

**"WHAT DETERMINES U.S. RETAIL
MARGINS?"**

by

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Abstract

Title: What Determines U.S. Retail Margins?

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In this paper we develop an economic framework for the empirical analysis of retail margins. This framework departs from the definition of profits and incorporates recent theoretical developments formalizing the role of distribution services in retail activities. Alternative approaches, based on a mark-up model and on a hedonic equation, are also considered. The data base is information on 49 retail sectors from the 1982 U.S. Census of Retail Trades. The results reject the hedonic approach and part of the previous specification of the mark-up model. They provide some support for the hypothesis of monopolistic competition as the relevant market structure in the retail sector and substantial evidence for the hypothesis that distribution services are the main determinants of retail margins.

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What Determines U.S. Retail Margins?

Surprisingly enough, there is a paucity of studies seeking to explain retail margins. What makes this scarcity remarkable is the abundance of studies seeking to explain profit margins, e.g., Schmalensee (1988), as well as the existence of publicly available data on retail margins, e.g., Census data in the U.S. One reason for this situation is the lack of interest by economists in the analysis of general retail issues, as noted by Bliss (1988) for example. Another reason is that models analyzing specific retail issues are, of course, narrowly focused. This is true of those contributions that stress the role of uncertainty, for example Pashigian (1988) and the references cited therein, as well as those of contributions that adopt a full information approach, e.g., Hess and Gerstner (1987) and the references cited therein. Consequently, there is no generally accepted economic framework in which to embed the empirical analysis of retail margins. One contribution of this paper is the provision of such a framework.

Our approach to the analysis of retail margins starts with the definition of profits, which allows one to obtain an identity equating the retail margin to the sum of the ratio of profits to sales and the ratio of the costs of retailing to sales. The first term in the sum provides a link to the previously mentioned literature on profit margins; the second term in the sum provides a link to recently developed literature formalizing the role of distribution services in retail activities, which is discussed below. The specification of the effect of distribution services on the second term, i.e., on cost and demand, is a novel component of our approach at the conceptual level. More generally, we have a framework that can be grounded on economic theory and is suitable for the empirical analysis of retail margins.

Retail firms provide consumers with a variety of distribution services, such as accessibility of location, product assortment, assurance of product delivery at the desired time and in the desired form, information and ambiance, Betancourt and Gautschi (1988). Higher levels of these services cost the firms more but reduce costs for their customers; these distribution services are not priced separately from the products purchased. Incorporation of these two characteristics into the analysis of retail markets generates new results on the nature of pricing policies and competitive behavior, Betancourt and Gautschi (1989). Broadly speaking, these distribution services are an important source of product differentiation in retail markets. Indeed, their analysis is very much in the spirit of Chamberlin's seminal work (1962) on monopolistic competition. In this context one of the main contributions of this paper lies in its being the first systematic effort at measurement, specification and analysis of the empirical role that these distribution services play in retail activities; hence, the paper operationalizes a major aspect of product differentiation in what are traditionally regarded as monopolistically, competitive markets.

Five broad categories of distribution services were mentioned above. Each of these categories can have several dimensions. Some of these services, or aspects of them, are provided for all items in an assortment (thus we label them "common"); some of these services are provided for selected items in an assortment (thus we label them "specific"). Undoubtedly, it is difficult if not impossible to capture all the dimensions of these concepts in our empirical measurements; nevertheless, we have developed a data base containing empirical counterparts to these concepts that is comparable to what exists for other purposes at a similar level of

aggregation (the three digit level of the SIC code). Our data source is the Industry Series Reports from the 1982 U.S. Census of Retail Trade.

The small body of literature on the empirical explanation of variations in retail margins across various sectors is based on a mark-up model put forth by Nooteboom (1985) together with several collaborators, Nooteboom, Kleijweg and Thurik (1988). Nooteboom (1985) has an illuminating discussion of several distribution services, in our terminology, but goes on to offer the criticism that "economic theory does not yield much that can be readily used for empirical analysis." The analysis of the role of distribution services on the demand for retail products, Betancourt and Gautschi (1990a, 1990b), together with the previously cited work on distribution services cast doubts on the validity of this statement at the theoretical level. One aim of this paper is to show in an empirical setting that this criticism is no longer warranted.

Assuming that there is only a single product, one can derive a direct relationship between the retail margin and the retail price. Hence, it is tempting to adopt a hedonic specification for the retail margin by analogy to the hedonic approach to price, which has become well established in economics since Rosen's classic paper (1974). Based on this logic, one could also appeal to recent explanations of price dispersion in retail markets, e.g., Borenstein (1989) and Shepard (1989), as explanations of variations in retail margins in a hedonic framework. We shall present some empirical evidence on the hedonic approach, but we should add in anticipation of our results that this approach is rejected by the data.

Among the main substantive findings of our empirical analysis are the following: the mark-up model generates results in the U.S. data that are substantially different from those in earlier work; monopolistic competition

is a more suitable market structure for the analysis of retail markets than any alternatives which entail differing degrees of monopoly power across retail sectors; distribution services are critical determinants of variations in retail margins across U.S. retail sectors. More specifically, higher levels of assortment, assurance of product delivery and specific distribution services depress margins whereas higher levels of information increase margins. The former results imply that demand effects dominate supply effects and the latter result implies the opposite.

Prior to delving into our analysis, brief mention should be made of its relation to Pashigian's (1988) work explaining markdowns. Besides extending Lazear's theory of clearance sales (1986), he shows that an increase in the demand for fashion or variety increases uncertainty which in turn generates increased markons, markdowns and percentage of goods sold on sale. An increase in the demand for fashion is characterized in our framework as an increase in one of the distribution services elasticities of demand, namely the one for assurance of product delivery in the desired form. This change leads to an increase in the percentage markons or retail margins as well as to an increase in the level of fashion provided to customers (this follows from Proposition 2 in Betancourt and Gautschi (1989)). Since other distribution services are also included in this analysis, these services and any exogenous factors which affect them on either the demand or the cost side have a natural vehicle to affect retail margins. This property is desirable if not indispensable to explain variations in retail margins across broad categories of retail sectors such as we find in our data. Thus, our approach is consistent with Pashigian's results and it accommodates explanatory factors other than changes in uncertainty.

The plan of the paper is as follows: the next section discusses the conceptual framework underlying the empirical analysis; issues related to empirical implementation are discussed in Section II, although the details of the data construction are relegated to an appendix; the two alternative frameworks discussed above, i.e., the mark-up model and the hedonic approach, and the corresponding estimates are presented in Section III; the results of our approach are presented in Section IV; finally, a conclusion provides some perspectives on our findings.

I. Conceptual Framework

Consider the following definition of the retail margin (R), which follows from manipulating the definition of profits (π)¹

$$R = \pi/p^*X_1 + C(X_1, X_j; V)/p^*X_1, \quad (1)$$

where p^* can be interpreted as a vector of retail prices or as a single retail price. Similarly, X_1 can be interpreted as a vector of quantities of items sold at retail or as the quantity of a single (presumably composite) item. X_j is a vector of the levels of distribution services, V is a vector of input prices, and C is a standard neoclassical cost function.

The ratio of profits to sales in (1) provides a simple straightforward link to the voluminous literature on the empirical analysis of profit margins. An excellent guide through the main issues is Waterson (1984, ch. 10) who argues that the essence of the literature is captured by the first term in the following specification:

$$\pi/p^*X_1 = g(c, b, \theta) + \epsilon, \quad (2)$$

¹That is, $\pi = p^*X_1 - pX_1 - C(X_1, X_j; v)$, where p represents suppliers prices.

where c stands for concentration, b stands for barriers to entry, θ is the elasticity of demand, and ϵ is a disturbance term. Subsequently, Mueller (1986, ch. 4) reconciles the inconsistency between the traditional practice of defining the ratio of profits to sales as including the ratio of fixed costs to sales and introducing barriers to entry in (2) by redefining the left hand side as a long-run profit margin and arguing that barriers affect it through θ ; hence, (2) becomes

$$\pi/p^*X_1 = k(c, \theta(b)) + \epsilon . \quad (2)'$$

We shall simply borrow the approach to the profit margin embedded in (2)'. Furthermore, since this approach is consistent with a variety of market structures, by placing (2)' in the context provided by the conceptualization in (1) we find a convenient means for testing the often made assertion that retailing is the typical example of a monopolistically competitive market structure. For, in this case the profit margin would be expected to be zero in long-run equilibrium and (2)' becomes $\pi/p^*X_1 = \epsilon$. Thus, if the variables expected to affect the profit margin are not 'statistically significant' determinants of retail margins the evidence is consistent with the assertion;² otherwise, this assertion is inconsistent with the evidence.

