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# DIFFERENTIAL IMPACTS OF INCOME AND INFLATION ON PRICES OF MAJOR RED MEAT COMMODITIES

By

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Analyzes the impacts of income and inflation on beef and pork retail prices.

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pacts of income and inflation on beef and pork retail prices. Macroeconomic policy implications for the food and fiber industry in light of these differential effects can be evaluated.

## Statement of Problem

Income and inflation are important demand shifters. As an indication of the income effect, most demand studies have estimated income elasticities or flexibilities for various commodities. The effect of inflation has often times been incorporated as a general price deflator. Only a few studies have separated these two effects (Heien, 1977; Briemyer; and George and King).

The effects of income and inflation also impact on farm level product prices. The lag distribution relating wholesale price to consumer price changes is analyzed by Silver and Wallace. Lamm and Westcott examine the effects of changes in factor prices and resultant consequences on retail food prices.

## Objectives

The major objective of this research is to analyze differential im-

## Methodology

The livestock model used in this study is one of the livestock models utilized by the U.S. Department of Agriculture, ESS (Yanagida and Conway). The estimated model is recursively solved for an equilibrium solution by the Gauss-Seidel iterative technique (see Heinen, Mathews, and Womack for a technical discussion of this technique).

This study analyzes demand equations for beef and pork in an annual framework for the sample period 1955-1976. The demand equations are in price dependent form and homogeneous of degree zero through deflation by per capita personal consumption expenditures on nondurable goods and services. Table 1 shows the estimated coefficients and other statistical properties of these demand equations.

Table 2 illustrates derived flexibilities for four major explanatory

TABLE 1. ESTIMATED DEMAND EQUATIONS FOR BEEF AND PORK (OLS)

Dependent Variable	Constant	BEEFCON	PORKCON	VEALCON	BEEIR/CAPY	CHIIRFR/CAPY	FISIR/CAPY	PCNDF/CAPY	$\bar{R}^2$	D.W.
BEEIR/CAPY	.824004 <sup>1</sup> (4.78)	-.004382 (-4.86)	-.000821 (-1.86)	-.019116 (-4.54)		.061698 (1.75)	.299798 (4.83)	.159001 (0.81)	.99	1.54
PORIR/CAPY	.526149 (14.52)		-.006469 (-10.35)		.329547 (3.75)	.233815 (5.95)		.268913 (2.39)	.96	1.86
Variable names and descriptions: <sup>2</sup>										
BEEIR	= Retail beef and veal price index (1967 = 1.0)									
CHIIRFR	= Retail frying chicken price index (1967 = 1.0)									
CAPY	= per capita personal consumption expenditures on nondurable goods and services									
BEEFCON	= Per capita beef consumption (pounds)									
PORKCON	= Per capita pork consumption (pounds)									
VEALCON	= Per capita veal production (pounds) <sup>3</sup>									
FISIR	= Retail fish price index (1967 = 1.0)									
PCNDF	= Consumer price index for nondurables less food (1967 = 1.0)									
$\bar{R}^2$	= Multiple correlation coefficient									
D.W.	= Durbin-Watson statistic									

<sup>1</sup>Numbers in parenthesis are t-statistics.

<sup>2</sup>Primary data sources for these variables were various commodity situation reports published by the USDA/ESCS.

<sup>3</sup>Veal production was used since veal consumption data were not available. Historically, veal trade and stock levels have been small as compared to consumption and production.

TABLE 2. PRICE FLEXIBILITIES DERIVED FROM REDUCED FORM IMPACT MULTIPLIERS FOR CHANGES IN VARIOUS EXPLANATORY EFFECTS

	Own Produc- tion Effect	Income Effect	Cross Effect		Inflation Effect
			Pork	Broilers	
BEEIR	-1.51	0.44	-0.14	-0.12	0.14
			Beef	Broilers	
PORIR	-0.90	0.53	-0.56	-0.39	0.18

effects. These flexibilities were calculated from impact multipliers for the livestock model. The own production effect results from production changes for the dependent variable. The income effect is derived from changes in consumer expenditures on nondurable goods and services. The cross effect is concerned with production and price changes in substitute livestock commodities (e.g., for the beef demand equation, the primary substitutes are pork and broilers). The last effect, the PCNDF, or inflation effect, represents the impact from changes in the CPI index of nondurable goods and services less food.

