61,11	38,89	85,33	66,67	33,33
Margerine	83,99	63,27	36,73	87,16	63,64	36,36	80,68	55,88	44,12	82,68	70,97	29,03
Milk	94,99	81,25	18,75	94,59	75,00	25,00	94,34	91,67	8,33	96,10	75,00	25,00
3. Grains and grain products	84,34	59,00	41,00	86,00	54,17	45,83	82,96	65,27	34,73	84,36	58,07	41,93
Rice	79,57	64,58	35,42	79,64	76,47	23,53	82,98	50,00	50,00	76,54	63,16	36,84
Lentils	83,54	33,64	66,36	84,52	7,69	92,31	80,88	53,85	46,15	85,05	41,38	58,62
Beans	61,04	54,64	45,36	74,52	55,00	45,00	61,21	51,56	48,44	48,86	56,67	43,33
Crackers	84,16	58,49	41,51	85,77	60,53	39,47	79,31	61,90	38,10	86,93	50,00	50,00
Sliced Bread	93,76	75,76	24,24	93,07	71,43	28,57	94,08	90,00	10,00	94,30	66,67	33,33
Pasta	90,87	63,33	36,67	89,31	60,71	39,29	91,54	76,47	23,53	92,27	53,33	46,67
Corn flour	90,24	65,15	34,85	90,57	64,00	36,00	84,76	65,63	34,38	95,52	66,67	33,33
Corn starch	91,53	56,36	43,64	90,59	37,50	62,50	88,94	72,73	27,27	95,38	66,67	33,33
4. Other processed foods	87,31	59,49	40,51	89,09	58,65	41,35	84,45	57,46	42,54	87,09	59,21	40,79
Sugar	82,24	71,43	28,57	81,71	74,47	25,53	81,73	68,42	31,58	83,41	70,59	29,41
Vegetable oil	83,01	55,26	44,74	84,91	37,50	62,50	82,59	68,57	31,43	80,98	61,54	38,46
Beer	77,46	60,15	39,85	80,00	63,27	36,73	59,26	59,09	40,91	90,16	55,56	44,44
Fruit juice	89,95	57,58	42,42	92,83	55,56	44,44	89,81	57,14	42,86	86,50	59,26	40,74
Ketchup	90,72	63,49	36,51	91,70	63,64	36,36	89,47	68,18	31,82	90,73	57,89	42,11
Guava paste	94,52	62,50	37,50	94,85	70,00	30,00	94,94	50,00	50,00	89,47	50,00	50,00
Coffee	91,05	48,39	51,61	94,87	57,14	42,86	90,23	19,05	80,95	86,83	66,67	33,33
Cocoa	89,54	57,14	42,86	91,83	47,62	52,38	87,56	69,23	30,77	88,67	52,17	47,83
5. Non-food items	86,16	57,68	42,32	90,97	60,33	39,67	81,63	58,60	41,40	84,56	54,04	45,96
Schnapps	88,01	69,62	30,38	90,65	69,57	30,43	83,49	77,14	22,86	89,55	57,14	42,86
Batteries	85,89	58,06	41,94	90,49	68,00	32,00	80,83	56,76	43,24	84,73	51,61	48,39
Shampoo	84,98	57,00	43,00	92,19	60,00	40,00	76,08	54,00	46,00	85,07	60,00	40,00
Toothpaste	83,39	54,21	45,79	90,55	62,50	37,50	73,71	49,02	50,98	83,67	56,25	43,75
Toilet paper	89,15	52,94	47,06	92,80	47,37	52,63	89,14	68,42	31,58	84,04	46,67	53,33
Hand soap	88,24	48,05	51,95	91,09	36,36	63,64	89,47	50,00	50,00	83,42	54,55	45,45
Washing soap	85,78	60,00	40,00	88,64	70,00	30,00	79,40	56,10	43,90	88,29	54,17	45,83
Cigarettes	84,13	62,65	37,35	87,24	80,00	20,00	76,97	57,89	42,11	87,65	50,00	50,00
Deodorant	85,74	61,04	38,96	91,22	66,67	33,33	82,25	66,67	33,33	82,53	51,72	48,28
Detergent	86,33	53,26	46,74	94,80	42,86	57,14	84,92	50,00	50,00	76,59	58,33	41,67
Total average	81,51	59,65	40,35	83,11	59,62	40,38	79,57	59,19	40,81	80,47	58,13	41,87