Specification of the second ratio in (1) provides a straightforward link to the role of distribution services in the determination of retail margins. In our research (1988, 1989) we have shown how the shifting of costs between consumers and retailers is captured on the supply side by specifying a cost function such that distribution services play the same role as the outputs of

²This evidence would also be consistent with the assertion that the profit margin, and consequently the degree of monopoly power, is the same in every retail sector.

a retail firm. A relevant implication for the empirical analyses is that the cost function will be increasing in X_1, X_j . Similarly, we have shown how on the demand side this shifting is captured when the distribution services of the retailer play the role of a fixed input in a household production model of the consumer (1990a, 1990b). This model has the property that the inverse demand function for retail items can be written as $p^* = p^*(X_1, X_j; r)$, where r is a vector of other variables that affect the household's demand function; and, similarly, the standard demand function for retail items can be written as $X_1 = X_j(p^*, X_j; r)$. Important implications of these specification are: $\partial p^*/\partial X_j > 0$ and $\partial X_1/\partial X_j > 0$ as well as the usual $\partial p^*/\partial X_1 < 0$ and $\partial X_1/\partial p^* < 0$.

Whether one assumes quantity setting behavior (the inverse demand specification) or price setting behavior (the standard demand specification), the second term in (1) can be specified as follows

$$C(X_1, X_j; V)/p^*X_1 = f(X_1, X_j; V, r) + \mu, \quad (3)$$

where μ is a disturbance term. If one is interested in interpretation of the effects of these variables on the retail margin from a theoretical point of view, one finds that under price setting behavior, for example, distribution services have the following effect

$$\partial R/\partial X_j = [(C_j + C_1(\partial X_1/\partial X_j))p^*X_1 - Cp^*(\partial X_1/\partial X_j)]/(p^*X_1)^2 = f_j \quad (4a)$$

Since $(\partial X_1/\partial X_j)$ is positive, f_j is of ambiguous sign. Similarly, we have for the quantity of retail items under price setting behavior

$$\partial R/\partial X_1 = (C_1p^*X_1 - Cp^*)/(p^*X_1)^2 = f_1, \quad (4b)$$

which is also ambiguous. Quantity setting behavior generates different expressions but the same conclusions: namely, the ambiguous sign for the

effect of quantity of retail items and distribution services on the retail margin as well as the highly nonlinear nature of the function f .

To conclude this discussion, the incorporation of (2)' and (3) into equation (1) leads to

$$R = k[c, \theta(b)] + f(X_1, \underline{X}_j; r, V) + \epsilon^* , \quad (1)'$$

where $\epsilon^* = \epsilon + \mu$ and it will be assumed to have the usual properties. We shall refer to this specification as the hybrid specification for reasons that will become clear below.

In drawing the implications of (1) and of our theoretical modelling of the role of distribution services for the analysis of retail margins, one could abandon the additive specification of profit margins and cost and demand interactions under either quantity setting or price setting behavior in favor of the following alternative. To illustrate assume quantity setting behavior, then (1) can be redefined as

$$R = [\pi(b, c) + C(X_1, \underline{X}_j; V)] / p^*(X_1, \underline{X}_j; r) \quad X_1 , \quad (5)$$

which can be specified for empirical purposes as

$$R = F(b, c, X_1, \underline{X}_j; V, r) + \mu^* , \quad (5)'$$

where μ^* is a disturbance term with the usual properties. That is, our analysis of distribution services can be interpreted as implying that the effects of concentration and barriers to entry on retail margins depend on the levels of distribution services. A similar result holds under price setting behavior. We shall refer to this specification as the full specification.

II. Empirical Implementation

While economic theory does not normally provide much guidance in the specification of functional form, in this instance some features of the conceptual framework suggest characteristics of the functional form. In particular, equations (4a) and (4b) suggest that the functional form should be general enough to allow the response of the retail margin to retail output and distribution services to be a function of these same variables. Thus, an additive specification of the second term in (1)' is unacceptable on a priori grounds. A similar argument holds for all of the variables in (5)'.

Among the several nonlinear functional forms that allow one to incorporate this feature of the theory into the empirical analysis, we selected a logistic functional form for two reasons: parsimony and tractability. With respect to parsimony, consider one of the most frequently used alternative nonlinear forms--a quadratic in the variables or in the logarithms of the variables. This alternative would require the estimation of at least 35 (29 for the logarithmic version) parameters in order to capture the behavior implied by (4a) and (4b).³ With respect to tractability, consider another of the frequently used nonlinear forms--a CES type of power function. This alternative requires that the values of the element being raised to a power be positive. Since the slopes in (4a) and (4b) can be either positive or negative, the positivity restriction on the argument of the power function must be imposed by constraining some parameters for different range of values of the variables. No general estimation techniques with this property are available.

³These numbers are based on our identification in the data of one output variable, five variables representing common distribution services and one variable representing specific distribution services as well as one variable representing concentration and another barriers to entry.

Consider now the logistic specification of the systematic component on the right hand side of (4), i.e.,

$$f(X_1, X_j; r, V) = e^{\beta'X} / (1 + e^{\beta'X}) , \quad (6)$$

where $X = [X_1, X_j]$ and β is a 1×7 vector of parameters that determines the sign of the response of the retail margin to output (β_1), common distribution services ($\beta_2 - \beta_6$), and specific distribution services (β_7). This form allows us to capture the intrinsic nonlinearity implied by (4a) and (4b) with a minimum of 7 parameters. Furthermore, it can be estimated by relatively straightforward nonlinear techniques. Finally, the range of values generated by the right hand side of (6) lies in the zero to one interval, thus coinciding with the feasible range of values of the retail margin.⁴

Regarding the specification of the determinants of the profit margin, we follow the literature by adopting a polynomial specification. More precisely, the following quadratic specification of the systematic component on the right hand side of (2)' will be employed, i.e.,

$$k(c, \theta(b)) = \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_8 X_9 + \beta_{11} (X_8)^2 + \beta_{12} (X_9)^2 , \quad (7)$$

where X_8 is concentration (c) and X_9 is barriers to entry (b).

Insertion of (6) and (7) into (1)' leads to one of the two principal estimating equations underlying our empirical work. Due to its additive nature, the results corresponding to it are the ones reported under the rubric of hybrid specification; this equation ties up most neatly our

⁴Incidentally, the specification in (6) brings out two of the assumptions being made in the empirical work. These assumptions are often made in implicit fashion. It is being assumed that the other variables affecting the demand function (r) take on the same value across observations or are uncorrelated with the included ones; it is also being assumed that the input prices facing the retail sectors (V) have a similar property.

emphasis on distribution services with the existing literature on profit margins. We present the results corresponding to the other principal estimating equation under the rubric of the full (logistic) specification. It is obtained by allowing F in (5)' to take on the logistic form as follows

$$R = e^{\beta'X} / (1 + e^{\beta'X}) + \mu^* , \quad (8)$$

where $X = [X_1, X_j, X_8, X_9]$ and β is a conformable 1×12 vector of parameters.⁵

Our data source is the 1982 U.S. Census of Retail Trades: more specifically, the three Industry Series Reports (RC82 I-1, I-2, I-3).⁶ These reports provide a wide variety of information for 49 retail sectors classified at the three digit level of the SIC code and in some instances (14 out of 49) at the four digit level. To preserve continuity in the exposition, the exact definition of the variables is presented in the Data Appendix. Here, we discuss controversial measurement issues and the procedures followed to resolve the controversies.

One issue that arises immediately is whether retail markets are local or national. If these markets were national then the Census figures for all variables measured in value terms, concentration ratios and accessibility of location measured in terms of the number of establishments are accurately defined or as close as one can get in empirical work. If, as it is likely to be the case, retail markets are local, value figures deflated by the number of establishments provide a more accurate measure of the relevant value variables, concentration ratios are inaccurate measures of concentration,

⁵The variables determining profits in the full specification were introduced as in (7) prior to the logistic transformation.

