Analyzing Establishment Growth Within New York Food Manufacturing Industries From 1987 Through 1995

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County-level determinants were analyzed to determine their influence on establishment growth of food manufacturing industries in New York state from 1987 through 1995. Macro-marketing studies, one of four food manufacturing research areas based on the Structure-Conduct-Performance (S-C-P) paradigm, seek to gain insights into the growth in value-added activities generated by food manufacturing industries. The analysis is conducted at the three-digit SIC level using multiple regression, model-building techniques, and logistic regression. Results of this study suggest that distinguishing between footloose and "constrained" industries and between rural and urban locations would offer more insights regarding the impact of transportation infrastructure and the proximity to raw materials on establishment growth. Taxes were negatively associated with establishment growth (except for fruit and vegetable manufacturers) but varied across regions as well as firm size. More information is needed on the sources of agglomeration diseconomies and on the existing density of food manufacturing establishments. Rural communities require innovative public policies to assist in creating an enabling environment for establishments that seek market opportunities.

The economic importance of the U.S. food manufacturing sector to the U.S. economy is apparent as it accounts for approximately 14 percent of all U.S. manufacturing activity. The value of food processing shipments continued to increase steadily during the mid-1990s, from $384 billion in 1990 to a projected $450 billion in 1995; food processing sales in 1994 were $430 billion, 4 percentage points above the 1993 level; and the number of workers employed by the 49 food processing industries across the United States in 1994 was 1.67 million, virtually unchanged from 1993. Average hourly earnings rose 2.1 percent to $10.67 per hour. The cost of living rose by 2.7 percent; however, employee benefits, especially health benefit costs, have risen sharply in recent years.

The structure of the food manufacturing sector continues to change as it adjusts to a constantly changing economic environment—competitive changes within the value-chain, information technology, and consumer tastes and preferences. Since this sector is a significant contributor to employment, is strategically located between producers and consumers, and contributes to rural economic development (Barkema, Drobenstott, and Stanley, 1990), efforts are warranted to gain a better understanding of its economic organization and performance, given the dynamic nature of the U.S. food marketing system.

The Industrial Organization (I/O) paradigm has been the most commonly used framework to guide inquiry into structure and performance relationships within the U.S. food manufacturing industries. Four areas of food manufacturing research based on this paradigm, each with a distinct objective, can be identified.[1] Traditionally, research on the U.S. food manufacturing industries has focused on the positive and negative effects on producers and consumers (subsector studies). Moreover, in those studies, the S-C-P paradigm is often reduced to an S-P model. More recently, research attention has been drawn to the economic development potential of value-added activities generated by growth in food manufacturing establishments (macro-marketing studies). In that research area, the performance component of the S-C-P paradigm lacks the breadth to analyze *growth.* More generally, such deficiency (lack of analytical depth (Rogers and Caswell, 1988; Connor, 1996) and breadth) in the S-C-P paradigm attests to the fact that the dynamic nature of food markets demands that economic analysts constantly reevaluate the adequacy of models and tools used to guide and to execute empirical analysis.

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[1] Subsector, 1940–1990s (typified by Collins and Preston, 1969; Parker and Connor, 1979; Connor, 1981; Zellner, 1989); micro-micro, 1980s (typified by Rogers and Caswell, 1988; Ding, Caswell, and Zhou, 1997); macro-marketing, 1980/1990 (as typified by Christy and Connor, 1989; Barkema, Drobenstott, and Stanley, 1990; Goetz, 1997); and global marketing, 1990s (typified by Malanoski, Handy, and Henderson, 1995; Reed and Ning, 1996; Henderson, Voros, and Hirschberg, 1996).

This study contributes to the emerging macro-marketing area of food manufacturing research by analyzing structure-growth relationships and, *primarily*, other determinant-growth relationships among food manufacturing industries. Growth in these industries has important implications for public policy and private strategies. Specifically, the purpose of this paper is to analyze county-level determinants influencing establishment growth of food manufacturing industries in the United States from 1987 through 1995.

The paper is organized as follows: First, relevant conceptual frameworks and literature will be reviewed; second, the specification of the empirical model and the empirical procedures will be outlined; third, the empirical results will be presented; and finally, the policy implications of the empirical findings will be discussed.

Conceptual Frameworks and Relevant Literature

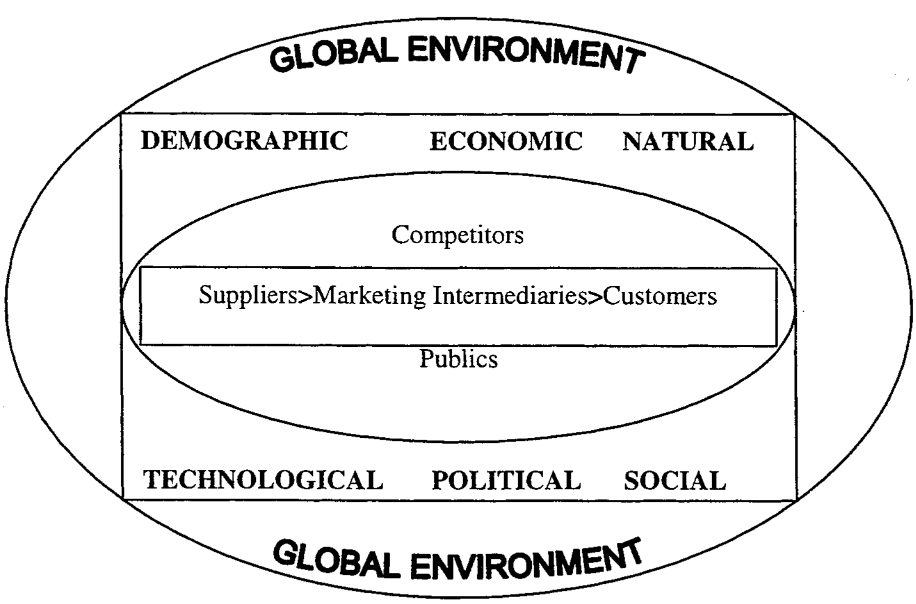
The food manufacturing sector is influenced by forces that are part of the macro- and micro-environment (Figure 1). Within the dynamic global environment, micro-agents (suppliers to customers and competitors and publics) in the food marketing system are influenced by macroeconomic forces that can be categorized into six categories: *(1) demographic; (2) economic; (3) natural; (4) technological; (5) political; and (6) social.*