Table 6

Correlation and Granger-Causality Tests[a]

			Null Hypothesis	
Frequency		Correlation	Skew causes Inflation	Infl. causes Skewness
WEIGHTED DATA				
Weekly	Level	0,71	0,12	0,40
Weekly	Change	0,79	0,79	0,25
Monthly	Level	0,61	0.04*	0,15
Monthly	Change	0,76	0,77	0,61
UNWEIGHTED DATA				
Weekly	Level	0,68	0,99	0,20
Weekly	Change	0,71	0,13	0.00*
Monthly	Level	0,67	0,58	0,83
Monthly	Change	0,74	0,54	0,11

a Figures for causality tests are p-values of null hypothesis.

Table 7
(S,s) Price Bands - Weekly Price Changes for 39 Supermarket Items
Pereira, 5 Store Averages, June 1991 to February 1994

	(S,s) Band Increases	(S,s) Band Decreases	(S,s) Band All Changes
1. Tubers, fruits and vegetables	18,49	-17,80	0,57
Cassava	16,50	-14,49	0,65
Plantains	15,46	-16,80	0,51
Tomato	21,25	-19,35	0,55
Onion	24,97	-24,31	0,33
Potatoes	14,26	-14,05	0,80
2. Meat and dairy	8,89	-6,12	3,95
Pork	8,37	-7,79	4,33
Chicken	5,42	-5,03	0,68
Fish	14,32	-17,42	-0,52
Beef	7,67	-5,02	5,46
Eggs	9,42	-2,50	6,17
Cheese	8,73	-3,63	4,40
Margerine	5,05	-2,94	2,11
Milk	12,13	-4,60	8,99
3. Grains and grain products	7,91	-6,21	1,98
Rice	3,36	-2,62	1,25
Lentils	5,59	-5,84	-1,99
Beans	17,90	-16,33	2,37
Crackers	7,51	-6,35	1,75
Sliced Bread	7,00	-4,08	4,31
Pasta	6,83	-5,06	2,47
Corn flour	8,23	-6,40	3,14
Corn starch	6,88	-2,99	2,57
4. Other processed foods	8,11	-6,38	2,31
Sugar	5,28	-5,30	2,26
Vegetable oil	4,24	-2,92	1,04
Beer	6,71	-6,05	1,62
Fruit juice	10,30	-8,35	2,39
Ketchup	5,76	-2,24	2,84
Guava paste	18,89	-18,91	4,72
Coffee	7,09	-4,91	0,90
Cocoa	6,59	-2,37	2,75
5. Non-food items	9,18	-7,27	1,95
Schnapps	6,32	-3,83	3,24
Batteries	9,51	-6,96	2,60
Shampoo	11,34	-10,32	2,03
Toothpaste	14,65	-15,66	0,77
Toilet paper	14,62	-10,23	2,93
Hand soap	12,08	-8,91	1,17
Washing soap	6,44	-6,02	1,46
Cigarettes	4,40	-2,81	1,71
Deodorant	4,99	-3,48	1,69
Detergent	7,47	-4,46	1,90
Total average	9,83	-7,98	2,26

Table 8
(S,s) Price Bands - Period Analysis
Pereira, 5 Stores, June 1991 to February 1994