⁶We are especially grateful to Mr. Howard Hamilton who provided a special tabulation with the information on the second of these three reports at a lower level of aggregation than what existed in the published series.

Metcalf (1968), and the number of establishments measures accessibility of location as well as the number of markets in a retail sector. Our procedure was to estimate two versions of the model: one with the variables measured in value terms specified on a per establishment basis (version I); the other with these variables specified in absolute terms (version II). With respect to the concentration ratio, the inaccuracy problem means that the indexes underestimate the real degree of concentration in each sector. In those sectors where there are many local markets the degree of underestimation is greater than in those sectors where there are few local markets. Since this increases the range of variation of the independent variable, it should increase its statistical significance which should be kept in mind when interpreting the results. With respect to accessibility of location, we simply note the ambiguity of interpretation associated with the measured variable, number of establishments, in version I.

Since we were able to develop two alternative measures of product assortment, a quantity based one identified as $X_{3i}(A)$ and a value based one identified as $X_{3i}(B)$ (see the Data Appendix), these two measures provide variant 1 and 2 of the model, respectively. The next measurement issue is more troublesome, namely the choice of an appropriate measure of output (X_1) for a retail sector. Sales or sales per establishment $X_1(A)$ is an obvious candidate, but the definition of the retail margin is also in terms of sales and, thus, the existence of either a simultaneity bias or an error in the variables problem or both becomes almost unavoidable with sales on both sides of the equation. Our procedure was to use the value of building rentals or the value of building rentals per establishment $X_1(B)$ as a proxy for output. We also estimated all models both ways. The measurement of the remaining

variables raises no controversial issues and its description is, thus, left to the Data Appendix.

The estimation method employed is nonlinear least squares. This choice was based on several considerations. First, the method was well documented and supported in the SAS package available at INSEAD where all the calculations were performed. Secondly, the asymptotic properties of the estimator are well established, as demonstrated by Amemiya's (1985, ch. 4) discussion of the estimator in the context of extremum estimators. Finally, the Monte Carlo experiments undertaken by Gallant (1975a,b) relied on a model specification similar to one of our two main ones. It consisted of a first degree polynomial added to an exponential. The experiments allow one to ascertain the accuracy of employing testing procedures in the nonlinear case that were similar to those valid for the linear one. Therefore, Gallant's results can be used confidently to guide our choice of testing procedures. For example, our joint tests of hypotheses will be carried out by using ratios of differences in residual sums of squares to residual sums of squares instead of ratios of explained sum of squares to residual sums of squares, i.e., by applying equation 4.3 in Amemiya (1985). The rationale is that tests based on the former statistic were found by Gallant (1975b) to have higher power than those based on the latter statistic in the context of a model similar to ours.

III. Alternative Frameworks

Before presenting the results based on the definition of profits, it is convenient to discuss the results for the two alternative frameworks mentioned in the introduction. It is fitting to begin our discussion with the mark-up model, for it has provided the basic framework for empirical analysis of retail margins with aggregate data. Since we are merely

duplicating Nootboom, et al. (1988), it is useful to be explicit and precise. The following estimating equation is put forth by them:

$$\mu_{it} = \alpha_1 k_{it} + \alpha_2 / q_{it} + \alpha_3 e_{it} + \alpha_4 \Delta M_{it} + \alpha_5 C_{it} + u_{it} . \quad (9)$$

μ_{it} is defined as the gross margin or R in our notation. k_{it} is defined as operating costs (excluding a reward for the shopkeeper's labor) as a percentage of sales. It will be defined as operating expenses divided by sales in our data and its coefficient will correspond to α_1 in terms of Table 1. q_{it} is defined as average sales size per shop; hence, this variable becomes number of establishments divided by sales in our data and its coefficient corresponds to α_2 in terms of Table 1. e_{it} is defined as the income elasticity of demand for the product-service package but the average value of inventory as a percentage of sales is used instead by the authors, because of measurement difficulties. We will use the average value of inventory divided by sales as well and its coefficient corresponds to α_4 in terms of Table 1. The last two variables in (9) are changes in market share and in volume of demand over time and they are identically zero in our data, because of its cross-section nature.⁷

In contrast to the results reported by Nootboom, et al. (1988), neither average sales size per shop nor the product-service package as defined in their model play any role as determinants of retail margins. Two aspects of the mark-up model are consistent with our data. First, the coefficient of the ratio of operating expenses to sales has a high t-ratio. Second, the null hypothesis that this coefficient is unity cannot be rejected by the data even at the 10 percent level of significance. In interpreting these results

⁷Nootboom, et al. (1988), use a combined cross-section time series data set with sixteen retail sectors and eight years of observations for each sector.

mention should also be made of the fact that sales is in the denominator of all the variables in the equation, dependent as well as independent. Hence, the simultaneity bias or error in the variables problem discussed earlier also arises here. Of course, since the variable appears in the same form on both sides of the equation, in this case, one expects a strong positive association as a result of this problem.

The regression reported under the label of scaling arises from the following reasoning. Suppose that there is no simultaneity bias due to sales and suppose that sales is measured without error, i.e., the source of all

TABLE 1
Hedonic and Mark-Up Specifications¹

	R ²	F	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	α_9
Linear												
I.1 (X ₁ (B))	.38	2.65	.44* (.04)	7.13 (4.48)	.0000000 (.0000004)	-.02* (.01)	-.41 (.35)	5.78* (2.56)	1.19 (.90)	-1.13 (.77)	.002 (.002)	-.94 (.49)
I.1 (X ₁ (A))	.52	4.73	1.43* (.04)	-.32* (.08)	.0000002 (.0000004)	-.02* (.01)	.21 (.32)	1.56 (2.56)	-1.06 (.92)	3.13* (1.26)	.002 (.002)	-.72* (.35)
Semi-Log												
I.1 (X ₁ (B))	.58	6.02	.69* (.22)	.03 (.03)	.003 (.016)	-.06* (.03)	-.09* (.02)	.12* (.03)	.07 (.04)	-.14* (.06)	.02 (.02)	-.004 (.04)
I.1 (X ₁ (A))	.85	25.54	.88* (.11)	-.28* (.03)	.003 (.009)	-.01 (.02)	-.018 (.014)	.02 (.02)	.03 (.02)	.23* (.05)	.00 (.01)	-.01 (.02)
Mark-Up	.92	176.38	.03 (.02)	1.01* (.06)	.001 (.004)		.02 (.06)					
Scaling	.92	47.65	.06* (.02)	4.86 (24.76)	.017* (.006)	-.003 (.003)	-.13 (.07)	3.02* (.63)	.37 (.21)	1.42* (.21)	.001 (.001)	-.03 (.03)

¹Standard errors in parentheses below the coefficient estimates.

*t-ratio greater than or equal to 2.

randomness in the dependent variable is cost of goods sold (CG), then one may want to scale by sales in a relationship explaining variations in cost of goods sold. After deflation by sales, the dependent variable is $CG/X(A) - 1 - R$, and one can fit either R or $CG/X(A)$. For comparability, we fitted R using as explanatory variables the reciprocal of sales $1/X_1(A)$, accessibility of location $X_2/X_1(A)$, product assortment $X_3(A)$, assurance of product delivery $X_4/X_2(A)$, information $X_5/X_1(A)$, ambiance $X_6/X_1(A)$, specific distribution services $X_7/X_1(A)$, concentration ratio X_8 and our measure of barriers to entry X_9 . Since three of the variables are measured as ratios, i.e., X_3 , X_8 , X_9 , they are not affected by the scaling procedure. If there is no simultaneity or error in the variables problem, we have a very strong relationship as can be seen from the R^2 or F value in Table 1; if as is likely there is a problem, we have little confidence in the meaning of these results. Additional insight into this issue can be obtained in the context of the hedonic approach to which we now turn.

Consider the following definition of the retail margin

$$R = (p^* - p)X_1/p^*X_1 = (p^* - p)/p^* \quad (10)$$

The identity in (10) is consistent with either a multiple item or a single item specification of output; on the other hand, the equality in (10) is only consistent with a single item specification of output. Under this assumption, there is a direct relationship between the retail margin and the retail price, i.e., $\partial R/\partial p^* > 0$. This suggests postulating a function analogous to the hedonic price function for the empirical analysis of retail margins. Thus, one can postulate

$$R = h(X_1, X_j, X_8, X_9) + \nu \quad (11)$$

where ν is a disturbance term with the usual properties and the other variables have been defined already. Incidentally, it is possible to develop arguments as to what the expected signs of the effects of these variables would be on the basis of the hedonic specification.

