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Urner Barry Shell Egg Quotes: How Good Are They?

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Eggs -- Prices

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Agricultural economists have for some time been concerned about thin markets. These concerns, while vaguely stated, usually relate to two problems associated with market thinness. The first is that the small number of recorded transactions (as a proportion of all trades) increases the potential for market manipulation. However, many speculate that the manipulation of these markets is infeasible (Cook). In one celebrated case, a large New York milk cooperative rigged the New York butter market for five days, but at a considerable cost to its members.

The second concern is that the limited number of observed transactions can lead to reported prices which do not reflect adequately market supply and demand conditions. The loss of pricing efficiency from improper reported prices is greatest when those reported prices are used throughout an industry to establish transaction prices via formula arrangements. Presently, formula pricing of agricultural products based on thinly traded markets is nearly universal for butter, cheese, carcass beef, and shell eggs (see Hayenga).

Despite the expressed concern about thin agricultural product markets, the documentation of the inadequacies of these prices is itself thin. For example, much attention has been directed to the National Provisioner's "Yellow Sheet", which

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reports car-lot carcass beef prices. Yet no pattern of error has been substantiated when error is defined as the deviation of prices recorded by the market reporters from the published quote for that day (Nelson; P&SA). Indeed, the reporting of prices reflective of market conditions is in this case largely a sampling issue, as Tomek has shown. The underlying concern then is whether or not there are sufficient openly negotiated transactions from which to derive a statistically valid reported price. A wholly different set of problems arise when there are essentially no negotiated prices on which to base a price quote. This paper is concerned with the quoted price from one such market, that for shell eggs.

Egg Pricing

Egg prices east of the Rocky Mountains are based on daily quotes from Urner Barry Publications, Inc., published in "Urner Barry's Price Current" (Schrader; Jesse). Thus, roughly five billion dozen eggs annually are affected by the Urner Barry quote (Lasley, p. 13). Since 1970 when egg trading ceased on the New York Mercantile Exchange, Urner Barry reporters have polled traders daily to collect information. The traders contacted represent an estimated 10-15 percent of the average 500 trailer loads that move daily in the eastern two-thirds of the country. Thus, in a purely numerical sense, the egg market can be described as thin, and possibly suspect. Additionally, there are four current reasons why egg pricing is an important issue:

1. From fall, 1983, to winter, 1984, retail egg prices rose by 66 percent (USDA). Much of this increase is due to supply reductions resulting from the outbreak of avian influenza in Pennsylvania, but with such sudden and large changes, attention has focused on the price making mechanism.

2. Urner Barry is involved in a dumping suit brought against a major midwestern producer.

3. The National Egg Price System Study Committee, a group largely representing producers and processors,

has proposed an alternative system for developing price quotations for eggs. Implicit in the new pricing methods is a belief by egg producers that Urner Barry quotations are too low to reflect current costs. (See letter from Helmut F. Smith.)

4. Urner Barry quotes in recent years have led the market by up to 13 cents a dozen (USDA). The existence of deep discounts does not necessarily invalidate the Urner Barry quotes; indeed, the real value of the service is determining the direction and degree of price changes. Nevertheless, when quotes are routinely discounted by some 17 percent, serious questions do arise about the price determination system.

The Urner Barry reporters during their daily contacts with egg producers and buyers rarely ask about exchange prices. Price information on spot sales (those not covered by standing sales agreements) is collected, and data from the Egg Clearinghouse, Inc. (ECI), are incorporated into the daily quotes according to the reporters and industry participants contacted by the Urner Barry reporters. However, the major component of the information exchange between the two groups concerns supply and demand conditions, or market "tone."

The compilation of information on market tone may indeed be necessary in a sector where virtually all participants use the daily egg quotes for setting prices (Jesse, p. 8). In the egg market, unlike carcass beef where a few firms negotiate prices, there may simply be no independent prices to observe. The process does, though, place an additional responsibility on the reporters. First, a representative segment of the industry must be sampled during a few hours each business morning. Second, the reporters must determine how much, if any, of a price adjustment is justified by the compiled market information. This is clearly a very difficult task.