The derived flexibilities shown in Table 2 are similar to those found in other studies. Waugh and Heien (1977) estimated beef flexibilities between -1.44 and -1.86. For pork, Breimyer and Heien (1975) found flexibilities close to the -0.90 level estimated in this study.

#### Results and Conclusions

To further illustrate these differential impacts from income and inflation, components affecting beef prices were examined.<sup>1</sup> Between 1978 and 1979, the retail price of beef increased from 2.010 (price index with 1967 = 1.0) to 2.558 or a 27.3% increase. In 1980, the beef price index

increased to 2.703 or a 5.7% change from the 1979 level.

The four major components of beef demand are the own production effect, income effect, substitution effect, and inflation effect. The own production effect represents a movement along the demand curve while the other effects are shifters of the demand function. Using impact multiplier analysis, the model predicts the following component effects for the beef price change between 1978 and 1979:

Own production effect	17.4%
Income effect	5.7%
Inflation effect	2.0%
Substitution effect	-3.3%
Other	<u>5.7%</u>
TOTAL	27.5%

The production effect is due to a reduction in beef output in 1979. The income effect is a consequence of an increase in personal consumption expenditures on nondurable goods and services. The inflation effect stems from an increase in the consumer price index on nondurables less food. The substitution effect results from increases in pork and chicken consumption. The residual or "other" category represents changes in fish and veal consumption and other factors not captured by the model.

For the time period 1979-1980, the 5.7% increase in the retail beef price can be delineated as:

Own production effect	-1.5%
Income effect	5.5%
Inflation effect	2.6%
Substitution effect	-1.1%
Other	0.2%
TOTAL	5.7%

The inflation and income effects reflect increases in these components. Production of beef increased slightly in 1980 yielding a negative effect on beef price. The substitution effect stems from increased pork consumption with no change in chicken consumption.

#### Implications

As shown from flexibility measurements in Table 2, income has a larger effect than inflation on red meat prices. These differential effects have policy implications for the meat industry. Macroeconomic policies, i.e., fiscal and monetary, have an effect on meat prices and in general, food prices. Results from this study suggest that programs and policies designed to increase consumer incomes (e.g., tax reductions, income subsidies, etc.) may have greater term impacts on food prices than monetary policies (specifically increasing the supply of money).<sup>2</sup>

Policies designed to increase incomes tend to raise aggregate demand for agricultural products. According to Tweeten and Quance, this results in higher marketing margins. If this income policy is inflationary, there will be second round impacts on food prices.

Income policies (i.e., increasing income) can result in two general forms of inflation--demand pull and cost push. Historically, the initial effects from demand pull inflation have

been more advantageous to the farm sector than cost push inflation (Brandow). However, it is argued that farmers are more likely to face a cost-price squeeze since general inflation affects factor markets more rapidly than product markets (Tweeten). Although this paper does not separate the inflation effect into demand pull and cost push components, the empirical results show that income policies will have a stronger income effect than the accompanying inflation effect on red meat price movements.

#### FOOTNOTES

<sup>1</sup>Similar year to year decomposition of major components affecting pork prices can be derived from impact multipliers. For illustrative purposes of differential impacts, only one case is sufficient. Beef was chosen since it is the principal meat consumed in the U.S.

<sup>2</sup>The quantity theory of money suggests that if the velocity of money and output are relatively constant, increases in the money supply will be manifested in increases in the general price level. Friedman adds that there is a lag between changes in the money supply and resultant changes on the price level.

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