The indexes of monopoly power would be expected to affect the retail margin positively, other things equal. For instance, the higher concentration and barriers to entry in a retail sector the more likely are retailers to be able to squeeze suppliers and lower their prices, thus increasing retail margins. Similarly, distribution services would be expected to affect the retail margin positively. Since these services play the role of outputs on the cost side, the higher their levels the higher the costs and the higher retail margins have to be on these grounds; moreover, since these services yield benefits to consumers, the higher their levels the higher the retail prices consumers are willing to pay and, thus, the higher the retail margins on these grounds. Therefore, the only coefficient with an ambiguous sign in (1) will be the coefficient of physical quantity output (X_1) since on the cost side it will be positively related to the retail margin but on the demand side it will be negatively related to the margin. Hence, this hedonic type of specification generates a number of restrictions grounded on economic theory that can be confronted with the data.

The hedonic type of model was implemented by considering two frequently used alternative functional forms in each of the nine independent variables.⁸

⁸ Parenthetically, no attempt was made to find the best fit with a Box-Cox type of transformation, as suggested by Halvorsen and Pollakowski (1981), or to develop a second stage to identify demand and supply parameters as customary in the hedonic literature, for example in the work of Kaufman and Quigley (1987) or Cropper, et al. (1988) and in the criticisms and procedures developed by Epple (1987) and Bartik (1987). The reason is that the initial results rejected the hedonic approach.

$$R = \sum_{i=1}^9 \alpha_i X_i + \nu, \quad (11a)$$

and

$$R = \sum_{i=1}^9 \alpha_i \log X_i + \nu. \quad (11b)$$

The specification of the variables in the regressions in Table 1 corresponds to the model that treats retail markets as local and uses the quantity based index $X_3(A)$ as a measure of product assortment, i.e., the one identified as I.1 in the previous section. The difference between the two rows within each functional form stems from the use of sales $X_1(A)$ as a measure of output in the second and fourth row and the use of the value of building rentals $X_1(B)$ as a proxy for output in the first and third rows. A comparison of the results in the first and second rows or in the third and fourth rows provides evidence on the simultaneity bias or error in the variables problem mentioned earlier. Since sales is in the denominator of the dependent variable and in the numerator of the independent one, a strong negative correlation would be expected. This is indeed the case in both cases as the coefficient of $X_1(A)$ (α_1) is negative and has a high t-ratio; moreover, there is a dramatic change in the sign and significance of this coefficient when the proxy is used to replace $X_1(A)$ in both linear and semi-log specifications. Other evidence of the existence of a simultaneity or error in the variables problem is the substantial increase in fit (R^2) with both specifications and the fact that other coefficient estimates even change signs. Therefore, we will view the specifications using $X_1(B)$ as the preferred ones.

With both functional forms the results of our preferred specification ($X_1(B)$) reject the hedonic approach. The theory underlying this approach requires that all variables except quantity of output have a positive

coefficient but there are several negative coefficients in each case.

Furthermore, using 2 as a critical value one must reject the null hypothesis that these negative coefficients are not significantly different from zero for one case in the first row and for three cases in the third row. In terms of predictive power the semi-log formulation is undoubtedly superior to the linear one, although this finding is somewhat useless in view of the contradiction of the theoretical basis underlying the hedonic approach by the data. Succinctly put, the analogy used here between the retail margin and the retail price is not supported by the data.

IV. Results

Each of the four models was estimated by nonlinear least squares for both the hybrid and the full logit specification. Before presenting the detailed results for each model, it is useful to discuss the statistics that allow one to evaluate overall performance within each model as well as across models. In Table 2 we present the necessary information for this evaluation in terms of both classical tests and non-nested tests for each of the two specifications.

Two classical tests of hypotheses were performed on each of the four models within each specification. The first one was designed to test the null hypothesis that monopolistic competition is the appropriate market structure for the analysis of retail sectors. If this is the case, and given the traditional long-run interpretation of cross-section data, one would expect that the determinants of the profit margin (X_8 through X_{12}) would not contribute to the explanation of retail margins, since the profit margin for each sector would be expected to be zero in long-run equilibrium. The first column of Table 2 shows that the null hypothesis cannot be rejected for any of the four models at the 5 percent level ($F_{.05}(5,36) = 2.48$) in either the hybrid or the full specification.

Table 2. Model Comparison Statistics

A: Hybrid Specification

Model	Classical Tests			Non-Nested Tests ⁴				Full
	F ¹	F ²	GF ³	I.1	I.2	II.1	II.2	
I.1	.93	6.57	.5429	---	0.47 (0.28)	0.54 (0.29)	0.56 (0.25)	1.00 (.22)
I.2	.07	2.48	.4497	.99 (.04)	---	.69 (.23)	.86 (.05)	.81 (.19)
II.1	.60	5.23	.4266	0.87 (0.24)	0.33 (0.46)	---	1.56 (9.99)	-.78 (.36)
II.2	.41	4.98	.3994	0.95 (0.22)	0.003 (0.43)	1.95 (1.09)	---	-.87 (.30)

B: Full Specification

Model	Classical Tests			Non-Nested Tests ⁴				Hybrid
	F ¹	F ²	GF ³	I.1	I.2	II.1	II.2	
I.1	.92	3.56	.5444	---	1.14 (.32)	.79 (.16)	.71 (.16)	.94 (.14)
I.2	1.10	2.89	.4920	.93 (.19)	---	.93 (.17)	.90 (.20)	.93 (.17)
II.1	0.60	2.23	.4275	1.02 (.14)	.97 (.14)	---	.92 (.16)	.98 (.17)
II.2	0.56	2.03	.4099	1.00 (.20)	.83 (.18)	1.78 (1.28)	---	-.69 (.32)

¹Observed value of the F statistic when the five coefficients of the determinants of the profit margin are set to zero ($\beta_8 = \dots = \beta_{12} = 0$).

²Observed value of the F statistic when the twelve coefficients of the determinants of the retail margin are set to zero ($\beta_1 = \dots = \beta_{12} = 0$).

³A descriptive measure of goodness of fit obtained as the R^2 in a simple linear regression using the predicted value from the model as the independent variable and the retail margin as the dependent one.

⁴Each entry in the table is the estimated value of θ and its associated standard error. The estimates are obtained from the nonlinear least squares estimation of (14).

A second classical test employed was designed to test the null hypothesis that none of the variables identified as determinants of the retail margin has any effect on the retail margin, either variables postulated as determinants of the profit margin ($X_8 - X_{12}$) or determinants of the cost and demand structure as output or distribution services ($X_1 - X_7$). The results reported in the second column of Table 2(A) lead to a categorical rejection of the null hypothesis, except for model I.2, at the 1 percent level of significance ($F_{.01}(12,36) = 2.72$). Even for model I.2, the null hypothesis is rejected at the 5 percent level ($F_{.05}(12,36) = 2.03$). Similar results hold for the full specification in part B of Table 2. Together these two tests bring out the importance of incorporating distribution services in any analyses of retail margins under both specifications.

While the third column in Table 2 is not a classical test statistic, it is a useful descriptive statistic that measures goodness of fit. It is the R^2 in a regression of the retail margin on the predictive value obtained from each model. Thus, it provides an informal measure of performance across models. As can be seen from the table, this measure of performance leaves no doubt that model I.1 is superior to the other three in terms of explaining variations in retail margins under both specifications, hybrid and full. It also suggests that the full model fits the data somewhat better than the hybrid one. Since this measure of performance is an informal one, we also performed nonnested hypotheses tests on the results to obtain formal comparisons of the models.