Characteristics of Egg Prices

Based on the methods used by Urner Barry to establish egg quotes and on other information about egg pricing, the following characteristics of the egg price determination

procedure provide, in our judgment, a good summary of the current situation:

1. Quotes are based principally on verbal descriptions of market conditions rather than on actual transaction prices. Spot quotes, ECI prices and military sales are incorporated, but because they represent such a small segment of total movement, they are not weighted heavily by Urner-Barry.

2. Because actual market prices are not collected, it is understandable how the Urner Barry quotes have drifted above actual exchange prices. At the same time, it is evident that users of the price service respond to price movements, not to the base levels.

3. The Urner Barry reporters in their conversations with egg traders focus primarily on such matters as unfilled orders and inventory levels. We interpret this information as being principally forward-looking: What do current conditions foretell about future price directions? Thus, in our interpretation, the Urner Barry quotes can best be understood as the <u>future price changes</u> needed to equilibrate short run supply and demand. That is, we view the quotes as being very short-term <u>price projections</u> rather than historic price information. This best fits the reporting practices as described and, according to our information, agrees with the way the quotes are used by the industry.

The determination of future prices is even more complex than inferring current price. Hence we expect to detect some errors in the Urner Barry price quoting process. These errors can be described in terms of three hypotheses about the behavior of the Urner Barry price quotes. The last of these hypotheses is tested here.

1. The daily changes in Urner Barry price quotes are on average correct in that supply and demand are equilibrated. If this statement were not true, the private Urner Barry service would not be into its second century.

2. Verbal descriptions of market tone are correct in that they are based on an adequate sample and accurately reflect the information collected.

3. Translating from the verbal descriptions to a daily quote, errors are made. The nature of these errors

> is toward excessive stability on a regular basis. But when price changes do come, as they must, they are relatively large compared to daily changes in supply and demand. The pattern of a general stability followed by relatively abrupt realignments causes Urner Barry quotes to be imprecise descriptors of short term supply and demand changes.

As justification for the final hypothesis, it is noted that stable prices do simplify planning and recordkeeping and reduce risk for sellers and buyers. At the same time, the Urner Barry reporters may be led toward price stability. A price change will benefit one side of the market at the expense of the other. An injured party might question a price change, leading the market reporters to require greater justification for a change than for no change. The effect is relative price stability.

From hypothesis (3), we anticipate Urner Barry prices will deviate from efficient market clearing prices. The nature of that deviation is toward excessive stability followed by accelerated realignment. However, data limitations permit only the testing of the simpler hypothesis, that pricing adjusts upward more rapidly than downward. Specifically, we will attempt to show that Urner Barry quotes are based largely on inventory levels. Since inventories are an effective indicator of short run supply and demand imbalances, a properly managed inventory-based pricing system can assist in the maintenance of market equilibrium. However a system which adjusts prices upward more rapidly than downward admits short term distortions. We will show that this pattern holds for Urner Barry prices and argue moreover that the asymmetric price adjustments are detrimental to the interests of inventory holders (primarily producers and packers).

Empirical Tests

Two tests of price efficiency are developed. The first compares the description of market conditions presented daily in "Urner Barry's Price Current" under the heading of "Egg

Situation" with the price change for that day. That will indicate the consistency with which the reporters move from their verbal descriptions to the daily quote. Second, we evaluate how well the quotes track over time changes in egg movement and inventories. If the quotes are precise, these factors should move in close harmony.

Internal Consistency

The internal consistency between the verbal description of market conditions and daily price change was tested by setting up an ANOVA table as follows.

		Demand	
		Low	Moderate
	Ample	$\|\Delta P\|$	
Supply	Adequate		
	Tight		

$|\Delta P|$ = UB large egg quote$_t$ - UB large egg quote$_{t-1}$ in absolute value. To show strict consistency, cell values should fall from left to right and be symmetrical around the "Adequate" supply level. Adequate supply with moderate demand describes the frequent condition where no price adjustment is needed.

To test these expectations, verbal descriptions of the daily egg market were placed in one of the six possible categories ("Urner Barry's Price Current," various dates, 1982). Each cell has five replications for a total sample size of thirty. Replications make it possible to test for interaction effects between supply and demand. Some judgment is required when deciding whether the verbal market description refers to ample supplies or just adequate. However, over time, the terminology showed considerable consistency so the errors due to the researchers' allocations to each category should be minimal. As examples, the following descriptions of supply conditions were encountered frequently:

Ample: ample, plentiful

Adequate: fairly good, fully sufficient, reasonable acceptable

Tight: minimal levels, very light, disappointing

For demand, conditions in the several parts of the country were sometimes described separately. In such instances, those relating to the New York City area were used since the price quote is "delivered, Metropolitan New York."