	Weeks 1-56			Weeks 57-99			Weeks 100-140		
	(S,s) Band Increases (%)	(S,s) Band Decreases (%)	(S,s) Band Mean (%)	(S,s) Band Increases (%)	(S,s) Band Decreases (%)	(S,s) Band Mean (%)	(S,s) Band Increases (%)	(S,s) Band Decreases (%)	(S,s) Band Mean (%)
1. Tubers, fruits and vegetables	**20,2**	**-19,7**	**-0,3**	**16,3**	**-16,5**	**0,6**	**18,9**	**-17,6**	**1,4**
Cassava	20,8	-18,1	3,0	11,0	-11,8	-0,5	17,7	-14,2	-0,4
Plantains	15,7	-17,5	-0,1	14,9	-14,0	0,9	15,7	-18,4	0,8
Tomato	20,4	-18,8	-4,3	21,9	-18,9	3,1	21,2	-20,4	2,4
Onion	27,1	-25,8	-1,9	21,4	-24,2	-0,3	26,1	-22,7	2,9
Potatoes	17,2	-18,4	1,5	12,4	-13,4	-0,4	13,9	-12,1	1,4
2. Meat and dairy	**8,5**	**-6,3**	**3,6**	**8,6**	**-6,2**	**2,6**	**9,7**	**-5,6**	**4,5**
Pork	8,8		8,8	6,2	-7,4	2,1	12,4	-8,3	3,0
Chicken	5,0	-5,3	0,2	6,1	-5,5	0,7	5,5	-3,9	1,4
Fish	11,0	-25,0	-10,6	17,1	-18,5	-0,1	13,0	-10,4	4,0
Beef	7,6	-5,7	6,8	4,5	-5,2	-1,9	9,2	-4,0	5,5
Eggs	10,2	-0,6	8,2	5,8	-3,4	2,5	13,1	-2,6	8,8
Cheese	6,8	-2,3	3,8	15,7	-6,0	7,3	5,3	-2,4	2,8
Margerine	4,3	-2,0	2,0	3,2	-2,3	0,8	7,3	-5,4	3,6
Milk	14,3	-3,1	9,9	10,5	-1,7	9,5	11,9	-8,3	6,9
3. Grains and grain products	**7,9**	**-6,1**	**1,4**	**7,8**	**-7,4**	**2,4**	**7,3**	**-5,3**	**1,8**
Rice	3,5	-2,3	2,1	3,5	-2,9	0,3	3,1	-2,5	1,0
Lentils	5,4	-6,4	-5,5	7,4	-5,6	1,4	2,5	-4,8	-1,8
Beans	15,1	-14,7	1,7	17,0	-16,5	0,8	19,7	-16,9	3,8
Crackers	7,1	-4,9	2,4	6,9	-7,1	1,6	9,4	-7,1	1,1
Sliced Bread	6,2	-3,0	3,6	6,7	-12,4	4,8	8,7	-2,7	4,9
Pasta	8,2	-4,7	3,1	5,3	-5,2	2,8	6,4	-5,5	0,9
Corn flour	9,3	-9,7	2,5	8,8	-4,9	4,1	3,5	-2,0	1,7
Corn starch	8,3	-2,7	1,4	6,9	-4,6	3,7	4,8	-1,1	2,9
4. Other processed foods	**8,3**	**-4,5**	**3,2**	**7,1**	**-7,7**	**0,4**	**10,5**	**-8,6**	**1,9**
Sugar	5,0	-4,4	2,6	5,1	-5,6	1,7	6,0	-6,1	2,4
Vegetable oil	4,0	-3,6	-0,8	3,5	-1,7	1,9	5,1	-2,6	2,1
Beer	8,2	-7,1	2,6	5,9	-6,1	1,0	5,0	-3,4	1,3
Fruit juice	12,3	-11,2	1,9	11,2	-5,7	4,0	8,4	-8,4	1,5
Ketchup	7,4	-2,4	3,8	4,8	-2,5	2,5	5,0	-1,9	2,1
Guava paste	16,9	-4,2	10,6	14,9	-30,0	-7,5	41,0	-41,0	0,0
Coffee	6,8	-1,3	3,3	3,4	-7,2	-5,2	8,0	-3,1	4,3
Cocoa	5,8	-1,9	1,8	7,9	-2,5	4,7	5,3	-2,8	1,4
5. Non-food items	**11,2**	**-6,6**	**3,3**	**8,8**	**-6,7**	**2,1**	**8,5**	**-7,4**	**1,1**
Schnapps	5,6	-2,1	3,3	6,9	-2,1	4,9	5,9	-6,7	0,5
Batteries	13,0	-7,8	6,3	7,2	-6,6	1,2	8,9	-6,9	1,2
Shampoo	9,8	-9,3	2,2	14,4	-12,4	2,1	7,8	-6,9	1,9
Toothpaste	15,9	-13,2	5,0	14,5	-17,7	-1,9	13,8	-13,5	1,9
Toilet paper	16,5	-9,6	2,8	12,7	-6,0	6,8	15,2	-12,3	0,6
Hand soap	19,4	-12,1	-0,7	11,3	-6,0	2,6	9,3	-8,0	1,4
Washing soap	5,4	-4,4	2,5	6,8	-5,9	1,2	7,4	-7,5	0,6
Cigarettes	5,0	-2,2	3,5	3,2	-2,4	0,8	6,0	-3,7	1,1
Deodorant	5,2	-1,7	2,9	4,8	-2,6	2,4	5,0	-4,9	0,2
Detergent	16,7	-4,2	4,8	6,1	-5,2	0,5	6,2	-4,0	2,0
Total average	**10,55**	**-7,73**	**2,49**	**9,17**	**-8,20**	**1,71**	**10,25**	**-8,19**	**2,16**