Demographic forces relate directly to consumer demand. In addition to the size and growth rate of a population (market), a firm's marketers must be attune to the different tastes, preferences, and needs of customers within and among various markets. Various demographic factors—which form the basis for distinguishing one group from another and, therefore, the types of products and services desired—include age, ethnicity, education level, household patterns, and regional characteristics and movements.

The level of demand by consumers depends upon their purchasing power and spending patterns; these two factors are, in turn, affected by *economic* forces that include wages, income, prices, interest rates, savings, debt, and credit availability.

The availability of *natural* resources and other raw materials, and the increasing costs associated with their scarcity are macro-forces under which firms must operate. Firms are faced with pressures from environmental groups also; these activists are literally forcing firms, and increasing their costs in the process, to reduce toxic emissions into the air, water, and soil. Therefore, firms—which are able to develop new substitute materials and/or successfully implement efficient and environment-friendly ways to produce—would sustain a significant competitive advantage.

Figure 1. Major Forces in the Firm's Macro-Environment.



Source: Adapted from Kotler (1997).

Another area in which *technology* is playing a critical role is in creating more value-added products and/or innovative products to meet the changing demands of consumers and to reduce production costs. Furthermore, beyond inputs, manufacturing processes, and outputs, technological advances—such as the Internet—are influencing firms' marketing strategies.

Regulations—such as federal, state, and local taxes, and antitrust laws—as well as government agencies like the Food and Drug Administration (FDA) and political-action committees (PACs)—which move governments and businesses to address consumer rights, women's rights, senior citizen rights, minority rights, gay rights, and other agendas—are influential *political/legal* forces that govern the behavior of firms. Firms must invest ever-increasing amounts of time, effort, and money to comply.

The different beliefs, values, and norms embodied in different cultures form the last category of macro-environment forces: *social/cultural.* Like demographic factors, the way that consumers view themselves, others, organizations, society, nature, and the universe has important implications for marketers determining the appropriate mix of products and/or services to offer.

These six macro-environment forces are shaping the organization and structure of the food manufacturing industries. Furthermore, the S-C-P paradigm purports that market structure conditions market conduct that, in turn, influences market performance; moreover, these three components (structure, conduct, and performance) are functionally related.

In extending Goetz's (1997) 1987–1993 empirical analysis on county-level determinants of food manufacturing establishment growth to 1995 for New York state, this macro-marketing study keeps with the traditional approach of bypassing the *conduct* of firms to investigate structure-growth relationships and, *primarily*, other determinant-growth relationships in New York food manufacturing industries. Empirical studies in the macro-marketing area of food manufacturing research include studies by Christy and Connor (1989), and Goetz (1997). Christy and Connor specified a linear regression model to estimate determinants of long-term growth in southern U.S. food manufacturing industries. Specifically, state population change—a proxy for effective demand for food—and state food manufacturing wages—a proxy for input prices—were regressed against state value of shipments, the dependent variable, and a proxy growth. The results showed that (1) the elasticity of a state value of shipments with respect to state population change was 1.48 and that, (2) for every $1,000 per year difference in state food manufacturing wages, the state value of shipment growth changes inversely by 1.0 percentage point per year. Those results were then used to project 1985–1995 growth in the value of shipments in southern states.

The Christy-Connor model of long-term growth omitted important factors that affect long-term growth: growth in the food service industry; industry organization and structure; relative energy costs; taxes; access to markets; access to raw products; input prices relative to other locations; labor markets; relative income growth; and technological change (Myers, 1989).

Several of those factors—namely industry organization and structure, taxes, access to markets, access to raw products, and labor markets—are captured in Goetz's (1997) more sophisticated empirical model. Another distinction between the two growth models is that, while Christy and Connor estimated growth in terms of value of food manufacturing shipments, Goetz captures growth by analyzing the net change in the number of food manufacturing establishments.

Specifically, Goetz, drawing on location literature, specifies 13 independent variables that can be classified into five categories. The first three categories—"nonpolicy" variables that are not easily changed by local policymakers in the short term—relate to (1) access to output markets; (2) labor force composition and quality; and (3) transportation infrastructure, respectively. The last two categories—policy variables—represent (4) the influence of state and local government policy, including taxes and spending, on establishment growth decisions and (5) the availability of raw materials used in manufacturing and inter- and intra-industry-specific agglomeration economies.

Under this classification scheme, Goetz specifies and analyzes separate state- and county-level location (growth) models to determine the impacts of determinants of U.S. food manufacturing establishment growth from 1987 through 1993; although some variables are relevant to both equations, state versus local establishment growth patterns are often influenced by different variables. Overall, Goetz concludes, "Significant agglomeration diseconomies are found to exist for nearly all subindustries at the county-level, but not at the state level. The ability of rural counties to attract food processors to create local employment opportunities and market outlets for farmers caries considerably across subindustries." (p. 838)

Although this study is focused on the county-level establishment growth model for New York, it extends Goetz's analysis by incorporating the most recently available data (1995) and by using model-building techniques and/or logistic regression, beyond multiple regression.

