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A HEDONIC INDEX OF SITE SELECTION WITH APPLICATION TO INSTRUCTIONAL TECHNOLOGY

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Abstract
This study invokes the Muth-Alonso residential location model to evaluate the locational attributes of large public housing sites (those with household populations of at least 500) for the purpose of establishing satellite link-up stations for relaying professional education programs that meet the needs of Public Housing Authority (PHA) managers and tenants. This practice predated the current age of Webinars. We formulated the success potentials of these PHAs for attracting patrons as a vector of three composite attributes centered on the Sites' Drawing Power, Trade Area Characteristics, and their Operating Characteristics as dictated by size. Applying Weighted Least Squares estimation to a sample drawn from this population, our results suggests that patrons are attracted to a site based on its demographic and spatial attributes. The thrust of the paper is to illustrate the application of location analysis.

1. Introduction

Public Housing Associations are constantly seeking ways to serve their residents and staff. One of these ways is through educational seminars to upgrade the skills of the former to enhance their employment potentials; and that of the latter for increased labor productivity. One of the recent approaches played is distance learning via satellite. The operation of the system modeled here was modified in 2006 with the introduction of video streaming, supplanting the original system of satellite beaming with webinars". In this paper, we develop a locational model for setting up a network of centers for conducting seminars beamed from a satellite location to its national audience by a vendor under specified operational constraints.[i] This approach to micro-location analysis is demand-based as distinguished from the classical approach for which the objective function is the minimization of costs. The success of a facility is viewed from the standpoint of the consumer. We consider this solution to be more efficacious for service firms.

The model follows an extension of the standard economic theory of residential location as propounded by Richard Muth (1969) and William Alonso (1964). The extension takes the position that the consumer of the Housing Television Network (HTVN) educational programming simultaneously determines how much of the product to consume and at what site. Following a brief overview of relevant location studies we undertake a discussion of the theoretical framework and erect a model that reflects the peculiar attributes of HTVN operation. We then test this model with a survey data on a sample of existing HTVN facilities using Weighted Least Squares estimation. Explanations of locational decision-making by firms and households have varied from Von Thunen to Alfred Marshal , Weber and Isard whose theories were cast within the context of agricultural and manufacturing settings. In their world, locational determinants are based primarily on cost considerations. Walter Isard (1956) extended their work to define location decision of firms from the standpoint of 'transport orientation' or 'labor-orientation.' The evolution from agricultural to industrial, service, and information technology-based economies has been attended by corresponding changes in the empirical determinants of location decisions by firms. Wallace Smith (1975) observed that the spectrum of considerations stretched from transportation cost focus to a predominance of non-transportation costs. This included weight-gaining and weight-losing production processes, transportation breakpoint induction, and the so-called footloose industry patterns. As Smith noted, "This is because transportation costs are becoming smaller relative to other costs of production for significant kinds of products…….due to technological improvements in transportation and emergence of new kinds of industry."[ii] The most prominent among these new comers are, of course, information technology.

The most striking feature of the information technology age is the private firm's dependence on highly-skilled manpower and process automation. O'Mara, 1999, undertook case studies of forty firms selected such that for each of them, information is a product or component of production. She found labor market, infrastructures, and quality of life to be the most significant factors in their location decisions. Her concluding, summary statement ran, "The optimal location for the information-age company supports both people and technology." Equally striking is the observation of the dynamic influence of corporate strategy on site selection. This 'foot looseness' and 'strategy' reflected themes hinted by Smith (1975). Shilton and Stanley (1999) observed a high degree of spatial concentration of corporate headquarters after modifying their land use model to include information technology as an input. We seek to explain the locational determinants for a particular economic activity which has a strong information technology bias.

2. Theoretical Framework

We make three observations regarding the decision process as follows:

1. Educational programming activity at HTVN sites constitutes an economic good which convey benefits to the patrons.
2. Demand for an HTVN site is a derived demand, contingent upon the utility enjoyed from the educational programs (the "product") by the consumer.
3. The consumption of "the product" is site-specific as viewers will have to be at the HTVN sites to enjoy the benefits from the program. Hence, the consumer's consumption bundle incorporates both location-specific and location-neutral elements.