Table 9
Normalized Kurtosis - Non-Zero Price Changes

1. Tubers and vegetables		
	Cassava	0,34
	Plantains	1,92*
	Tomato	0,17
	Onion	0,23
	Potatoes	4,18*
2. Meat and dairy		
	Pork	1,49
	Chicken	0,25
	Fish	2,13*
	Beef	0,84
	Eggs	-0,71
	Cheese	2,63*
	Margerine	0,76
	Milk	1,72*
3. Grains and grain products		
	Rice	-0,26
	Lentils	1,43
	Beans	2,01*
	Crackers	0,55
	Sliced Bread	-0,33
	Pasta	0,50
	Corn flour	1,38
	Corn starch	-0,32
4. Other processed foods		
	Sugar	-0,01
	Vegetable oil	0,29
	Beer	-0,42
	Fruit juice	-0,32
	Ketchup	-0,72
	Guava paste	0,56
	Coffee	-0,83
	Cocoa	1,27
5. Non-food items		
	Schnapps	-0,50
	Batteries	-0,40
	Shampoo	0,63
	Toothpaste	-0,92
	Toilet paper	-1,03
	Hand soap	0,35
	Washing soap	1,38
	Cigarettes	7,13*
	Deodorant	4,05*
	Detergent	0,32
Total average		0,81

* Significantly different from zero at 95% level.

Table 10
Relationship betweeen Inflation and Relative Price Variability

Variable	(1)	(2)	(3)
Constant	0,03 (12.58)*	0,02 (8.31)*	0,03 (12.87)*
Inflation	0,92 (4.50)*		
Abs(Inflation)		2,61 (4.86)*	1,51 (6.73)*
$Inflation^2$		-33,37 (-2.62)*	
Abs(Inflation)xDum[b]			1,41 (2.41)*
R squared	0,74	0,78	0,78
No of observations	139	139	139

[a] T statistics in parenthesis. * denotes 95% significance.

[b] Dum is 0 when inflation is positive and 1 when negative.

Table 11
Relationship between Commodity RPV and Inflation
Specification with Negative Inflation Dummy