Empirical Procedures and Data

An establishment is defined as ". . . an economic unit, generally at a single location, where business is conducted or where services or industrial operations are performed." (OMB, 1987)

The Goetz (1997) county-level establishment growth model for counties in New York takes the general form:

$$Gsj = f(\beta Wj, \varepsilon sj),$$
$$j = 1, \ldots, 62 \text{ counties}, s = 1, \ldots 9 \text{ SIC 200 subindustries},$$

where Gsj = net change in the number of food manufacturing establishments in the three-digit Standard Industrial Classification (SIC) category s in county j from 1987 through 1995; Wj = independent variables measured at the county-level in 1987; β = the corresponding coefficient vector to be estimated; and εsj = error term. The specific county-level independent variables (Wj) and their expected signs are listed in Table 1. Data sources are provided in Table 2.

Table 1. Specific County-Level Independent Variables and Their Expected Signs.

Category	Variable	Description	Expected Sign
Market Access	HWY	Interstate highway access (DV = 1 if entry/exit ramp present)	+
	RAIL	Railroad access (DV = 1 if node known to exist)	+
	PORT	Seaport access (DV = 1 if present)	+
Labor Force	WAGE	Manufacturing wages ($/hour, 1987)	-
	HSGD	High school graduates (% of adults, 1990)	+
	UNEM	Unemployment rate (% of labor force, 1986)	+
	HNDL	Handlers, etc. (% of labor force, 1990)	+
	OPRT	Operators, etc. (% of labor force, 1980+1990 avg.)	-
Policy	PTAX	Property taxes per direct general expenditure (ratio, 1987)	-
Raw Materials (Inputs)	LIVE	Livestock marketing cash receipts ($/capita, 1986–88 avg.)	+
	CROP	Crop marketing cash receipts ($/capita, 1986–1988 avg.)	+
Agglomeration Economies	POPL	Population (in thousands, 1987)	+
	$ES87_{200\text{-}209}$	SIC 200–209 establishments (#/100,000 persons, 1987)	+

DV = dummy variable.

Table 2. Data Sources.

Market Access Variables (HWY, RAIL, PORT): Determined by feeding Caliper™ Data CD-ROM, 1996 data into TransCad©.

Manufacturing Wages (WAGE): U.S. Department of Commerce, *Census of Manufactures*, 1987.

Unemployment Rates (UNEM): U.S. Department of Commerce, *U.S.A. Counties* CD-ROM, 1994 (1987 data are not reported).

High School Graduates (HSGD), Handlers, etc. (HNDL), and Operators, etc. (OPRT): U.S. Department of Commerce, *U.S. Census of Population*, 1980 and 1990.

Property Taxes Per Direct General Expenditure (PTAX): U.S. Department of Commerce, *Census of Government*, 1987.

Livestock Marketing Cash Receipts (LIVE), Crop Marketing Cash Receipts (CROP), and Population (POPL): U.S. Department of Commerce, Bureau of Economic Analysis, *Regional Economics Information System (REIS)* CD-ROM, May 1995.

Agglomeration Economies (ES87s): U.S. Department of Commerce, *County Business Patterns*, 1987.

Market Access Variables

The three infrastructure variables represent interstate highway access (HWY), railroad access (RAIL), and seaport access (PORT). These regressors are included in the county-level establishment growth model to capture the accessibility of food manufacturers' products to regional, national, and international markets. Proximity to these markets is a plus in the location (growth) decisions made by food manufacturers'; therefore, all three coefficient estimates are expected to be positive. RAIL was excluded from the empirical analysis due to no variation across the 62 counties in New York. Although it is uncertain which railway lines are still in operation, all counties have railroad access.

Labor Force Composition and Quality Variables

County-level manufacturing wages (WAGE) serves as a measure of labor costs. Higher labor costs would tend to deter food manufacturing firms from locating in a county (expected negative sign). Since wage rates also reflect the skill level of workers, educational attainment (HSGD) is included in the growth model to control for differences in labor quality (expected positive sign).

Higher unemployment rates (UNEM) represent an abundance of potential workers, *ceteris paribus*, thereby allowing food manufacturing firms to recruit employees with minimal search costs (expected positive sign). As for the ability to recruit employees with the desired skill level, food manufacturers prefer high concentrations of low-skill workers, such as handlers, equipment cleaners, helpers, and laborers (HNDL) (expected positive sign). Machine operators, assemblers, and inspectors (OPRT) are not as desirable (expected negative sign) since food processors can take advantage of the higher turnover rates in the former category of workers. (It should be noted that these two variables have implications for agglomeration economies also.)

Policy Variables

As an additional cost of doing business, relatively higher property taxes (PTAX) imposed by state and local governments would deter food processors from locating in a county (expected negative sign).

Raw Materials Availability Variables

In addition to the accessibility of output markets, the availability of raw inputs to manufacture final food products also weighs heavily on the location decision (expected positive signs). Crop marketing cash receipts (CROP) and livestock marketing cash receipts (LIVE) are the proxies used to capture raw inputs availability.

Agglomeration Economies Variables

Agglomeration economies relate to the market structure of the food manufacturing industries and refer to the advantages associated with locating in an established industry. In addition to controlling for county (market) size, county population (POPL) also captures *general* manufacturing agglomeration economies. A larger population means greater output markets for manufactured food products and must be supported by extensive services, such as transportation and packaging, accounting firms, etc. Along with higher concentrations of low-skilled workers (HNDL) and fewer higher-skilled workers (OPRT), the availability of such support services presents potential cost savings to food manufacturers. To capture *industry-specific* agglomeration economies, the number of establishments per capita (ES87*s*) in the relevant SIC three-digit subindustry is analyzed.