In Table 2 we also report the results of the particular nonnested test that we employed. This test is based on the artificial embedding procedure developed by Davidson and McKinnon (1981) and subsequently extended by other

authors, e.g., McKinnon, White and Davidson (1983). This procedure is known as the J-test. For instance, consider the null hypothesis

$$H_0 : R_i = g(X_i\beta) + u_i^0, \quad (12)$$

and the alternative

$$H_1 : R_i = h(Z_i\gamma) + u_i^1, \quad (13)$$

where $X_i\beta$ represents one of the four models in question, for example I.1, and $Z_i\gamma$ represents another of the four models, for example I.2. One can then construct a compound model in the following manner:

$$H_0 : R_i = (1 - \theta)g(X_i\beta) + \theta h(Z_i\hat{\gamma}) + u_i, \quad (14)$$

where $\hat{\gamma}$ indicates the nonlinear least squares estimator of the parameter vector.

Estimation of (14) by nonlinear least squares yields estimates of θ that can be used to test the null hypothesis that one model, for example I.1, contains all of the information available in the data for the explanation of retail margins ($\theta = 0$) against the alternative that another one of the models, for example I.2, contains additional information ($\theta \neq 0$) relevant for this purpose. One weakness of this test is that, in general, it can be inconclusive. Interestingly enough, the results presented in Table 2 for the four models under the hybrid specification (part A) are not inconclusive; however, the results presented under the full specification (part B) are inconclusive.

Each row of the table gives the estimate of θ obtained by assuming as the null hypothesis the particular combination of measure of product assortment and nature of the retail market embodied in the model identified

at the margin. The estimate of θ then indicates whether an additional contribution to the explanation of the retail margin can be obtained by introducing the predicted values of the model obtained under the particular alternative hypothesis indicated by the column heading. In part A of Table 2, using the model that employs the quantity index as a measure of product assortment and the local market as the relevant one for the retail sector (I.1), at the 1 percent level of significance ($t_{.005(36)} = 2.75$) one cannot reject the null hypothesis that this is the true model when tested against each of the other three alternatives. By contrast, using each one of the other three possibilities as the null hypothesis, at the 1 percent level of significance one can always reject the null hypothesis that each of these alternatives contains all the information relevant for explaining the retail margin against the alternative that model I.1 contains additional relevant information. Hence, these results provide conclusive evidence in favor of model I.1 under the hybrid specification. In part B of Table 2, on the other hand, the results are inconclusive using the same level of significance. Model I.1 is rejected against each of the other three when treated as the null hypothesis; however, each of the other three models is rejected when treated as the null hypothesis against the alternative of model I.1.

The last column in Table 2 provides the results of a non-nested test of the two specifications, hybrid and full. Thus, in part A of the table the estimates of the coefficient of the predicted value obtained from the corresponding model regression in the full specification are presented. In part B of the table, similar estimates for the coefficient of the predicted value from the hybrid specification are presented. Once again, the results are inconclusive. Our explanation of these results is that the specification supported by the data is neither the hybrid one nor the full one but a

restricted one in which all the coefficients of the variables representing indexes of monopoly power are set to zero. This interpretation is precisely what the classical test in column 1 suggests for all four models under both specifications.

The detailed results are presented in Table 3. For each of the four models and under both specifications, we present the nonlinear least squares coefficient estimates obtained with the variables that determine the profit margin; we also present the results of eliminating these variables. Thus, the first finding that emerges from those results is that none of the individual coefficient estimates associated with the determinants of the profit margin differs from zero in a statistically significant manner at either the 5 percent or the 1 percent level.⁹ This result holds true in each of the four models for both specifications and it is consistent with the corresponding result presented in Table 2 for the joint test. Within each model the results for the coefficients of the other variables (X_1 to X_7) are relatively insensitive to the removal of the determinants of the profit margin. For instance, in model I.1 under both specifications there are no changes in coefficient signs and only one change in coefficients that differ from zero in a statistically significant manner using 2 as a critical value of the t-ratio.¹⁰

Since the model comparisons presented in Table 2 strongly favor the selection of I.1 and since the individual results presented in Table 3 are

⁹ Parenthetically, it is useful to remember that the bias in our measure of concentration is toward creating statistical significance when there is none.

¹⁰ The estimate of β_3 in the full specification is so close to 2 that we are treating it as equal to 2 throughout our discussion of results.

Table 3. Nonlinear Least Squares Estimates of Determinants of U.S. Retail Margins¹

	β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	β_{10}	β_{11}	β_{12}
Model I.1: Per Establishment Variables, Quantity Index of Assortment													
Hybrid	.1963* (.0649)	41.37 (60.93)	-.000008 (.000005)	-.6269* (.2716)	-30.64* (14.34)	189.46* (63.42)	46.14 (25.84)	-44.41* (17.11)	.0057 (.0050)	.5168 (.5815)	-.0226 (.0410)	-.00005 (.00006)	.2277 (.7760)
Restricted	.3089* (.0206)	126.53 (74.35)	-.0000013 (.000006)	-.8632* (.2993)	-49.51* (19.92)	269.61* (81.87)	31.65 (33.54)	-49.26* (19.84)					
Full	.3070* (.0208)	128.54 (99.07)	-.0000061 (.0000068)	-.7877* (.3955)	-37.99* (16.68)	186.77* (91.14)	53.57 (44.46)	-45.47 (25.76)	-.2936 (.1920)	-24.28 (25.74)	-.4750 (1.4773)	-.0104 (.0060)	6.18 (254.99)
Model I.2: Per Establishment Variables; Entropy Index of Assortment													
Hybrid	.2548* (.0692)	133.34 (169.60)	.000015 (.000008)	-.0749 (1.0018)	-87.57 (47.03)	361.65 (222.13)	-77.65 (60.52)	-36.56 (40.25)	.0023 (.0058)	.4793 (.6134)	.0061 (.0450)	-.00004 (.00007)	-.3829 (.8380)
Restricted	.3303* (.0186)	218.04 (134.05)	.000014 (.000008)	-.7079 (.8669)	-99.24* (40.21)	463.99* (167.54)	-72.18 (58.11)	-57.47 (32.69)					
Full	.3161* (.0228)	238.31* (114.02)	.000006 (.000008)	.4509 (1.9018)	-71.66* (31.02)	168.75 (148.12)	-95.62 (99.88)	7.83 (59.23)	.3113 (.1866)	-60.15 (34.40)	2.68 (2.21)	-.0178 (.0101)	19.75 (23.44)
Model II.1: Absolute Levels Variables; Quantity Index of Assortment													
Hybrid	-.0360 (.0667)	.0005 (.0006)	.000001 (.000007)	-.0664 (.0506)	-.00010 (.00006)	.0012* (.0005)	-.00002 (.00018)	-.00009 (.00010)	.0016 (.0057)	-.7229 (.6077)	.0034 (.0512)	.00001 (.00027)	.2461 (.9858)
Restricted	-.0983* (.0285)	.0005 (.0004)	-.0000007 (.000005)	-.0262 (.0279)	-.00012* (.00004)	.0012* (.0005)	-.00007 (.00009)	-.00006 (.00006)					
Full	-.0343 (.0702)	.0005 (.0007)	-.000001 (.000002)	-.0608 (.0511)	-.00012 (.00007)	.0012* (.0005)	-.00004 (.00019)	-.00008 (.00011)	.0062 (.0233)	-3.0949 (2.6727)	.0287 (.2126)	.00004 (.00036)	.9674 (4.06)
Model II.2: Absolute Levels Variables; Entropy Index of Assortment													
Hybrid	-.0480 (.0680)	.0008 (.0007)	-.000003 (.000007)	.0191 (.1236)	-.00014* (.00006)	.0010* (.0005)	-.00009 (.00020)	-.00005 (.0001)	.0008 (.0059)	-.832 (.618)	.0146 (.0521)	-.00004 (.00006)	.1100 (1.004)
Restricted	-.1147* (.0288)	.00049 (.00043)	-.0000004 (.000005)	.0109 (.0942)	-.00010* (.00004)	.0011* (.0005)	-.00010 (.00009)	-.00004 (.00005)					
Full	-.0364 (.0691)	.0008 (.0007)	-.000004 (.000008)	.0376 (.1266)	-.00017* (.00007)	.0010* (.0005)	-.0001 (.0002)	-.00003 (.00011)	.0026 (.0237)	-3.90 (2.67)	.0915 (.2125)	-.0002 (.0003)	.1792 (4.07)

¹Standard errors in parentheses below the coefficient estimates.