Given that the program seeks to provide a flow of educational and training services to the greatest number of trainees from specific locations, we may cast the problem within a utility-maximizing framework as[iii]

$$U = U_o(G_o, G^*, K) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where U = utility garnered by the consumer (patron) of HTVN programming from his full consumption basket

G_o= vector of consumption attributes of HTVN educational programs consumed

G^*= vector of the composite for all other influences on utility excluding the location element below K = vector of location-specific influence on utility

This says that the utility (satisfaction) enjoyed by the patron of HTVN programming depends in part upon the amenities offered by the training and educational programs which may be site-specific (K) or site-neutral (G_o), other things being equal[iv]. The level of consumer satisfaction enjoyed from receiving the common set of instructions beamed to all sites during any one period will be influenced by the location at a Public Housing Authority (PHA) site where the instruction is delivered. PHA sites with attributes most desirable to patrons will attract more patrons than those with less desirable attributes. How should HTVN stations be assigned? Efficiency dictates that the sites exhibiting more desirable attributes should have priority over those with less by virtue of their drawing power. A rationing mechanism for potential HTVN sites can now be devised based on attributes hypothesized to be most potent.

From the foregoing, we hypothesize that the determinants of the consumption of HTVN educational programs (HEP) include patron’s incomes (Y), the price of HEP (P), the composite price of all other goods and services in their consumption basket (P*), the locational attraction of an HTVN site (K), and the demographic and related characteristics of the consumer (D).

i.e. $Q = q(Y,P,P^*,K,D)$..(2)

Where Q = consumption of HEP.

This could be calibrated as number of patrons attracted to a site or the dollar value of sales at the HTVN site.

The variables in the model are demand determinants from standard empirical economic studies on consumer behavior[v].Equation (2) simulates what would be the decision calculus of an HEP patron under a utility-maximizing assumption. He makes a simultaneous decision on how much HEP to buy and at which PHA location.

However, the decision-making process by which some patrons determine this is not left totally to their volition. For managers of PHA, organizational demand is at play. This is particularly the case with the “off-site subscription” arrangement by which the organization makes a bulk purchase of seats at a given HTVN site and then assigns patronage of various course offerings to various employees[vi]. Consumption by individuals so assigned may not represent their optimal choice and hence violate the strict utility-maximizing assumption. This phenomenon is also exhibited by the “Host Site” procurement option which allows the host of a satellite station to assign participants to the classes.[vii]Under these constraints, we formulate an HEP locational choice model that considers the firm (PHA) and the employee as joint decision makers, with the latter's decision being constrained by the former.[viii] This model is, therefore, a constrained utility maximizing approach. But just as the PHA might assign an employee to a particular program based on perceived benefits to the firm, the employee might determine the program to attend subject to his employer's approval. The employee in either case derives utility from his skill enhancement and the potential for job mobility. In essence, there is an interlocking utility function between the PHA and the employee.

3. A Locational Model for HTVN

The locational model is based on the rational premise dictated by the three basic tenets noted under the theoretical framework in section 2 (above). This implies that PHAs will make locational decisions by deferring to the preferences expressed by consumers of HEP depicted in equation 2. We use a probabilistic form to specify the hedonics and employ both Ordinary Least Squares and Generalized Least Squares procedures in our search for the most fitting specification.

As data on income is not available even at the level of PHA aggregation, we employ surrogates to capture this effect. These variables describe Trade Area Characteristics and some of the elements of Demographic and Economic Characteristics. The effect of price is influenced by the bulk purchase or wholesaling arrangement through which HEP is sold leading to significant quantity discounts. Larger PHAs are better able to take advantage of this. For this reason, we capture the price influence through an index of PHA size as depicted by PHA Operating Characteristics.

The model formulates the probability, P(Q), that a PHA hosting an HTVN will attract a given number of trainees (q) to its HTVN Satellite Station training telecast over a given period (say one year). We hypothesize that this probability, P(Q=q), is a function of the Site's Drawing Power (SDP), it's Trade Area Characteristics (TAC), Demographic attributes of patrons (DEM) and Operational attributes of the PHA site (OPHA).

$$P(Q=q) = f(X,T,D,H) \quad \ldots\ldots (3)$$

Where X = vector of the site's drawing power (SDP)
T = vector of the trade area characteristics (TAC)
D = vector of the demographic and attributes of potential customers or employees/ residents of the PHA site
H = vector of operational attributed of the PHA site