Results are shown in Table 1. The interaction effect is non-significant meaning there is no evidence of non-additivity in the data. Row effects are non-significant, while the column effects are significantly different from zero at the five percent level for a one-tailed test. Further emphasizing the importance of demand, the individual cell comparisons are all insignificant except ample supplies, low demand, and ample supplies, moderate demand. Cell means are shown in Table 2.

Table 1: Analysis of Consistency Between Verbal Descriptions of Market Tone and Urner Barry Daily Large Price Quotes

Due to	DF	SS	MS	F
Supply (row)	2	8.07	4.03	3.41
Demand (column)	1	7.50	7.50	6.35
Interaction	2	7.40	3.70	3.13
Error	24	28.40	1.18	
Total	29	51.37		

Table 2: Cell Means from ANOVA Test, 1982

		Demand	
		Low	Moderate
Supply	Ample	2.8	.4
	Adequate	.6	.4
	Tight	1.8	1.4

Source: "Urner Barry's Price Current," 1982, various dates.

The ANOVA results lead to several insights into the Urner Barry price formation process. First the demand (column) effects are statistically significant while the supply (row) effects are not. This characterizes the Urner Barry quotes as highly sensitive to perceived demand conditions but not supply. A relevant question is how the reporters and their correspondents interpret demand. Certainly most of that information comes from suppliers since they represent 85-90 percent of the contacts made by Urner Barry. Second the prices changes are not symmetrical around the adequate supply level. In particular the price changes the greatest amount under low demand when supplies are ample. Thus price changes under low demand conditions are more lumpy downward than upward. Under our definitions of consistency these findings do not qualify.

The ANOVA test can be considered strict because the extreme conditions--such as low supplies and high demand--occur infrequently and then often in response to exogenous weather shocks. Clearly, setting the correct prices during these periods is a real test of the Urner Barry reporters' skills. Yet it can be argued that during such times, a price service is critically necessary and should be accurate. During most periods when supply and demand are in general harmony and little price change is called for, it is easier to set prices more accurately, but at the same time less necessary.

Short-Term Price Accuracy

The short-term (week-to-week) accuracy of the Urner Barry quotes is examined by comparing them to inter-week changes in supply and demand. In particular, the model's dependent variable is the average weekly change in the Urner Barry large egg quote (UBQ). The independent variables include weekly percentage changes in production (CEME), movement into New York retail channels (MERC), and eggs processed (EGG PROC). A fourth independent variable is the percentage change in Monday morning floor stocks (INVENTORIES). Binary variables (both

intercept and slope) are included to account for seasonality. It is hypothesized that the Urner Barry quotes on average track these descriptions of market conditions. Other variables are important, but over time we anticipate these four to provide the majority of explanatory power. Data for the analysis were taken from Urner Barry's Monthly Price Review and the USDA Poultry Market News Annual Summary.

As justification for our hypothesis, we identify similar modeling attempts during the early 1970's. Several models of both weekly and monthly price changes used many of the same variables, although some of the signs of the coefficients were not consistent with expectations (Masters and Jones; Henson; Roy and Henson). Furthermore, the four variables described are used in a qualitative way by Urner Barry reporters to check the accuracy of past price changes. Indeed, the values are published regularly in the "Weekly Insiders Dairy and Egg Letter", and represent the same kinds of information which would be collected by the reporters.

Regression results (Table 3) for 1977-1982 weekly data show weak statistical relationships between Urner Barry quotes and the supply and demand variables. While the F-value indicates a good fit for the model, the multiple correlation coefficient is only .28. Thus, the four independent variables (plus two seasonal binary slope variables) are explaining only 28 percent of the variation in the weekly change of the Urner Barry quote. The t values for the percentage change in egg production is significant at the 99 percent level but the sign of the coefficient is positive, the opposite of what theory predicts. The percentage change in inventory levels is also highly significant and the coefficient has the correct sign. The percentage change in movement into retail and the percentage change in egg processing are not significant. Plus, the signs on both of these variables are the opposite of what was expected. Two of the binary variables for seasonality in the second quarter are highly significant (99 percent level). One (INVENTORY2) indi-

cates that the coefficient for inventories is different in the second quarter and the other (EGG PROC2) indicates the coefficient for egg processing varies during that quarter. This is an expected finding as the second quarter includes Easter. The remaining seasonal slope and intercept shifters were found to be insignificant.