*t-ratio greater than or equal to 2.

more stable for this model than for the other three models, we will limit the interpretation of the results for the individual coefficients to this model. First of all if for simplicity we use 2 as a critical value of the t-ratio, we find that the following distribution services have a statistically significant effect in lowering retail margins: namely, product assortment (β_3), assurance of product delivery (β_4) and specific distribution services (β_7) (except in the full model). By contrast, with the same critical value we find that information (β_5) has a statistically significant effect in raising retail margins. The former results imply that the effect of the distribution services on demand dominates their effect on cost for each of these three distribution services; similarly, the latter result leads one to conclude that the effect of information on demand is dominated by its effect on the cost of providing information.¹¹ The results for ambiance (β_6) and accessibility of location (β_2) suggest that the effect of the distribution service on demand is cancelled by its effect on cost. This result is quite noticeable for accessibility of location which has an observed t-ratio substantially less than unity.¹²

Finally, the output variable (β_1) has a positive effect on the retail margin although this effect is not statistically significant using the same critical value as before. For completeness, we have estimated the same four models replacing our proxy for output with sales. These results are

¹¹One should not fail to mention that advertising expenditures, which is our measure of information, can also be interpreted as an index of barriers to entry. Indeed, it is a common explanation in the traditional literature on profit margins, Schmalensee (1988), and it also appears in recent empirical analyses of contestable markets, Kessides (1986).

¹²An alternative interpretation, based on the discussion of section II, is that this variable represents the number of local markets in a retail sector and that variations in this number across retail sectors has no effect on the retail margins.

presented in two tables, identical to 2 and 3 attached to the Data Appendix. Here, we merely note that some of the results, particularly those based on individual coefficients, are dramatically different when sales is used as a measure of output. For instance, the coefficient of output changes sign and becomes 'statistically significant' when sales is used while that of specific information changes sign and remains 'statistically significant'. Once again these changes are suggestive of either a simultaneity bias or an error in the variables problem. Finally, it is worth noting two results not affected by the change in output variable: the per establishment version (I) and the full logit specification fit the data better than the alternatives, namely the absolute levels (II) and the hybrid.

Concluding Remarks

Our main substantive findings are: monopolistic competition is supported by this data as a relevant market structure for the analysis of retail markets; distribution services play a critical role in determining retail margins. On the methodological side the economic framework based on the definition of profits is shown to be an attractive alternative to the mark-up model, because it avoids the use of sales on both sides of the equation and it provides straightforward links to prior literature. Furthermore, in contrast to the hedonic approach, it is not rejected by the data.

Considering the extensive literature on the analysis of profit margins, we suspect that subsequent literature will try to challenge the first substantive finding. Those who follow the traditional empirical paradigm can note one of Schmalensee's (1988) stylized facts, namely concentration measures are not systematically associated with profits in cross-section studies; however, they have a harder time explaining why our measure of

barriers to entry also fails to exhibit such an association. Those who follow the new empirical paradigm a la Bresnahan (1988) might argue for the need to specify the unobservable price cost margin. Note, however, that specification of the nature of monopoly power through this margin is only necessary if one chooses as the null hypothesis the existence of monopoly power. An advantage of the approach based on the definition of profits is that one can choose monopolistic competition as the null hypothesis and this is as legitimate an econometric procedure as the other one. Our position is that the result must be interpreted with caution for two reasons. First, our empirical finding with respect to advertising can be interpreted as an indication of the existence of an association between barriers to entry and retail margins and, thus, be used to argue for rejection of the null hypothesis; second, we are accepting a null hypothesis and we do not know what is the power of this test.

Empirical analysis of the role of distribution services in retail activities is nonexistent. Therefore, from our perspective, the second substantive finding is important as the first source of empirical support for the ideas in recent theoretical work identifying and formalizing the role of distribution services in these activities. The positive nature of the results should stimulate further empirical and theoretical research along these lines. Indeed, at present we are engaged in developing and analyzing similar data sources for several European countries.

By the way of a conclusion, it is worthwhile to place our empirical approach in the context of the empirical traditions in industrial organization as articulated recently by Schmalensee (1988) and Bresnahan (1988).

Schmalensee concludes his survey by arguing that interindustry research... "should generally be viewed as a search for empirical regularities, not as a set of exercises in structural estimation." Since our data is limited to the retail sector, it is not clear that this advice is applicable; nevertheless, if it were deemed applicable, we think it is poor advice. For instance, a robust finding of our analysis is the rejection of the hedonic approach as a framework for the analysis of retail margins. This robustness stems from our identification of the single output assumption as necessary for its applicability as well as from the statistical results being inconsistent with the approach under alternative specifications. Had we been just looking for patterns, it is very doubtful that we would have thought of the hedonic approach as a possibility.

At the other extreme one can quote Bresnahan (1988) "a typical NEIO paper is first and foremost an econometric model of an industry." Our position is that much insight and information can be gained by intermediate approaches that bring information from the theory to bear on the data without having a fully specified econometric model of an industry. To illustrate, consider one of our most robust findings, namely that the full logit specification of the determinants of retail margins is the one which best fits the data. This specification follows from selecting the definition of profits as an appropriate economic framework for the analysis of retail margins and deriving the logical consequences of this definition and of the role of distribution services for the functional form to be used empirically. Searching for patterns or for a fully specified econometric model would not have generated this finding.

Finally, just as in the case of the hedonic approach with respect to prices, we certainly would agree that a useful task for future research is

the identification of some structural parameters via special cases which arise through the use of simplifying assumptions and/or particular characteristics of certain markets and data sets. Such a task, however, may be impossible to accomplish with our data set. For instance, specification of a simple cost function and a simple demand function in our analysis generates fourteen parameters which would have to be estimated with seven variables in our data set. Since the issues presented here have not been empirically analyzed before, it is certainly useful to exploit the information available before embarking on a laborious and expensive data construction project. Indeed, one of the contributions of this research is as a standard or reference to use, together with the knowledge gained from detailed studies of specific industries (for example, Borenstein's and Shephard's studies of the gasoline market), in designing ambitious data construction projects.

REFERENCES

- Amemiya, T., Advanced Econometrics, Cambridge, 1964.
- Bartik, T., "The Estimation of Demand Parameters in Hedonic Price Models," Journal of Political Economy, February 1987, 95, 81-88.
- Betancourt, R. and D. Gautschi, "The Economics of Retail Firms," Managerial and Decision Economics, June 1988, 9, 133-144.
- _____, "Demand Complementarities, Household Production, and Retail Assortments," forthcoming, Marketing Science.
- _____, "Two Essential Characteristics of Retail Markets and Their Economic Consequences," Maryland Working Paper No. 89-6.
- _____, "The Demand for Retail Products and the Household Production Model: New Views on Complementarity and Substitutability," forthcoming, Journal of Economic Behavior and Organization.
- Bittlingmayer, G., "The Elasticity of Demand for Books, Resale Price Maintenance and the Lerner Index," mimeo, University of California-Davis, March 1989.
- Bliss, C., "A Theory of Retail Pricing," Journal of Industrial Economics, June 1988, 36, 372-391.
- Borenstein, S., "Selling Costs and Switching Costs: Explaining Retail Gasoline Margins," Institute of Public Policy Discussion Paper #305, University of Michigan, September 1989.
- Bresnahan, T., "Empirical Studies of Industries with Market Power," in R. Schmalensee and T. Willig, eds., Handbook of Industrial Organization, Amsterdam, 1988.
- Chamberlin, E., The Theory of Monopolistic Competition, 8th edition, Cambridge, 1962.
- Cropper, M., L. Deck and K. McConnell, "On the Choice of Functional Form for Hedonic Price Functions," Review of Economics and Statistics, November 1988, 70, 668-675.
- Epple, D., "Hedonic Prices and Implicit Markets: Estimating Demand and Supply Functions for Differentiated Products," Journal of Political Economy, February 1987, 95, 59-80.
- Gallant, R., "Nonlinear Regressions," The American Statistician, 1975, 29, 73-81.
- _____, "Testing a Subset of the Parameters of a Nonlinear Regression," Journal of the American Statistical Association, 1975, 70, 927-32.