SDP constitutes the characteristics of a PHA site that would attract HEP patrons to the site. It is a erasure of the productivity of the site. It consists of variables that reflect the site's attributes by which it provides services instrumental to learning at, or facilitate the use of the HTVN facility. These variables are primarily accessibility factors. We invoke a broad measure of accessibility named Locational Index (LOC) to capture this effect. LOC measures the relative accessibility or "environment of access" of an HTVN site. It describes the congestion and negative urban image of larger cities (greater than 100,000) relative to the less urbanized (those less than 100,000). The prohibitive cost of data gathering prevented us from obtaining a more robust measure of accessibility based on the specific HTVN site.[ix]

TAC refers to the geographic threshold from which patrons are optimally attracted to the down-link site. We hypothesize that an HTVN site will draw most of its patronage from its primary trade area. The extent of such an area will be a function of influences or land uses that support or are complementary to its utilization. Competing influences or land use activities that detract from its utilization will negatively affect its patronage. The variables employed here are distance from the nearest HTVN site (DSV), distance from supporting land use (DSH), population of the metropolitan area (MPO) and city (CPO) in which the host HTVN is located.

DEM and OPHA describe the strength of potential demand for HEP from the host (HTVN) site as a result of its scale of operation, characteristics of its residents, and manpower requirements. As indicated earlier, decisions on how much HEP to procure and at what site are made jointly by PHAs and employees to reflect these attributes. These are important to the extent that customers will be drawn from both on-site and off-site sources. The variable, total number of households residing at the host PHA (HSU), is used to capture these attributes in the face of data constraints. [x]

The locational model can now be stated as (with the expected sign of the variables in parenthesis):

$$NLV = f(\underset{(+)}{HSU},\ \underset{(+)}{MPO},\ \underset{(+)}{CPO},\ \underset{(-)}{LOC},\ \underset{(+)}{DSH},\ \underset{(-)}{DSV})$$

Where NLV = Number of log-in viewers of HTVN broadcasts in 1999(= Q)
MPO = Metropolitan Population for the HTVN site
CPO = City Population for the HTVN site.
LOC = Location Index (= 1 if CPO > 100,000 ; = 0 if otherwise)
HSU = Total number of households resident in a PHA
DSH = Distance of an HTVN site from a complementary land use
DSV = Distance of an HTVN site from the closest HTVN site

HSU is a measure of PHA characteristics; MPO, CPO, DSH, DSV are measures of Trade Area Characteristics, and LOC is a measure of Site Drawing Power. On an a priori basis, we expect the coefficients of HSU, MPO, CPO, and DSV to be positive. Larger metropolitan as well as city populations should lead to more patrons for the site because of a larger market implied by the larger size. The same may be said of the size of resident households as PHAs with more residents require bigger operations and hence greater demand for training programs for its personnel. DSV is a measure of competitive threat. The longer the distance of an HTVN from another, the greater the monopoly influence it would have over surrounding PHAs without HTVN and hence the higher its patronage. DSH is expected to be positively related to viewer-ship (NLV). The closer a complementary land use is to the site, the more should be its patronage. Negative sign is expected for the coefficient of location because larger metropolitan areas carry more negative urban image from congestion, which poses a disincentive for visiting such locations (LOC =1 for CPOP > 100,000).

4. Data Generation and Sampling

The population frame for the dependent variable was the list of HTVN sites in operation in December 1999 which were about 110. Database on 451 Public Housing Authorities with resident household population above 500 constituted the frame for the other variables. Data availability and other constraints yielded sample a size of 52. The variables were generated as follows.

HSU	Total number of households resident in a PHA was obtained from vendor's database.
MPO	PHA's metropolitan population is a 1997 projection obtained from the U.S. Census Bureau's website.
CPO	PHA's city population is a 1998 projection obtained from the U.S. Census Bureau's website.
LOC	Location was derived as a categorical variable using city population data above.
DSV	Distance of an HTVN site from the nearest HTVN location was calibrated using a web-based program mapping program in combination with the National Geographic Road Atlas distance measurements. The same approach was used to calculate DSH using the distance from the nearest HUD location as a surrogate for a complementary land use. This determination was based on the recommendation of the HTVN vendors.
NLV	The dependent variable, number of log-in viewers, was obtained from the vendors. They generated the data through a telephone survey of a random sample of existing HTVN sites in December 1999. The exercise yielded 65 returns of which 52 are usable. This sample size constituted about 47% of the population of existing sites.