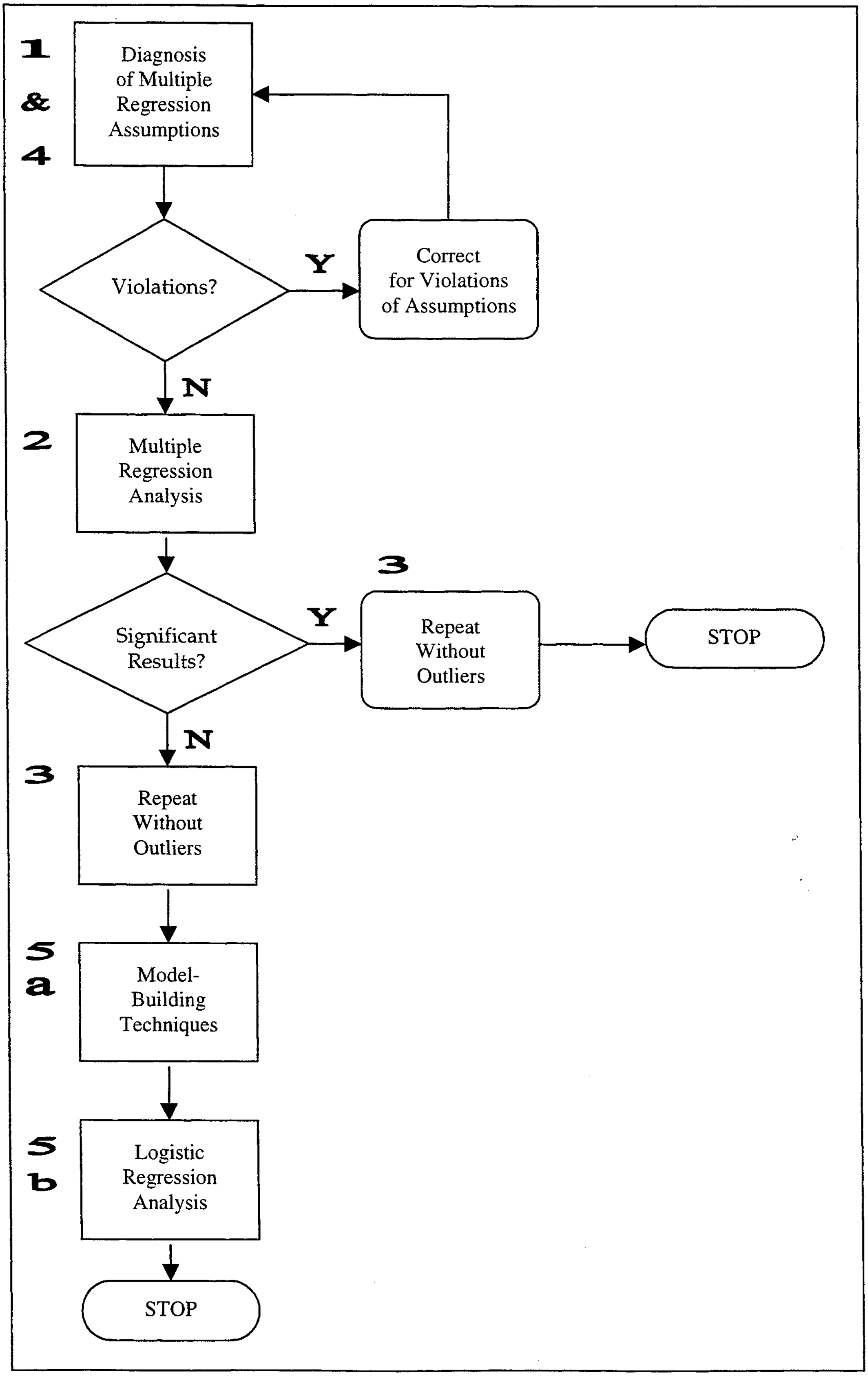
As the model specifies, 10 multiple regressions—each analyzing one of the 10 three-digit SIC food manufacturing subindustries—will be estimated to analyze determinants of food manufacturing establishment growth in the 62 counties of New York from 1987 through 1995. The 10 three-digit SIC food manufacturing subindustries are SIC 200—All Food and Kindred Products combined; SIC 201—Meat Products; SIC 202—Dairy Products; SIC 203—Preserved Fruits and Vegetables; SIC 204—Grain Mill Products; SIC 205—Bakery Products; SIC 206—Sugar and Confectionery Products; SIC 207—Fats and Oils; SIC 208—Beverages; and SIC 209—Miscellaneous Foods and Kindred Products.

Empirical Procedures

The empirical procedures followed in this study are outlined in Figure 2. SPSS® 8.0 data analysis software was used throughout the analysis.

<u>Steps 1 and 4</u>. Prior to running any multiple regression model, it is imperative to diagnose whether the assumptions for multiple regression are being met. Step 4 is taken to assess those multiple regression assumptions that can only be tested for compliance by evaluating the residuals of a multiple

Figure 2. Flowchart of Steps for the Empirical Analysis.



regression analysis—in other words, after a legitimate (linear) regression model has been estimated. Multicollinearity is also tested for during these two steps.

Step 2. Multiple regression analysis.

Step 3. To test the multiple regression assumption that a linear relationship exists between the dependent variable and independent variables, scatterplots were created. In the process, outliers were revealed and identified. Since outliers can render results that are significant when, in fact, they are not significant and vice versa, the multiple regression analysis in Step 2 is repeated without outliers to assess the robustness of the results from the first multiple regression run.

Step 5a. Acting on the possibility that the original county-level establishment growth model lacks predictive power, this step employs three common model-building techniques—namely, stepwise variable selection, backward elimination, and forward selection—to construct a simpler model (one with fewer independent variables) that would potentially have greater predictive power.

