

Event Study Analysis of Retail Infant Formula Prices

The primary objective of this report is to determine the effects of WIC and its infant formula rebate program on infant formula retail prices beyond their effect on wholesale prices. The examination in the previous section of average retail prices across market areas did not reveal a clear and consistent relationship between being the WIC contract brand and having the highest average retail price. However, comparing the retail prices of contract and noncontract brands of formula by market area does not necessarily identify WIC-related price effects since other factors may affect retail prices, too. For example, a brand's wholesale price is an important determinant of that brand's retail price, and therefore differences in wholesale price across manufacturers can confound price effects due to WIC and its rebate program.¹

An event study methodology and a multivariate regression methodology are two approaches for holding other factors constant in order to isolate WIC-related price effects. The event study is simpler to implement than a regression approach, and as a result of that simplicity, the event study's results may be more transparent and easier to interpret. On the other hand, the event study approach has certain inherent limitations and statistical weaknesses that can be remedied by using the more sophisticated regression approach—but at the cost of greater complexity in both implementation and interpretation. This chapter describes the event study and its results, while the next chapter explains the regression analysis approach and its results.

The event study analysis used here examines the change in retail infant formula prices when the holder (i.e., the infant formula manufacturer) of the WIC contract changes. Thus, the specific “event” referred to in this “event study” analysis is a change in the *contract brand* in a particular market area. The event differed in time from market area to market area, and some market areas had two events during the 1994-2000 study period. A new WIC contract does not in itself constitute an event: if a State WIC agency awarded a new contract without a change in contract brand—i.e., the new contract was awarded to the same manufacturer that held the old contract—then no change in contract brand took place.

The event study analysis may also be called a “pre-/postanalysis.” Specifically, it compares the prechange and postchange retail prices of the infant formula brand of the contract winner (i.e., the new WIC contract holder) in a market area with the pre- and postchange retail prices of both the infant formula brand of the contract loser (i.e., the old WIC contract holder) and the other brand of infant formula in the market area (other brands of formula are brands in which their WIC contract status did not change during the period—that is, they neither won nor lost the WIC contract).² If the change in retail prices during the pre- and postchange period is greater for the new contract holder relative to the old contract holder and the other brand of formula, it would suggest that being the WIC contract brand results in higher retail prices.

¹ Carnation's wholesale price, for example, is well below the wholesale prices of Mead Johnson and Ross. Even after taking into account that retailers generally establish a percentage retail markup for Carnation that is greater than that of the other two brands, Carnation products can be expected to be sold in most market areas at a relatively low retail price due to Carnation's relatively low wholesale price. Thus, any price-increasing effect of Carnation being the WIC contract brand would have to be so large as to overcome the price-dampening effect of its relatively low wholesale price. As a result, being the WIC contract brand in a specific area can increase the retail price of that formula in the area and yet its price may still be below the prices of the other noncontract brands.

² In this analysis, one “other” brand was designated per market area. In those instances in which there were several brands of formula none of which won or lost the WIC contract during the period in question, the “other” brand was represented by the brand of the larger manufacturer.

A key assumption underlying the event study analysis is that the prechange and postchange periods are sufficiently close together so that, within the given market area for each event, other price-determining factors are essentially constant.³ The InfoScan data on infant formula retail prices were collected by quarter. To determine the effect of a change in the holder of the WIC contract in this study, the price of formula in the quarter before the change occurred was compared with the price in the quarter after the change occurred. For example, if the change in the WIC contract occurred during the 3rd quarter of 1998, then the price of infant formula in the 4th quarter of 1998 (postchange) was compared with the price in the 2nd quarter of 1998 (prechange).⁴

Within the 54 market areas in which a WIC contract brand was designated, the holder of the WIC milk-based contract changed 51 times during the 1994-2000 study period and the holder of the WIC soy-based contract changed 47 times.⁵ In 12 cases, the change in the WIC contract holder in both the milk- and soy-based markets involved Wyeth losing the WIC contract in 1996, the same year that Wyeth phased out their production of infant formulas for the U.S. market. Because Wyeth's exit during this period could have affected the retail pricing of their formulas, these 12 cases were excluded in the following analysis.⁶