Statistical Summary of Sample Data

Table 1 is a statistical summary of sample data. The sample has a mean PHA resident population (HSU) of 2096, mean metropolitan population of 1190423 and a mean city population of the PHAs of 167912. The maximum metropolitan area population is San Francisco, California with 6.7 million people and the minimum is El Mira, New York with 93088 people. Baltimore City Housing Authority has the largest resident population (HSU) of 16716 households while Danbury PHA, Connecticut, has the least with 524 households. San Diego has the maximum city population (CPO) in the sample with 1.22 million people and Cambridge, Massachusetts has the lowest with 11791 people.

The HTVN site in the sample that is of the greatest distance from its nearest HTVN is Seattle, Washington which is 816 miles from San Francisco, California while two HTVN sites , Central Falls and Pawtucket both in Rhode Island are only 5 miles from Providence, Rhode Island HTVN site. The average distance between HTVN sites in the sample is 86.4 miles. There is a very wide variation in these distances as the sample standard deviation of the distances is 116.94 miles.

The mean number of students that logged in live for each HTVN host site in the sample (NLV) was 27.65 in 1999. On the average, 77% or 21.31 of these students were from the host site (HST) itself, with slightly under one-quarter coming from the outside. Again, there was a very wide variation in the sample given a sample standard deviation of 53.15 students. The San Francisco HTVN site had the greatest number of patrons (311) in the sample for 1999. None of these were reported to be from the outside.

We had to contend with the problem of possible measurement error in the value of the dependent variable, NLV. The vendors tell us that the value does not necessarily represent the exact number of viewers. 22% of the viewers are estimated to be unaccounted for by the log-in counts while another 26% , on the average, are estimated to be secondary viewers who only watched the reruns of the telecasts. For the purpose of our estimation, we have assumed that any measurement errors involved are random. That is, discrepancies in actual versus reported log-in viewers were reasonably uniform across locations.

5.Empirical Results

We initially employed the OLS technique with appropriate transformations to correct for non-linearity in the in the estimation. Our initial regression which assumed strict linearity for all variables produced rather puzzling results. While the R^2 value was high (0.69) in the presence of all the variables, the influence of metropolitan population (MPO) was largely dominant, explaining nearly 65% of the total variation in NLV by itself. Its coefficient had the wrong sign when CPO was included but was consistently significant for all trials with different variables present. These preliminary observations led us to undertake non-linear transformation and test for heteroskedasticity. Our non-linear transformation produced a slight improvement in R^2 to 72.6% (see table 3). The results depicted here represents the best model ignoring the fact that heteroscedasticity may be present. All the variables are statistically significant with the exception of HSU which is dropped while the coefficients had the correct signs with the exception of the location index (LOC). The quadratic effect of MPO, DSV, and DSH appear to be driven by the pull effect of a few large metropolitan. Areas.

Tests for Heteroscedasticity

Clearly, the presence of heteroscedasticity would have a substantial impact on the statistical tests. Our a priori suspicion is that the MPO variable is a source of heteroscedasticity. Thus, we suspect that error terms for large metropolitan populations would be greater than error terms for small metropolitan populations. Our suspicion is that the number of log-in viewers (NLV) would have a higher variance for large metropolitan populations than for the smaller ones. If this is true, this would bias our tests for statistical significance of our parameters. In order to test for heteroscedasticity we performed the White test (White, 1980). Table 4 presents the results of White's test.

Using White's test we were able to reject the null hypothesis of homoscedasticity at the .005% level. The test statistic is number of observations times r-square which equals 41.9. This is chi-square distributed with 2 degrees of freedom. The critical value of the Chi-Square with 2 degrees of freedom is 10.6. Therefore, we reject the null hypothesis of homoscedasticity since 41.9 > 10.6.

Weighted Least Squares Estimation Our tests for heteroskedasticity indicated that the above model (table 3) exhibited significant heteroskedasticity. Further tests clearly isolated the MPO variable as the chief source of this heteroskedasticity.

Thus, in order to correct for heteroskedasticity we used a weighted least squares model. This provides us with a good model for both interpretation and prediction. The weights used represented a scaling of all the variables by the mean weighted MPO.