Although these techniques may offer some insights regarding determinants that are particularly important for county-level establishment growth, it is critical to note that observed significance levels for the coefficients are, in a strict statistical sense, not really correct. This occurrence exists because the final model constructed by these techniques is the one that best fits the data in the researcher's sample and is, almost certainly, not the best one for fitting any other sample in the population, nor the whole population. Therefore, the observed significance levels estimated for the researcher's sample would likely be higher than the true significance levels.

Step 5b. Another step taken to ensure that important determinants of establishment growth are not overlooked involves logistic regression. Under this approach, the data is split into two groups: counties with a net change in number of establishments (positive or negative) versus counties with no net change in number of establishments from 1987–1995. A dummy variable that assigns a "1" to the former group and a "0" to the latter group is then created, and the same 12 independent variables are regressed on this transformed dependent variable.

Although the results of this approach do not indicate the directional impacts of the determinants on food manufacturing establishment growth, via odds ratios, they do highlight those determinants that are potentially important in influencing *change* in establishment numbers.

Results and Interpretation[2]

For all 10 multiple regression runs and subsequent runs excluding outliers, serious departures from the multiple regression assumptions did *not* exist. Furthermore, multicollinearity was not a problem (tolerances all greater than 0.1).

The individual empirical results from Steps 1 through 5 of the analysis are shown in Tables 3 through 6. A summary of those individual results is presented in Table 7. An attempt has been made to rank significant determinants based on the statistical method used, the significance level, and if applicable, the logistic regression odds ratio values.

First, the empirical results support that county-level agglomeration diseconomies are associated with all nine individual food manufacturing subindustries. Overall, for all food manufacturing subindustries combined, agglomeration diseconomies also exist. These findings suggest that all categories of food manufacturing subindustries in New York counties are relatively established, and therefore, new firms seeking to locate there will face entry barriers or, upon entry, relatively higher costs.

Second, a large population base is important to adequately service meat products, grain mill products, bakery products, fats and oils, and miscellaneous foods and kindred products manufacturers. Overall, a large population size is an important factor in the location (growth) decisions of all food manufacturing subindustries combined.

Third, in terms of attracting processors of the same SIC category, seaport is relatively more important to the sugar and confectionery products subindustry and relatively less important to the miscellaneous foods and kindred products subindustry.

Fourth, increasing the productivity of workers—through improved education and training—in the bakery products subindustry would promote establishment growth while doing so for the sugar and confectionery products subindustry might actually stunt establishment growth. Sugar and confectionery products and miscellaneous foods and kindred products manufacturers tend to hire low-skill workers.

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[2] The criteria for evaluating the multiple regression results are as follows: 1) Coefficients significant at least at the 10 percent levels will be reported; 2) the signs on those coefficients will be compared with expectations; and 3) for logistic regression, in addition to the two criteria above, the magnitude of the odds ratios will be compared.

Table 3. Multiple Regression Results for SICs 206 and 209 after Excluding Outliers.

Variable	Coefficients	
	Sugar & Conf.	Misc. Foods
Constant	1.591	-0.446
HWY	0.401	-5.1E-02
PORT	**0.997**[b]	**-1.149**[c]
WAGE	9.722E-02	1.474E-03
HSGD	**-0.131**[b]	0.131
UNEM	-1.8E-02	1.936E-02
HNDL	**0.591**[c]	0.459
OPRT	-3.8E-03	-2.9E-02
PTAX	1.070	**-4.797**[c]
LIVE	-1.3E-04	-8.2E-05
CROP	-4.6E-04	4.099E-04
POPL	**-1.3E-03**[c]	**4.214E-03**[a]
ES87*s*	-7.1E-03	**-0.253**[a]

[a]Significant at 1% level.	R^2=0.305	R^2=0.326
[b]Significant at 5% level.	Adj.R^2=0.131	Adj.R^2=0.158
[c]Significant at 10% level.	F=1.755	F=1.938
	Sig.=0.084	Sig.=0.053

Table 4. Results of Model-Building Techniques for SICs 206 and 209 after Excluding Outliers.

	Stepwise		Backward		Forward	
SIC	Variable	Coeff.	Variable	Coeff.	Variable	Coeff.
206	Constant	**-1.365**[c]	Constant	2.360	Constant	**-1.365**[c]
	WAGE	**0.180**[b]	PORT	**0.926**[b]	WAGE	**0.180**[b]
			WAGE	**0.138**[c]		
			HSGD	**-0.138**[a]		
			HNDL	**0.409**[c]		
			POPL	**-1.3E-03**[a]		
209	Constant	0.210	Constant	**1.475**[b]	Constant	0.210
	$ES87_{209}$	**-0.256**[a]	PORT	**-1.004**[c]	$ES87_{209}$	**-0.256**[a]
	POPL	**3.15E-03**[a]	PTAX	**-3.694**[c]	POPL	**3.15E-03**[a]
			POPL	**4.19E-03**[a]		
			$ES87_{209}$	**-0.278**[a]		

Table 5. Logistic Regression Results for SICs 206 and 209 after Excluding Outliers.

	Sugar & Conf.		Misc. Foods	
Variable	Coeff.	Odds	Coeff.	Odds
Constant	9.2274	N/A	**17.5010**[c]	N/A
HWY	**2.2160**[c]	9.1704	-1.3800	0.2516
PORT	**2.6748**[b]	14.5102	1.8583	6.4126
WAGE	-0.0203	0.9799	0.0842	1.0878
HSGD	**-0.4633**[b]	0.6292	-0.3946	0.6739
UNEM	0.0445	1.0455	-0.3090	0.7342
HNDL	**1.5893**[c]	4.9002	**1.7181**[c]	5.5741
OPRT	-0.0556	0.9459	-0.2519	0.7773
PTAX	-2.5714	0.0764	-12.7030	0.0000
LIVE	-0.0008	0.9992	0.0011	1.0011
CROP	0.0017	1.0017	0.0016	1.0016
POPL	-0.0021	0.9979	0.0226	1.0229
ES87*s*	0.3564	1.4281	0.5311	1.7007

"Overall Regression Test":		
Chi-Square =	30.483	39.911
Significance =	0.0024	0.0001
H-L Goodness-of-Fit Test:		
Chi-Square =	3.7462	9.742
Significance =	0.8793	0.2836

Table 6. Multiple Regression Results of SICs 202, 204, 205, and 200 After Excluding Outliers.