Appendix B contains tables of infant formula retail prices, pre- and postchange, by individual market areas. In 33 of the 39 events in which the WIC contract for milk-based powder changed (excluding those cases where Wyeth lost the contract in 1996), the price of WIC contract-winning brand of formula increased more than the price of the contract-losing formula (appendix table B-1).⁷ In 30 of the 39 events, the price of the winning contract holder's formula increased more than the price of the "other" brand of formula. With regard to milk-based liquid concentrate, in 35 of the 39 events the change in the price of the contract-winning brand of formula exceeded the change in price of the contract-losing brand and in 31 of the 39 events, the price change in the contract-winning formula exceeded that of the "other" formula (appendix table B-2). Tests indicated that these results were statistically significant at the 5 percent level of significance (i.e., there was less than a 1 in 20 chance of these results occurring as a random event).⁸

This statistically significant pattern also held for the soy-based infant formulas. In 23 of the 35 events in which the WIC contract for powder changed (excluding those cases where Wyeth lost the contract in 1996), the price of the contract-winning brand of formula increased more than the price of the contract-losing brand, and in 20 of 27 events, the price of the contract-winning brand increased more than that of the "other" brand (in 8 market areas, there were no sales data for the "other" brand during the period in which the contract changed) (appendix table B-3). For liquid concentrate formula, the change in the price of the winning contract brand of formula exceeded the change in price of the contract-losing brand in 24 of the 35 events, while in 19 of the 27 events,

³ For example, changes in a market area's average income or its poverty rate may affect the area's infant formula prices, but in short spans of time such factors do not usually fluctuate by large amounts.

⁴ The quarter after the change was used to represent the "postchange" since the contract may have changed late in a quarter and most of that quarter's data would be more representative of the period before the change. In addition, because of existing inventory at the time of the change, retailers may wait until they have sold off their existing stock of formula before instituting a price change.

⁵ In some market areas with separate solicitations, the holder of the milk-based contract changed while the holder of the soy-based contract remained the same (or vice versa). Some market areas experienced two changes in the holder of the WIC contract during the study period.

⁶ The same general conclusions concerning price effects would be reached whether or not these 12 cases were included in the analysis; see appendix B.

⁷ Two "events" could occur in a market area if that market area experienced two changes in the holder of the WIC contract during the study period.

⁸ Sign tests were used to test for statistical significance.

the price change in the contract-winning brand exceeded that of the “other” formula (there were no sales data for the “other” brand in 8 of the events) (appendix table B-4).

The average change in the retail price of formula after a change in the WIC contract holder by product base and form is summarized in figure 8-1. The results clearly show that the average increase in infant formula prices pre- and postchange in contract holder was greater for the contract-winning brand of formula than for both the contract-losing brand of formula and the “other” brand of formula. For example, the retail price of milk-based powdered formula for the contract-winning brand increased by an average of 10 cents compared with 3 cents for the contract-losing brand of formula and 5 cents for the “other” brand. This general result held regardless of product base and physical form. These findings are consistent with economic theory. Winning the WIC contract increases the demand for the contract brand of formula resulting in an increase in its retail price since price-insensitive WIC recipients are required to purchase the WIC brand of formula.⁹ Demand for the contract brand of formula may also increase among non-WIC consumers to the degree that winning the WIC contract results in increased shelf space in stores or if physicians recommend the contract brand to non-WIC mothers.

Table 8-1 shows the average change in the retail price of infant formula by brand when the WIC contract holder changes.¹⁰ For example, the average price of Carnation brand milk-based powdered formula increased by 14 cents when it won the contract but increased only 8 cents when it lost the contract.¹¹ In every case, the average price of a manufacturer’s infant formula increased more when it gained the WIC contract than when it lost the contract. That is, regardless of the brand of formula, winning the WIC contract resulted in an average increase in its retail price greater than when it lost the contract.

One might expect that after losing the WIC contract, the retail price of the contract-losing brand would decrease, or at least increase to a lesser degree than the price of the “other” brand. That is, since it no longer was the WIC contract brand of formula (and therefore no longer guaranteed all the WIC sales), the demand for that product would lessen, resulting in lower prices, or at least prices that increase by relatively little. At the same time, the “other” brand neither gains nor loses the demand of the WIC household. Tests were conducted to determine whether the percentage of cases in which the change in the price of the “other” brand was greater than that of the old WIC contract holder was statistically significant. However, the proportion of market areas in which the change in the price of the “other” infant formula exceeded the change in the price of the old WIC contract holder was not statistically different from 50 percent. For example, in 24 of the 39 market areas in which the WIC contract for milk-based powder changed (excluding those cases where Wyeth lost the contract in 1996), the price of the “other” WIC contract holder increased more than the price of the contract-losing brand. For milk-based liquid concentrate formula in 20 of the 39 market areas, the price of the “other” WIC contract holder increased more than the did the price of the contract-losing brand. With regard to soy-based powder, in only 8 of the 27 market areas did the change in the price of the “other” brand exceed the change in price of the contract-losing brand and, in 11 of these 27 areas, the price change in the “other” brand’s soy-based liquid concentrate formula exceeded that of the contract-losing brand of formula.