	Constant		Abs (Inflation)		Abs(Inflation)xDummy[a]			
Good	Coef	t stat	Coef	t stat	Coef	t stat	R^2	No of obs
Rice	0,003	(4,86)	0,70	(4,55)	0,38	(2,39)	0,61	137
Crackers	0,005	(2,57)	1,64	(13,99)	0,53	(2,76)	0,63	139
Sliced Bread	0,001	(3,25)	0,89	(5,86)	0,65	(1,65)	0,75	139
Lentils	0,004	(3,49)	2,24	(12,84)	-0,69	-(3,)	0,65	139
Pasta	0,003	(2,99)	1,39	(4,44)	0,61	(2,22)	0,61	139
Beans	0,032	(5,52)	1,12	(10,6)	0,17	(1,12)	0,72	125
Cassava	0,046	(6,05)	1,48	(9,06)	-0,23	-(1,42)	0,46	137
Potatoes	0,039	(3,98)	1,45	(10,24)	-0,35	-(1,3)	0,41	133
Plantains	0,028	(4,48)	1,71	(9,82)	-0,07	-(,35)	0,57	134
Tomato	0,089	(7,22)	0,45	(4,53)	0,24	(2,36)	0,26	134
Onion	0,082	(5,89)	1,23	(5,81)	-0,09	-(,49)	0,39	134
Beef	0,001	(2,57)	1,50	(7,99)	-0,02	-(,09)	0,86	139
Pork	0,002	(3,06)	1,44	(8,8)	0,82	(4,9)	0,88	139
Chicken	0,015	(5,71)	0,99	(5,26)	-0,06	-(,37)	0,44	130
Fish	0,027	(2,97)	1,02	(8,23)	0,01	(,02)	0,69	52
Cheese	0,001	(3,12)	1,07	(13,32)	1,03	(9,38)	0,93	137
Margerine	0,003	(3,03)	1,50	(5,75)	0,48	(1,39)	0,66	136
Milk	0,001	(1,02)	0,45	(2,94)	1,86	(9,65)	0,54	137
Coffee	0,002	(3,48)	1,56	(7,27)	-0,61	-(1,89)	0,81	139
Cocoa	0,002	(4,38)	1,51	(10,48)	0,03	(,15)	0,87	137
Sugar	0,004	(4,11)	1,54	(10,65)	0,12	(,72)	0,64	139
Eggs	0,001	(3,04)	1,37	(12,37)	-0,38	-(2,53)	0,90	139
Vegetable oil	0,003	(3,05)	1,57	(5,18)	0,17	(,55)	0,76	139
Beer	0,008	(3,3)	1,56	(11,65)	0,16	(,72)	0,61	131
Schnapps	0,003	(3,76)	1,09	(8,58)	0,60	(3,15)	0,80	137
Batteries	0,004	(3,02)	1,83	(15,15)	0,04	(,25)	0,83	136
Corn flour	0,002	(2,82)	1,77	(10,3)	0,32	(1,71)	0,82	139
Fruit juice	0,004	(3,25)	1,65	(8,25)	0,18	(,69)	0,80	139
Corn starch	0,001	(3,35)	1,77	(11,64)	0,01	(,62)	0,89	139
Ketchup	0,001	(2,1)	1,98	(10,69)	-0,08	-(,38)	0,80	139
Guava paste	0,000	(1,43)	1,42	(29,03)	0,31	(6,25)	0,99	89
Cigarettes	0,001	(1,68)	1,53	(8,29)	0,24	(1,45)	0,90	139
Shampoo	0,003	(2,32)	2,33	(7,94)	-0,43	-(1,26)	0,69	139
Hand soap	0,010	(5,07)	0,82	(3,32)	-0,15	-(,6)	0,56	139
Deodorant	0,001	(2,64)	1,72	(9,44)	0,22	(1,04)	0,90	139
Toothpaste	0,009	(3,37)	1,55	(12,55)	0,00	(,)	0,74	139
Toilet paper	0,008	(2,45)	1,51	(10,53)	0,74	(1,97)	0,57	136
Washing soap	0,003	(2,56)	1,62	(5,29)	0,49	(1,83)	0,82	139
Detergent	0,001	(3,03)	1,91	(17,54)	-0,26	-(1,58)	0,91	139

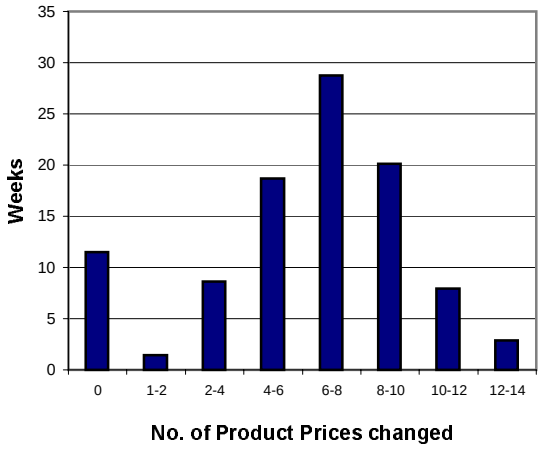
[a] If Inflation is negative, then Dummy takes the value of 1, zero otherwise.