	Coefficents			
Variable	Dairy	Grain Mill	Bakery	All Foods
Constant	1.863	-0.247	0.766	1.631
HWY	-7.6E-02	-0.257	-0.370	-1.274
PORT	0.121	-0.111	0.666	1.894
WAGE	9.161E-02	7.152E-02	1.181E-02	0.224
HSGD	-8.7E-02	4.874E-02	-3.4E-02	-0.199
UNEM	8.742E-02	-4.5E-02	-3.1E-02	-2.6E-02
HNDL	0.168	-0.151	-0.486	-0.260
OPRT	-6.7E-04	8.482E-03	4.054E-02	2.889E-02
PTAX	-1.177	-0.203	4.242	**13.313**[c]
LIVE	3.381E-04	-5.2E-04	6.084E-04	1.866E-03
CROP	-9.0E-04	-1.5E-04	-1.2E-03	-1.6E-03
POPL	5.048E-04	7.180E-04	**1.066E-02**[a]	**1.951E-02**[a]
ES87*s*	**-0.437**[a]	**-0.491**[a]	**-0.275**[a]	**-0.309**[a]
	R^2=0.561 Adj.R^2=0.452 F=5.117 Sig.=0.000	R^2=0.402 Adj.R^2=0.252 F=2.688 Sig.=0.008	R^2=0.721 Adj.R^2=0.650 F=10.118 Sig.=0.000	R^2=0.511 Adj.R^2=0.388 F=4.172 Sig.=0.000

Table 7. Summary of the Empirical Results for All Three-Digit SIC Food Manufacturing Subindustries.

All Foods	Meat	Dairy	Fruits and Vegetables	Grain Mill	Bakery	Sugar and Confection.	Fats and Oils	Beverages	Misc.
SIC 200	201	202	203	204	205	206	207	208	209
$POPL^{*+}$ $ES87_{200}^{*-}$ $PTAX^{+}$	$ES87_{201}^{-}$, $POPL^{+}$	$ES87_{202}^{*-}$	$ES87_{203}^{-}$ $PTAX^{+}$	$ES87_{204}^{*-}$ $POPL^{+}$	$POPL^{*+}$ $ES87_{205}^{-}$ $HSGD^{+}$	$ES87_{206}^{-}$ $HSGD^{*-LR-}$, $PORT^{*+LR+}$ $HNDL^{*+LR+}$ $POPL^{-}$ $WAGE^{+}$ HWY^{LR+}	$ES87_{207}^{-}$, $POPL^{+}$	$ES87_{208}^{-}$ $CROP^{+}$	$ES87_{209}^{-}$, $POPL^{+}$ $PORT^{-}$, $PTAX^{-}$ $HNDL^{LR+}$

*supported by at least two empirical steps.
$^{+}$positive relationship (multiple regression and, if applicable, model-building result).
$^{-}$negative relationship (multiple regression and, if applicable, model-building result).
$^{LR+}$Logistic regression result; odds > 1.
$^{LR-}$Logistic regression result; odds < 1.

Fifth, high property taxes deter miscellaneous food and kindred products manufacturers; however, they may not be as much of a hindrance to fruits and vegetables manufacturers. Overall and unexpectedly, those counties in New York that finance a higher proportion of their direct general expenditures through property taxes would not suppress the growth of all food manufacturing subindustries combined.

Finally, proximity to crop-related raw materials is an important factor in the location (growth) decisions of beverages manufacturers.

Conclusions and Policy Implications

Sustaining economic growth requires both public policy and prudent private strategies. Most economists would agree that government plays an essential role in establishing an "enabling environment" for a market economy. This environment would include, at a minimum, 1) labor force composition and quality (education); 2) transportation and communication infrastructure; and 3) laws enforcing contracts. Beyond public policies, the firm has private strategies to achieve its goals. Essentially, those policies are related, but not limited, to location, product, promotion, and price.

The multidimensional model of an "enabling environment" for the U.S. food manufacturing industries is shown in Figure 3.

National macroeconomic policies (macropolicies) consist of *fiscal and monetary policies* that influence *inflation rates* (*interest rates* and *exchange rates*); national policies concerned with *unemployment* (and *regulation* in areas such as pricing of natural resources, air and water quality, and worker safety); national *foreign policies* as they relate to food aid, foreign assistance, and trade; and *immigration policies*. These policies are exogenous from an individual firm's perspective.

Although firms exert substantial effort to influence various aspects of national industry policies, the effects of those policies are also likely to be much stronger than their ability to control or influence them to any significant degree. National industry policies are designed to influence firms' decisions or to regulate the U.S. industry, generally; in other words, they set the general economic and regulatory environment (McCorkle, Archibald, and McCalla, 1988). They include *regulatory policies* and *programs* (influenced by specific macropolicies), *antitrust and implementing policies, environmental policies, commercial trade policies, research and development policies, corporate tax policies, and interest rates and exchange rates* (also influenced by specific macropolicies). Food and farm-sector policies are those associated with the analysis of the farm sector, food industries, and consumers. (Note that "food industries" is synonymous with "food manufacturing"; the direct and indirect effects of wholesalers, retailers, and other market participants are typically not analyzed.) Although distinct policies exist for each group, the intersecting rings represent the interactions among them; therefore, food and farm-sector policies are not wholly exogenous to the decisions made by individual firms.