Table 3: Relationship between average weekly changes in the Urner Barry large egg quote and the major indicators of supply and demand, 1977 to 1982.

UB Weekly Average =

	.0016	+ .231 CEME	- .244 INVENTORY	- .020 MERC	
change	(1.10)	(2.52)	(-8.62)	(-1.21)	
	- .002 EGG PROC	+ .220 INVENTORY2	- .273 EGG PROC2		
	(-.118)	(6.76)	(-4.28)		

DW = 1.41 F = 19.85 R^2 = .28

Note: t-statistics are in parentheses

Several variations on this model were also tested. These included using movement to different consumption points as well as trying a one-week lead-lag relationship with the Urner Barry quote leading the supply and demand indicators. While small changes were apparent, the basic relationships were constant. In addition, the actual values, rather than weekly percentage changes, were used in further analyses. Those results had higher R^2's due to trends in the data. But, the basic relationships again remained largely unchanged.

These results indicate that the Urner Barry quote does not closely track the movement of market supply and demand factors. This conclusion is based on the assumption that the USDA data used in the analysis are accurate. That is a difficult assumption to test. Industry observers generally agree the

inventory value is quite accurate. Supply (CEME) and movement (MERC) values are more questionable.

Our finding of the relative insensitivity of the Urner Barry quote to production and shipment changes supports an earlier conclusion of Bessler and Schrader. They found for the late 1970's that the prices discovered on the electronic exchange of the Egg Clearinghouse, Inc. (EMEC) to be a relatively more accurate and sensitive indicator of changes in the equilibrium price of eggs than were the Urner-Barry quotes (p. 770). However, repeating the analysis in Table 3 but using weekly changes in EMEC quotes as the dependent variable does not confirm the Bessler and Schrader findings (Table 4). The explained variance of this model is roughly the same as the model presented in Table 3 and there is but one notable difference in the estimates of the variables' coefficients. In fact, a replication of the Bessler and Schrader analysis for a later period, one which roughly coincides with the study period used here, failed to detect any differences in the Urner Barry and EMEC price series (Schrader, personal communication).

Table 4: Relationship between average weekly changes in the Egg Clearinghouse quote and the major indicators of supply and demand, 1977 to 1982.

EMEC weekly average =

.0018	+ .343 CEME	− .372 INVENTORY	− .065 MERC
(.920)	(2.88)	(−10.13)	(−3.05)

+ .025 EGG PROC	+ .353 INVENTORY2	− .271 EGG PROC2
(1.11)	(8.36)	(−3.28)

DW = 1.659 F-value = 22.62 R^2 = .31

Note: t-statistics are in parentheses

When comparing the two models (Tables 3 and 4), production and inventory are still statistically significant and the sign of the production variable remains opposite of what theory predicts. The seasonal binary variables which are significant remain so. That is, the coefficients for inventory and eggs processed are significantly different in the second quarter for both models. When changes in weekly EMEC quotes are used as the dependent variable, the sign for the eggs processed variable is positive. However, the t-value is such that we cannot reject the null hypothesis that the coefficient is equal to zero. The major difference between the two models occurs with the movement to retail variable. In the model using Urner Barry quotes, the sign is opposite what theory predicts, but the coefficient was not significantly different from zero. With changes in the EMEC quote as the dependent variable, the sign is still wrong but the coefficient is significantly different from zero.

The results from Tables 3 and 4 require further explanation. One reason for the negative signs of the MERC terms is reserve causality; when prices are low, more eggs move into retail channels and vice versa. Reverse causality, however, should make the coefficient of the MERC term significant. This is not the case when Urner Barry prices are used. Thus, a more plausible explanation, and one which may also account for the unexpected signs of the production variable, is problems of variable accuracy.

The key explanatory variable in terms of statistical significance and appropriateness of signs in both models is inventories. This fact is further substantiated by the significance of the second quarter slope binary variable. In the second quarter, the impact from changes in inventories falls near zero. This is logical in that a build-up of inventories to meet the Easter demand should not significantly influence quote changes.