Table 12
Relationship between Commodity RPV and Inflation
Specification with Quadratic Term for Inflation

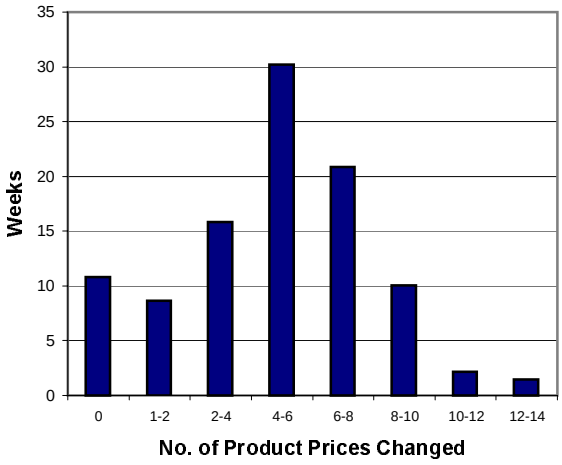
	Constant		Abs (Inflation)		$Inflation^2$			
Good	Coef	t stat	Coef	t stat	Coef	t stat	R^2	No of obs
Rice	0,001	(2,86)	1,65	(15,58)	-22,13	-(7,81)	0,78	137
Crackers	0,003	(2,11)	2,56	(12,96)	-17,75	-(4,11)	0,65	139
Sliced Bread	0,000	(,67)	1,83	(6,35)	-12,29	-(3,99)	0,81	139
Lentils	0,002	(1,95)	2,62	(14,44)	-22,20	-(6,21)	0,68	139
Pasta	0,002	(1,97)	2,43	(12,57)	-21,76	-(5,33)	0,69	139
Beans	0,010	(2,4)	2,26	(10,72)	-3,58	-(5,89)	0,81	125
Cassava	0,034	(4,13)	2,30	(6,86)	-8,36	-(3,09)	0,49	137
Potatoes	0,022	(3,33)	2,04	(10,42)	-3,09	-(5,78)	0,46	133
Plantains	0,019	(3,16)	2,30	(8,52)	-4,54	-(3,02)	0,59	134
Tomato	0,072	(4,93)	1,06	(5,11)	-1,72	-(2,63)	0,31	134
Onion	0,055	(4,)	2,27	(7,88)	-5,11	-(4,98)	0,46	134
Beef	0,000	(1,22)	2,28	(17,62)	-18,67	-(5,04)	0,91	139
Pork	0,001	(2,2)	2,19	(16,47)	-9,53	-(7,98)	0,91	139
Chicken	0,007	(4,16)	2,13	(11,5)	-18,60	-(7,29)	0,56	130
Fish	0,006	(,91)	1,72	(5,33)	-2,46	-(2,52)	0,74	52
Cheese	0,001	(3,58)	1,61	(9,66)	-3,83	-(4,15)	0,94	137
Margerine	0,000	-(,33)	3,51	(8,86)	-55,60	-(4,22)	0,78	136
Milk	0,001	(2,6)	0,28	(,56)	0,78	(,47)	0,50	137
Coffee	0,000	-(1,13)	2,79	(16,14)	-24,98	-(14,65)	0,94	139
Cocoa	0,001	(7,72)	2,23	(9,74)	-12,42	-(5,19)	0,92	137
Sugar	0,001	(1,28)	2,98	(13,)	-56,88	-(7,73)	0,72	139
Eggs	0,000	(1,89)	1,97	(6,66)	-10,07	-(2,17)	0,92	139
Vegetable oil	0,001	(1,43)	2,65	(20,78)	-28,64	-(12,31)	0,87	139
Beer	0,005	(2,1)	2,49	(10,36)	-18,60	-(3,98)	0,65	131
Schnapps	0,002	(2,35)	1,92	(13,48)	-13,10	-(5,89)	0,86	137
Batteries	0,001	(1,31)	2,78	(16,06)	-18,80	-(6,5)	0,87	136
Corn flour	0,001	(1,02)	2,72	(11,31)	-17,65	-(4,08)	0,84	139
Fruit juice	0,002	(1,93)	2,66	(21,73)	-14,60	-(8,59)	0,86	139
Corn starch	0,000	-(1,61)	2,74	(19,08)	-26,44	-(8,)	0,95	139
Ketchup	0,000	(,64)	2,87	(12,44)	-36,46	-(4,81)	0,84	139
Guava paste	0,000	(,66)	1,61	(7,58)	-0,85	-(,83)	0,98	89
Cigarettes	0,001	(1,88)	1,66	(7,25)	-2,04	-(,31)	0,90	139
Shampoo	-0,001	-(,58)	3,40	(7,55)	-22,06	-(3,79)	0,72	139
Hand soap	0,001	(1,48)	2,25	(18,08)	-7,38	-(11,35)	0,92	139
Deodorant	0,001	(2,44)	2,08	(8,74)	-7,27	-(,9)	0,90	139
Toothpaste	0,003	(1,88)	2,89	(13,6)	-15,48	-(6,22)	0,81	139
Toilet paper	0,006	(1,65)	3,01	(10,99)	-16,57	-(7,03)	0,61	136
Washing soap	0,001	(,57)	2,84	(16,94)	-21,88	-(6,17)	0,88	136
Detergent	0,001	(1,61)	2,20	(7,73)	-9,79	-(1,09)	0,91	139