Most important to this study, food manufacturing polices are designed primarily to ensure that foods are safe for consumers. Such policies encompass the specification of certain practices (*food safety requirements*), the monitoring of processes (*standards*), and the examination of the quality of the end product (*grading*). In addition, there are *product characteristic regulations* that serve a dual role of providing market control and product information to consumers.

Consequently, a wide array of policies play an important role in creating an "enabling environment" for the U.S. food manufacturing industries. As outlined in Figure 3, the empirical results of this study have implications for those policies that influence food manufacturing. Specifically, the *public policy variables* analyzed in this study can be further classified under the policy levers discussed above or from other literature as follows:

(1) *unemployment*—UNEM;

(2) *regulation (taxes)*—PTAX;

(3) *development of infrastructure (transportation only)* (Johnson, 1995)—PORT, HWY, RAIL;

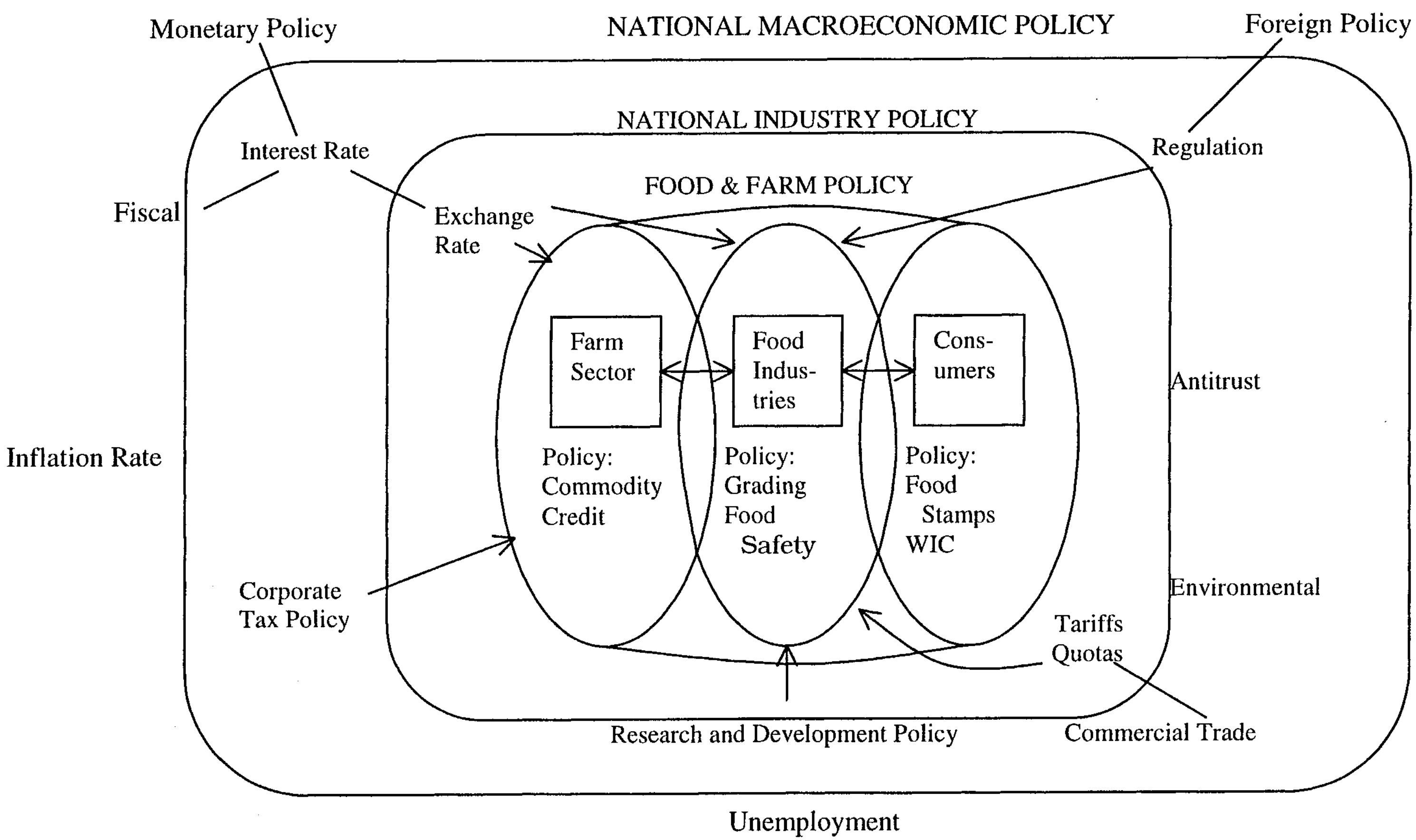
(4) *physical resources* (Christy, 1996)—CROP, LIVE;

(5) *investment in human resources (education and training)* (Christy, 1996)—HSGD, HNDL, OPRT, WAGE.

As for <u>private strategies</u> analyzed in this study:

(6) *location*—ES87s, POPL.

Figure 3. Policy Model of the Food Manufacturing Industries.



Source: McCorkle, Jr., Archibald, and McCalla (1988).

In comparing the empirical results of this study to conventional wisdom (hypotheses and expectations), the policy and strategic implications for food manufacturing firms in counties in New York from 1987 through 1995 are as follows.

Unemployment

Higher unemployment rates imply a larger pool of potential workers from which food manufacturing firms can recruit. In this study's analysis of New York counties, none of the food manufacturing firms consider the *quantity* of labor to be significant in their location (growth) decisions. Although this result provides no base for guiding economic development policies, it does support a suggestion made by previous authors: Unemployment is a poor proxy for labor availability (Goetz, 1997).