One possible explanation for this result is that demand for infant formula exhibits strong brand preference or habit persistence. This may result from the effects of medical detailing and/or the

⁹ For an additional discussion on the economic theory on how WIC contracts may affect retail prices, see appendix C.

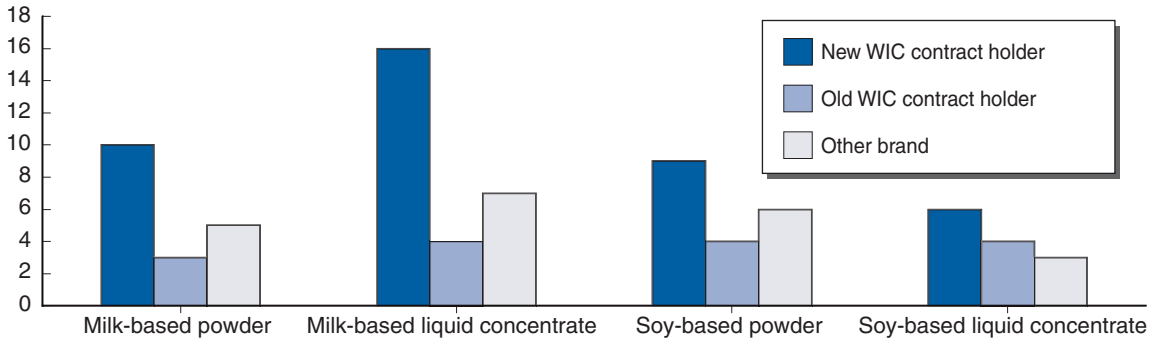
¹⁰ For this analysis, all market areas in which the WIC contract changed (even those areas in which Wyeth lost the contract in 1996) were included.

¹¹ Note that the average increase in prices of Carnation brand formulas was based on only a small number of observations.

Figure 8-1

Change in the retail price of infant formula when the holder of the WIC contract changes

Cents per 26 reconstituted ounces



Note: The change in price reflects the difference in the price of infant formula in the quarter before the holder of the WIC contract changed and the price in the quarter after the change occurred. Based on unweighted data, that is, each market area was given the same weight.

Source: ERS analysis of InfoScan supermarket data.

Table 8-1—Average change in retail price of formula when the holder of the WIC contract changes, by formula type and manufacturer

Formula type/manufacturer	New WIC contract holder	Old WIC contract holder
<i>Dollars</i>		
Milk-based powder:		
Carnation	0.14 (n=4)	0.08 (n=5)
Mead Johnson	0.11 (n=32)	0.04 (n=12)
Ross	0.1 (n=12)	0.0 (n=20)
Milk-based liquid concentrate:		
Carnation	0.16 (n=4)	0.11 (n=5)
Mead Johnson	0.17 (n=32)	0.04 (n=12)
Ross	0.11 (n=12)	0.02 (n=20)
Soy-based powder:		
Carnation	0.1 (n=4)	NA (n=0)
Mead Johnson	0.06 (n=28)	0.05 (n=12)
Ross	0.06 (n=12)	0.03 (n=21)
Soy-based liquid concentrate:		
Carnation	0.14 (n=4)	NA (n=0)
Mead Johnson	0.09 (n=28)	0.03 (n=12)
Ross	0.12 (n=12)	0.04 (n=21)

Notes: N=number of observations. NA=No data available. Change in price reflects the difference in the price of infant formula in the quarter before the holder of the WIC contract changed and the price in the quarter after the change occurred.

Source: ERS analysis of InfoScan supermarket data.

actual or perceived digestive sensitivities of infants to product changes.¹² Consequently, prices of infant formula may be “sticky downwards”—that is, they tend not to decrease. Although some retailers may lower the price of infant formula to act as a loss leader at least in some instances, the event study analysis indicates that, on average, retailers do not lower price when a particular brand loses the WIC contract. Instead, retailers simply do not raise the price of the contract-losing brand of formula as much as the price of the new WIC contract brand.

¹² For example, parents who are satisfied with an infant formula may be reluctant to change brands out of concern that their infant will not tolerate the new formula as well.