Table 5 provides an analysis of the data using weighted least squares. Our results indicate that MPO, DSH, and LOC are statistically significant. Our adjusted model also has a very strong R2. Three of the variables now have the correct signs while two do not. These are the distance to the closest HTVN (DSV) which is also not significant and locational index (LOC). It appears that considerable amount of unsatisfied demand exists in the market so that anticipated competitive threat is not in effect. The fact that LOC is significant but has the wrong sign suggests that the variable may have been calibrated so broadly that it fails to adequately capture the effects of the Site Drawing Power (SDP). There is also only a small proportion (25% on the average) of off-site customers that patronize the HTVN centers.
Table 6 represents the results of the weighted least squares regression with only those variables which were found to be statistically significant. This represents our best model and should be used as the best hedonic equation.[xi]

6.Conclusion

These results lead us to the following particular conclusions:

1. The level of patronage for HTVN sites is invariant with the number of a PHA's resident population.
2. The performance of an HTVN educational programming site depends largely on the metropolitan area population.
3. Expansion of HTVN educational programming (HEP) should be undertaken with the aid of the hedonic index incorporating primarily, the potential site's market area and secondarily, the Site Drawing Power characteristics. .
4. Operating characteristics of the PHA appear largely unimportant. Perhaps the influence of SDP could be improved given a more effective measurement.

In general, proximity to the market, the site's accessibility and its amenities appears to constitute the most potent site selection criteria for service activities. This market orientation outcome is similar to observations made in a recent study (Maning, 1999) about Hewlett Packard's decision to locate one of its manufacturing sites in Italy. They also support O'Mara's results noted earlier. This has also demonstrated the efficacy of demand-side models for site selection.

Table 1, Descriptive Statistics

	MPO	CPO	DSH	DSV	NLV	HSU	HST	LOC	TR	PRICE
Mean	1190423	167911.9	48.48077	86.44231	27.65385	2096.058	21.30769	0.442308	531.8846	6000
Median	582415	88359.5	26.5	66	6	1260.5	0	0	198	6000
Maximum	6700753	1220666	208	816	311	16716	311	1	4717	6000
Minimum	93088	11791	0	5	1	265	0	0	0	6000
Std. Dev.	1448381	222762.3	51.98321	116.9418	53.15308	2583.134	52.00322	0.501506	960.9964	0
Skewness	2.010162	2.831959	1.145274	4.821806	3.461675	3.835803	3.887807	0.232321	3.194462	NA
Kurtosis	6.631803	11.83808	3.632759	30.41745	17.17455	21.09555	20.31538	1.053973	13.32975	NA
Jarque-Bera	63.59814	238.7487	12.23516	1830.217	539.1763	836.9884	780.6122	8.672978	319.6313	NA
Probability	0	0	0.002204	0	0	0	0	0.013082	0	NA
Observations	52	52	52	52	52	52	52	52	52	52

Table 2, Correlation Matrix

	MPO	CPO	DSH	DSV	HST	HSU	LOC	NLV	TR
MPO	1	0.366334	-0.36229	-0.19852	0.541029	0.34254	0.102936	0.524985	-0.06355
CPO	0.366334	1	-0.07729	-0.03332	0.450603	0.526653	0.567911	0.450482	-0.09795
DSH	-0.36229	-0.07729	1	0.070412	-0.10207	-0.35866	-0.25878	-0.01882	0.379697
DSV	-0.19852	-0.03332	0.070412	1	0.069383	-0.09403	-0.15151	0.11149	0.187611
HST	0.541029	0.450603	-0.10207	0.069383	1	0.197358	0.160083	0.975944	-0.05721
HSU	0.34254	0.526653	-0.35866	-0.09403	0.197358	1	0.467541	0.166532	-0.13736
LOC	0.102936	0.567911	-0.25878	-0.15151	0.160083	0.467541	1	0.122077	-0.21625
NLV	0.524985	0.450482	-0.01882	0.11149	0.975944	0.166532	0.122077	1	0.153738
TR	-0.06355	-0.09795	0.379697	0.187611	-0.05721	-0.13736	-0.21625	0.153738	1

Table 3, OLS Estimation with Non-Linear Transformation

Dependent Variable: NLV				
Method: Least Squares				
Sample: 65				
Included observations: 52				
Excluded observations: 13				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	36.50625	17.85848	2.044197	0.0471
MPO	-6.20E-05	1.34E-05	-4.633257	0.0000
MPO^2	1.39E-11	2.06E-12	6.749046	0.0000
DSH	-0.889050	0.300773	-2.955888	0.0050