Regulation (Taxes)

The effect of property taxes on New York food manufacturing establishments deviates from conventional wisdom in one of the nine subindustries, namely fruits and vegetables. A deviation by this variable, in particular, is cause for pause. To all firms, without exceptions, all types of taxes are added costs of doing business. The important question raised by the empirical results of this study, then, is: What are the circumstances surrounding the location (growth) decisions of New York fruit and vegetable manufacturing firms that make higher property taxes an embraced cost? There are five plausible explanations:

(1) Sufficient property tax breaks (abatements) are available.

(2) Region-specific tax breaks are alleviating costs, for example in the Fruit Belt.

(3) The national industry policy related to *corporate* taxes is relatively more straining to food manufacturing firms.

(4) Use of 1987 property taxes data hindered the empirical analysis, which runs up until 1995.

(5) Data on establishments captures larger firms that are relatively more immune to higher taxes than smaller firms.

Besides the fact that local governments have fewer revenue sources available than state governments, Goetz (1997) also points out that the authority of local governments to change their tax structures is dictated by state government policies. The above explanations insist that state policy decisions concerned with attracting food manufacturing firms must *jointly* assess and reevaluate (1) the type of tax chosen; (2) the region and firm size to which the specific tax is applied; and (3) the expected and actual performance of enforcing the tax. Also, this list highlights the importance of an open line of communication between state and local governments: Local governments have a firsthand understanding of the individual characteristics of their counties, and this understanding should be incorporated in the economic development strategies designed and implemented by state governments.

Development of Infrastructure (Transportation Only) and Physical Resources

The impact of adequate transportation infrastructure and accessible raw inputs depends on underlying assumptions related to (1) whether industries are footloose or not and (2) whether rural communities or urban centers are being considered (among others). In Goetz's (1997) empirical analysis, food manufacturing establishments are assumed to be "footloose in making their profit-maximizing location decisions." (p.839) In footloose industries, it is asserted that "neither the costs of delivery to the customer nor the costs of acquiring sufficient input supplies may dominate the location decision." (Capps, Fuller, and Nichols, 1988, p.464) That is, costs of transportation and proximity to raw materials are relatively less important factors in the location (growth) strategies of food manufacturing firms.

This assumption appears to be justified by the empirical results of the New York county-level analysis: Only seaport access positively affected fruits and vegetables and sugar and confectionery establishment growth. Moreover, proximity to crop inputs is only significant in beverages production whereas livestock inputs are not significant in the location (growth) decisions of all New York food manufacturing firms.

However, if one assumes that food manufacturing industries are not footloose—that is, "bound to their raw materials site(s) by perishability considerations or significant weight and bulk reductions during manufacturing"—then the distinction between rural versus urban locations becomes important. For "constrained" industries, "rural communities may have an advantage over urban centers in attracting food manufacturing establishments." (Goetz, 1997, p.839) On the other hand, rural communities with their low population densities may not find it feasible to upgrade those transportation modes that would attract additional food manufacturers.

Importantly, the effective use of those policy levers associated with the development of transportation infrastructure and the demand and supply of physical resources must carefully consider the interactions among (1) the type of subindustry (footloose versus "constrained") under question; (2) the characteristics of the products being manufactured; (3) the goals of the firms (for example, profit-maximization); and (4) the type of area (rural or urban) in which the subindustry and/or firm is situated.

Investment in Human Resources (Education and Training)

Educational attainment was significant in only one of the 10 food manufacturing subindustries. However, the importance of the role of public policy in improving the *quality* of labor in food manufacturing industries should not be diminished. A shortage of high-skill laborers is of concern to New York food manufacturing firms, especially as the demand for qualified labor (education) to manage the increasing number of technological advances applied in food manufacturing escalates.

Therefore, in addition to investment in education and training, policymakers who regulate and support food manufacturers must also be prepared to handle potential problems that might stem from those consequences associated with more value-added products.

Location

The location decision(s) made by food manufacturing firms tends to be dictated by whether an established industry already exists and/or the existing and potential size of consumer and service markets. Although conventional wisdom expects counties with an established industry to be attractive to food manufacturers (Barkema, Drobenstott, and Stanley, 1990), the existence of an established industry for all 10 food manufacturing subindustries in New York counties has a repelling effect on food manufacturers. However, this result is consistent with Goetz's (1997) county-level analysis for the entire United States, where only the beverages subindustry was an exception.

To activate the appropriate policy levers and, as importantly, to activate them so as to create an "enabling environment" for food manufacturers, policymakers must be informed about: (1) the sources associated with the agglomeration diseconomies and (For example, in the meat products subindustry, animal waste product disposal problems may preclude additional meat processing facilities from being established.) (2) the existing density of establishments for all 10 subindustries across all counties. Those counties with fewer establishments would be more capable of attracting new ones.

Appropriate policy levers to consider and evaluate when addressing agglomeration diseconomies would include at a minimum:

- *subsidies on externalities* to reduce the negative effects (on utility and production possibilities) of the actions of one producer on another and
- *support of research (technology)* to increase efficiency in areas associated with agglomeration economies and diseconomies.

Moreover, interviews with targeted questions posed to firm managers would shed light on the decision(s) not to locate amongst incumbent establishments at the county level.

Contrary to Goetz's results, which found large market populations to have a positive effect on the establishment growth of some subindustries and a negative effect on others, large market populations in New York counties have either a positive effect or no effect. This finding means that, for rural counties with their relatively smaller population bases, attracting those subindustries that are affected positively by large market size would be most difficult. Therefore, as a means of stimulating local employment and providing nearby market outlets for farmers, rural policymakers must direct more attention and resources to creating an "enabling environment," particularly for those subindustries. Appropriate policy levers for this purpose would include, at a minimum, those efforts that offset the opportunity costs for establishments associated with rural markets.

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