- Gerstner, E. and J. Hess, "Why Do Hot Dogs Come in Packs of 10 and Buns in 8s or 12s? A Demand Side Investigation," Journal of Business, October 1987, 60, 491-517.
- R. Halvorsen and H. Pollakowski, "Choice of Functional Form for Hedonic Price Equations," Journal of Urban Economics, July 1981, 10, 37-49.
- Hess, J. and E. Gerstner, "Loss Leader Pricing and Rain Check Policy," Marketing Science, Fall 1987, 6, 358-374.
- Hotelling, H., "Stability in Competition," Economic Journal, March 1929, 39, 41-57.
- Kaufman, D. and J. Quigley, "The Consumption Benefits of Investment in Infrastructure: The Evaluation of Sites and Services Programs in Underdeveloped Countries," Journal of Development Economics, April 1987, 25, 263-84.
- Kessides, I., "Advertising, Sunk Costs and Barriers to Entry," Review of Economics and Statistics, February 1986, 68, 84-96.
- Lazear, E., "Retail Pricing and Clearance Sales," American Economic Review, March 1986, 76, 14-32.
- Metcalf, D., "Concentration in the British Retail Grocery Trade," in K. Tucker and B. Yamey The Economics of Retailing, London, 1973.
- Mueller, D., Profits in the Long Run, Cambridge, 1986.
- Nooteboom, B., "A Mark-Up Model of Retail Margins," Applied Economics, August 1985, 17, 647-667.
- _____, A. Kleijweg and R. Thurik, "Normal Costs and Demand Effects in Price Setting: A Study of Retailing," European Economic Review, April 1988, 32, 999-1011.
- Pashigian, P., "Demand Uncertainty and Sales: A Study of Fashion and Markdown Pricing," American Economic Review, December 1988, 78, 936-953.
- Perry, M. and R. Groff, "Resale Price Maintenance and Forward Integration into a Monopolistically Competitive Industry," Quarterly Journal of Economics, November 1985, 100, 1293-1311.
- Rosen, S., "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," Journal of Political Economy, Jan./Feb. 1974, 82, 34-55.
- Schmalensee, R., "Inter-Industry Studies of Structure and Performance," in R. Schmalensee and T. Willig, eds., Handbook of Industrial Organization, Amsterdam, 1988.
- Sharkey, W., "The Theory of Natural Monopoly," London, 1982.

Shephard, A., "Price Discrimination in Retail Markets," MIT Working Paper No. 526, June 1989.

Smith, A. and D. Hitchens, Productivity in the Distributive Trades, London, 1985.

Waterson, M., Economic Theory of the Industry, London, 1984.

Winsten, C. and M. Hall, "The Measurement of Economies of Scale," Journal of Industrial Economics, July 1961, 9, 255-64.

U.S. Bureau of the Census, Census of Retail Trade, Industry Series Reports, RC82 I-1, I-2, I-3.

DATA APPENDIX

We start with the dependent variable, R . For each sector the retail margin is measured as $[\text{sales } (X_1(A)) - \text{cost of goods sold } (CG)]/\text{sales}$. Both of these variables are taken directly from the original data source and require no further discussion.

The output of a retail sector (X_1) is much more difficult to measure. As mentioned in the text, one obvious candidate is sales or sales per establishment. If all sectors provide the same or proportional levels of services per unit of output and price each unit of output the same, either sales or sales per establishment would capture variability in quantity output across sectors. Neither assumption holds and the first one has been thoroughly discussed in the early economic literature on the use of Census data, Winsten and Hall (1961). More recent literature, Smith and Hitchens (1985), makes the same point. In addition, there is the simultaneity or error in the variables problem indicated in the text. Thus, our proxy measure for output, which is directly available in the data source, will be the value of building rentals [$X_1(B)$] or the value of building rentals per establishment. The basic idea is that higher quantities of output are associated with larger spaces and rents are positively associated with these spaces. While this measure is subject to some of the same shortcomings as sales, it avoids the most important limitation of sales which is the simultaneity bias.

Accessibility of location (X_2) will be measured by the number of establishments in each sector, which is directly available in the data. While the theoretical concept is broader than this empirical measure, e.g., it could include other dimensions of access such as size of parking lot, etc., the empirical measure is as good a counterpart of the theoretical

concept as any that one finds in an economic study if retail markets were national or if they were local to the same degree in each sector.

A distribution service which has very well defined empirical counterparts is the breadth of product assortment (X_3). We are able to construct two alternative indexes of this theoretical variable. For each sector the data contain information on the number of establishments carrying and the sales made on a particular product line for a universe of thirty product lines. Thus, we construct two alternative indexes of assortment for each sector or observation, i.e.,

$$X_{3i}(A) = \frac{\sum_{j=1}^{30} X_{2ij}}{X_{2i}} \quad (A1)$$

and

$$X_{3i}(B) = - \sum_{j=1}^{30} (S_{ji}/S_i) \ln(S_{ji}/S_i) , \quad (A2)$$

where the first index, $X_{3i}(A)$, is based on the number of establishments carrying a product line in a sector relative to the total number of establishments in the sector and the second one, $X_{3i}(B)$, is based on the percentage of sales of a product line in a sector relative to total sales in this sector. The second index simply measures the level of breadth of assortment in a sector by the entropy of sales over product lines in that sector. In both cases there is a direct relation between the value of the index and the level of assortment.

With respect to the remaining distribution services, there is a wider gap between the theoretical construct and the empirical counterpart and little that can be done about it. For instance, assurance of product delivery at the desired time and in the desired form has several dimensions. Our empirical measure (X_4) will be the average of inventory holdings at the

beginning and at the end of the year (both pieces of information are directly available in the original source) or the same concept on a per establishment basis. This empirical measure captures the idea that the greater the number of goods available the more likely the consumer is to find the desired product, but it does so imperfectly because it is a value term rather than a quantity measure. Moreover, this measure captures mainly the common aspects of this distribution service, i.e., those that are available to all the items in the assortment, but not the specific ones, i.e., those that would be available to particular items in the assortment as a result of the efforts for example of specialized sales personnel.

Just as with respect to the previous distribution service, the next one (information) has several dimensions. Our empirical construct, (X_5) advertising expenditures, is directly available in the data and purports to capture one of these dimensions: namely, the higher the level of advertising the more information is made available to the consumer on issues such as prices, store hours and product availability. Once again, however, this measure is a value measure and it does not capture other aspects of this distribution service such as the specific information on an item that can be provided by a sales force. Moreover, as this discussion suggests, in some cases there is jointness between the provision of information and assurance of product delivery in the desired form or time.

Last among the common distribution services is ambiance (X_6), which will be measured empirically by the gross value of assets in buildings and structures in each sector which is taken directly from the data source. This distribution service varies across retail sectors and our argument is that higher levels of this 'quantity' will be associated with higher values of building and structures.

Finally, different sectors provide different levels of specific distribution services, that is, those associated with a particular item or sets of items in the assortment. Thus, we will define a variable (X_7) to capture the levels of these specific distribution services. Since most of them require the use of labor resources, sometimes specialized ones, we will use the sector's payroll, which is available in our data source, as an indication of the level of specific distribution services provided.

Turning to the determinants of the profit margin, we will be measuring concentration (X_8) by the ratio of sales of the four largest firms in the sector to total sales in the sector. This measure is directly available in the data. Its shortcomings have been discussed in the text. Finally, we note that barriers to entry (X_9) will be measured by the ratio of multi-establishment firms to single establishment firms. The number of both types of firms is directly available in the data. While this variable is a sensible measure of barriers to entry, it may also proxy for economies in purchasing thus capturing part of the effect of concentration.

Since the measurement of distribution services is a unique feature of our study and the analysis of retail margins is somewhat neglected, we provide two summary statistics on the values of all our variables in Table A1. Namely, we present the mean and the range of each variable for nine broad retail sectors into which the forty-nine sectors from the Census of Retail Trades can be aggregated.