Figure 1
Synchronization of Price Changes within Stores

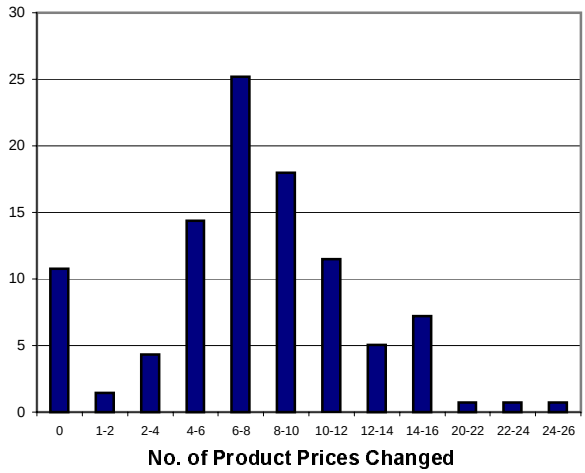
STORE #1



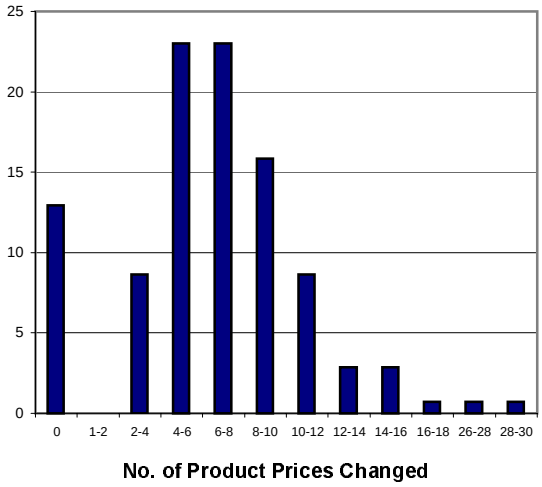
STORE #2



STORE # 3



STORE #4



STORE #5

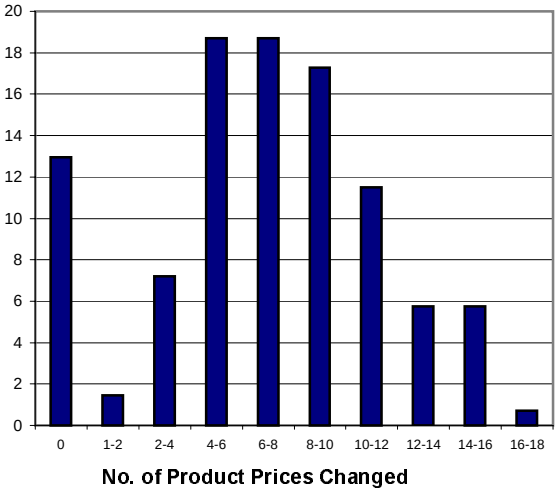


Figure 2
Distribution of Price Changes - (S,s) Model

Figure 3
Spacing of price Changes
Corn Flour