DSH^2	0.003747	0.001535	2.440703	0.0189
MPO*DSH	4.33E-07	1.24E-07	3.489150	0.0011
DSV	0.307320	0.111172	2.764376	0.0084
DSV^2	-0.000346	0.000138	-2.504971	0.0161
LOC	18.79337	9.058768	2.074606	0.0440
R-squared	0.726168	Mean dependent var		27.65385
Adjusted R-squared	0.675222	S.D. dependent var		53.15308
S.E. of regression	30.29155	Akaike info criterion		9.815725
Sum squared resid	39455.84	Schwarz criterion		10.15344
Log likelihood	-246.2088	F-statistic		14.25382
Durbin-Watson stat	1.264361	Prob(F-statistic)		0.000000

Table 4, White Heteroscedasticity Test

White Heteroskedasticity Test:				
F-statistic	94.45322	Probability		0.000000
Obs*R-squared	41.90779	Probability		0.000000
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 06/08/00 Time: 10:44				
Sample: 1 65				
Included observations: 53				
Excluded observations: 12				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1573.081	504.1420	3.120314	0.0030
MPO	-0.002238	0.000648	-3.456783	0.0011
MPO^2	8.86E-10	1.17E-10	7.599365	0.0000
R-squared	0.790713	Mean dependent var		1970.119
Adjusted R-squared	0.782342	S.D. dependent var		4693.167
S.E. of regression	2189.544	Akaike info criterion		18.27571
Sum squared resid	2.40E+08	Schwarz criterion		18.38724
Log likelihood	-481.3064	F-statistic		94.45322
Durbin-Watson stat	1.806203	Prob(F-statistic)		0.000000

Table 5, Models with Weighted Least Squares Estimation

Dependent Variable: NLV				
Sample: 65				
Included observations: 52				
Excluded observations: 13				
Weighting series: MPO				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.994361	45.39066	0.110031	0.9129
MPO	-5.49E-05	2.17E-05	-2.526491	0.0150
MPO^2	1.36E-11	2.66E-12	5.100244	0.0000
DSH	0.614415	0.274502	2.238290	0.0301
DSV	0.140852	0.200779	0.701526	0.4865
LOC	50.78720	19.83843	2.560041	0.0138

Weighted Statistics				
R-squared	0.913536	Mean dependent var		60.95228
Adjusted R-squared	0.904138	S.D. dependent var		255.2992
S.E. of regression	79.04468	Akaike info criterion		11.68607
Sum squared resid	287410.8	Schwarz criterion		11.91121
Log likelihood	-297.8378	F-statistic		97.20294
Durbin-Watson stat	1.307583	Prob(F-statistic)		0.000000
Unweighted Statistics				
R-squared	0.003095	Mean dependent var		27.65385
Adjusted R-squared	-0.105264	S.D. dependent var		53.15308
S.E. of regression	55.88065	Sum squared resid		143641.8
Durbin-Watson stat	1.137625			

Table 6, Final Model with WLS Estimation

Dependent Variable: NLV				
Sample: 65				
Included observations: 52				
Excluded observations: 13				
Weighting series: MPO				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.20447	43.97224	0.277549	0.7826
MPO	-5.64E-05	2.15E-05	-2.627851	0.0116
MPO^2	1.37E-11	2.64E-12	5.180365	0.0000
DSH	0.678957	0.257224	2.639558	0.0112
LOC	55.73694	18.44088	3.022467	0.0041
Weighted Statistics				
R-squared	0.912611	Mean dependent var		60.95228
Adjusted R-squared	0.905174	S.D. dependent var		255.2992
S.E. of regression	78.61646	Akaike info criterion		11.65825
Sum squared resid	290485.7	Schwarz criterion		11.84587
Log likelihood	-298.1145	F-statistic		122.7066
Durbin-Watson stat	1.310401	Prob(F-statistic)		0.000000
Unweighted Statistics				
R-squared	-0.079449	Mean dependent var		27.65385
Adjusted R-squared	-0.171317	S.D. dependent var		53.15308
S.E. of regression	57.52619	Sum squared resid		155535.3
Durbin-Watson stat	1.097405			

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