Table A1: Descriptive Statistics on U.S. Retail Industry

Retail Sector	R		X ₁ (B) ¹		X ₂		X ₃ (A)		X ₃ (B)		X ₄ ¹		X ₅ ¹		X ₆ ¹		X ₇ ¹		X ₈		X ₉	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
52 Building Materials and Hardware	.341	.072	129	167	13280	20326	2.78	3.96	.765	1.47	1912	5019	174	470	717	2305	1339	3684	.11	.15	.097	.069
53 General Merchandise Stores	.335	.034	734	1454	11381	3194	14.62	7.98	2.77	0.25	7457	15414	1181	2920	5047	12694	6438	15426	.43	.35	.680	1.773
54 Food Stores	.402	.426	402	2384	25174	125551	2.17	3.78	.469	.786	2118	14257	337	2190	1633	10374	3910	24812	.15	.26	.079	.080
55 Automotive Including Gas	.232	.210	465	843	41451	104767	2.96	2.61	.489	.592	6276	20810	420	1396	1472	3185	4291	11738	.05	.06	.065	.080
56 Apparel & Accessory Stores	.400	.104	416	940	19162	38838	1.81	3.01	.585	1.050	1670	2956	195	382	605	1514	1306	3010	.16	.21	0.149	.125
57A Furniture, Floors and Draperies	.430	.074	216	510	13611	25543	2.31	1.28	.759	.885	1304	3644	274	766	545	1674	1041	2669	.07	.05	.092	.042
57B Household Appliances, Radio & Music Stores	.329	.083	168	170	13096	10178	2.74	1.66	.959	1.189	1315	1089	207	332	240	40	854	686	.14	.14	.136	.084
58 Eating and Drinking Places	.574	.053	1901	3167	159936	197295	1.84	0.71	.492	.259	1117	1700	1059	1954	9228	15169	13084	22860	.03	.05	.037	.042
59 Miscellaneous Drug, Liquor, Florist, & Nonstore Retailers	.399	.370	262	738	22965	45524	2.54	4.43	.961	2.377	1817	5894	220	963	570	1392	1458	3626	.13	.25	.097	.138

¹These value figures are all in millions of 1982 dollars.

Table A2: Model Comparison Statistics (Sales)

A: Hybrid Specification

Model	Classical Tests			Non-Nested Tests ⁴				Full
	F ¹	F ²	GF ³	I.1	I.2	II.1	II.2	
I.1	0.86	7.512	0.7479	---	-0.572 0.101	-0.609 0.157	-0.504 0.161	0.974 0.063
I.2	0.52	7.164	0.7396	-0.585 0.102	---	-0.544 0.167	-0.525 0.164	0.931 0.054
II.1	0.60	2.743	0.4777	1.012 0.140	0.956 0.137	---	-1.170 0.148	-1.192 0.141
II.2	0.41	2.524	0.4557	1.013 0.129	0.972 0.135	1.771 1.195	---	-1.193 0.140

B: Full Specification

Model	Classical Tests			Non-Nested Tests ⁴				Hybrid
	F ¹	F ²	GF ³	I.1	I.2	II.1	II.2	
I.1	9.8	19.16	0.8667	---	-0.427 0.135	0.304 0.161	0.369 0.142	0.379 0.096
I.2	10.0	19.71	0.8717	-0.440 0.120	---	0.356 0.148	0.377 0.128	0.195 0.070
II.1	0.61	2.747	0.4780	0.970 0.064	0.956 0.060	---	-1.049 0.154	-1.256 0.137
II.2	0.46	2.467	0.4595	0.945 0.058	0.931 0.052	-0.789 0.339	---	-1.140 0.147

¹Observed value of the F statistic when the five coefficients of the determinants of the profit margin are set to zero ($\beta_8 = \dots = \beta_{12} = 0$).

²Observed value of the F statistic when the twelve coefficients of the determinants of the retail margin are set to zero ($\beta_1 = \dots = \beta_{12} = 0$).

³A descriptive measure of goodness of fit obtained as the R² in a simple linear regression using the predicted value from the model as the independent variable and the retail margin as the dependent one.

⁴Each entry in the table is the estimated value of θ and its associated standard error. The estimates are obtained from the nonlinear least squares estimation of (14).

Table A3: Nonlinear Least Squares Estimates of Determinants of U.S. Retail Margins¹

Model I.1: Sales Definition of Output, Per Establishment Variables, Quantity Index of Assortment													
	B ₀	B ₁	B ₂	B ₃	B ₄	B ₅	B ₆	B ₇	B ₈	B ₉	B ₁₀	B ₁₁	B ₁₂
Hybrid	.007 (.043)	-2.394* (.403)	-.0000007 (.000001)	-.048 (.043)	-1.863 (1.421)	14.317 (9.619)	8.317 (4.852)	11.409* (4.964)	-.0005 (.004)	-.419 (.449)	-.001 (.034)	-.00003 (.00005)	.059 (.632)
Restricted	-.020 (.023)	-2.336* (.364)	.0000004 (.000001)	-.004 (.021)	-2.285 (1.332)	14.366 (8.772)	3.430 (3.127)	10.640* (4.324)					
Full	.236* (.016)	-9.447* (1.688)	-.000002* (.000001)	.007 (.087)	-4.045* (2.08)	83.228* (21.9)	-.911 (8.05)	38.557* (8.071)	-.038* (.018)	-10.557* (2.568)	.52* (.182)	.00002 (.0004)	-2.716 (4.274)
Model I.2: Sales Definition of Output, Per Establishment Variables, Entropy Index of Assortment													
	B ₀	B ₁	B ₂	B ₃	B ₄	B ₅	B ₆	B ₇	B ₈	B ₉	B ₁₀	B ₁₁	B ₁₂
Hybrid	-.007 (.045)	-2.447* (.389)	-.0000007 (.000001)	-.001 (.102)	-2.357 (1.387)	11.244 (10.806)	6.484 (4.848)	12.733* (4.867)	-.001 (.004)	-.371 (.463)	.007 (.0344)	-.000004 (.00004)	-.136 (.64)
Restricted	-.027 (.026)	-2.313* (.364)	.0000003 (.000001)	.043 (.072)	-2.586* (1.267)	12.746 (9.556)	4.109 (3.134)	10.487* (4.343)					
Full	.238* (.016)	-9.911* (1.669)	-.000002* (.000001)	.137 (.13)	-3.825 (2.013)	80.377* (21.788)	-4.906 (8.268)	42.033* (8.619)	-.042* (.019)	-11.195* (2.571)	.577 (.176)	-.000009 (.0003)	-2.266 (4.245)
Model II.1: Sales Definition of Output, Absolute Levels Variables, Quantity Index of Assortment													
	B ₀	B ₁	B ₂	B ₃	B ₄	B ₅	B ₆	B ₇	B ₈	B ₉	B ₁₀	B ₁₁	B ₁₂
Hybrid	-.063 (.064)	-.00001 (.000006)	.0000004 (.000005)	-.056 (.045)	-.00006 (.00005)	.0008* (.0004)	-.0001 (.0001)	.0001 (.0001)	.001 (.005)	-.596 (.575)	.011 (.046)	.000006 (.00007)	.115 (.833)
Restricted	-.112* (.027)	-.00001* (.000005)	.0000003 (.000003)	-.02 (.024)	-.00005 (.00004)	.0008* (.0004)	-.0001 (.00009)	.00008 (.00008)					
Full	-.062 (.065)	-.00001 (.000006)	.0000004 (.000005)	-.053 (.044)	-.00006 (.00005)	.0008* (.0004)	-.0002* (.0001)	.0001 (.0001)	.003 (.021)	-2.496 (2.371)	.053 (.189)	.00002 (.0003)	.422 (3.474)
Model II.2: Sales Definition of Output, Absolute Levels Variables, Entropy Index of Assortment													
	B ₀	B ₁	B ₂	B ₃	B ₄	B ₅	B ₆	B ₇	B ₈	B ₉	B ₁₀	B ₁₁	B ₁₂
Hybrid	-.087 (.065)	-.00001 (.000006)	.0000005 (.000005)	.027 (.115)	-.00008 (.00005)	.0006 (.0005)	-.0002* (.0001)	.0001 (.0001)	-.00002 (.005)	-.612 (.589)	.027 (.046)	-.00004 (.00006)	-.195 (.858)
Restricted	-.127* (.027)	-.00001 (.000005)	.0000003 (.000003)	.012 (.088)	-.00006 (.00004)	.0008* (.0004)	-.0001 (.00008)	.0001 (.00008)					
Full	-.079 (.065)	-.00001 (.000006)	.0000005 (.000005)	.031 (.115)	-.00009 (.00005)	.0006 (.0005)	-.0002* (.0001)	.0001 (.0001)	-.001 (.022)	-2.788 (2.43)	.131 (.189)	-.0002 (.0002)	-.989 (3.465)

¹Standard errors in parentheses below the coefficient estimates.

*t-ratio greater than or equal to 2.

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