Inventory levels are an obvious motivation for using the Egg Clearinghouse. Producer/packers can use that market for surplus inventory removal and for locating additional supplies for unfilled orders. Thus, EMEC quotes should be highly responsive to inventory levels. The regression analysis also indicates that inventories are the best explanatory factor for changes in the Urner Barry quote. Inventories are visible, are easily discussed when reporters call producers and packers, and serve as an early indicator of supply and demand imbalances. Thus, adjusting the quote in response to inventory levels provides a procedure for maintaining the market near equilibrium.

Conclusions

The proceeding analysis suggests strongly that the Urner Barry quote is not effective at predicting/describing weekly supply and demand changes. This is not a recent finding; for the period 1963-1967 Roush found, "...the quotation changes [in Chicago] did not reflect changes in supply and demand factors for eggs" (p. 57).

Yet Urner Barry does appear to assist the industry in maintaining equilibrium as no evidence of major surpluses or defects has been observed. This result is possible by focusing on inventories, and it provides a useful service for the industry (see Darrah, Forker and Miller, p. 52). What remains in question is the degree to which Urner Barry quotes contribute to an equitable distribution of income among producers and packers, and retailers. The distinction between these groups is that the former two hold inventories while the latter does not. Inventory holders are affected by price changes both up and down. However price decreases reduce book values of inventories more simply because inventory levels are greatest when prices are reduced. Conversely higher prices inflate value, but only when inventory levels are lower. This would not matter if sales remained constant over the two periods; inventory values vary but revenues would show greater symmetry. High inventory

levels do though compel the holder to move more product to end users. Whether the user is breakers, or retailers who agree to special eggs for an additional price concession, the producer/packer is increasing sales through further discounting during periods of low prices.

Compounding the position of inventory holders is the apparent tendency for Urner Barry to drop prices in larger increments than those used for price increases. That pricing pattern is a likely response to Urner Barry's stabilization of prices until the evidence for a price reduction is overwhelming. Then prices are reduced substantially and apply to a very large inventory which has amassed during the high price period. Sellers losses are compounded.

Table 5 illustrates the fact that Urner Barry tends to reduce its quote less often and by a larger average amount than it increases its quote. This table also compares the number of price changes and the average amount of price changes between Urner Barry and EMEC. Over the six year period 1977-1982, the EMEC quote changed a total of 274 times while the Urner Barry quote changed only 207 times. The EMEC quote decreased 8 more times than it increased while the Urner Barry quote increased 11 more times than it decreased. More significant, however, is the fact that the average Urner Barry quote decrease was .37 cents larger than the average quote increase. The average EMEC quote decrease was .16 cents less than the average quote increase. These data offer evidence that Urner Barry does indeed reduce its quote less often but in larger increments.

From our analysis it may be concluded that Urner Barry prices are driven primarily by inventory levels. Inventories provide a practical if perhaps suboptimal basis for gauging equilibrium and setting short term prices in a market. Where Urner Barry quotes are lacking is their excessive stability, particularly in the face of rising inventories. Urner Barry

management needs to adjust prices more frequently, especially downward.

Table 5: Total number of price changes and average price change (cents per dozen) - A comparison between Urner Barry and EMEC

	Total Price Changes (number)				Average Price Change (cents per dozen)			
	UB +	UB −	EMEC +	EMEC −	UB +	UB −	EMEC +	EMEC −
1977	15	22	19	28	4.67	3.52	4.74	3.56
1978	22	16	28	18	2.77	3.44	3.18	4.61
1979	17	16	23	23	3.29	3.50	3.35	3.74
1980	19	14	20	25	3.32	4.29	3.95	3.04
1981	19	14	21	22	2.79	3.93	3.76	3.48
1982	17	16	22	25	3.53	3.94	3.95	3.54
1977-1982:								
	109	98	133	141	3.40	3.77	3.82	3.66

What practical suggestions can be drawn from these conclusions? For the present the onus is on the seller to manage inventories more closely. As inventories build it will often be more profitable to move them early even at a reduced price than to wait for further accumulations when Urner Barry will cut prices. Urner Barry for its part is not really helping producers and packers by delaying price reductions. More frequent smaller price reductions which prevent the buildup of inventories are in the long run interest of inventory holders.

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