Understanding Firms' Relocation and Expansion Decisions Using Self-Reported Factor Importance Rating⁺

*Wuyang Hu, Linda J. Cox, Joan Wright, and Thomas R. Harris**

ABSTRACT. Using individual business surveys, this study examines the most important factors for firms' decisions to relocate or expand in the past as well as their intention to relocate or expand in the future. Results indicate that factors related to firms' internal characteristics, features of location sites, and the general economic environment may affect firms' past and future decisions. These factors are found to be generally consistent in their impact upon the past and future decisions with several noticeable differences. The hypothesis of footloose firms is supported by this study.

Key Words: Business retention; firm location

JEL Classifications: R11, R30

I. INTRODUCTION

In order to understand the spatial redistribution of natural resources, labor, the production of goods and services, and wealth, the behavior of individual businesses must be examined (Mariotti, 2005). One of the top economic development priorities of a government is to attract and retain desirable firms (van Dijk and Pellenbarg, 2000). The relocation of a firm to a particular region increases the demand for the region's resources and may generate demand for outputs from other local producers. This multiplier effect may cause the benefits of a new firm to a local municipality to be greater than those from its direct input demand (Harris et al., 2000). The out-migration of a firm, on the other hand, will have the opposite effect and may even reduce local input demand (Skiba, 2006).

Since the location and relocation of a firm involves many individuals, from city planners, real estate developers and construction staff, to professionals in trade agreements, a tremendous effort is required for attraction and retention programs. At the same time, this task is also one of the most challenging decisions firms make in their growth cycles. Clearly, one of the direct consequences of firm relocation is its impact on the distribution of wealth across different regions (Van Dijk and Pellenbarg, 2000). A local government may be successful in attracting a large number of firms and reap the benefits of increased job opportunities and government revenues. A developing nation may negotiate the expansion of existing firms or even the relocation of firms in order to collect similar benefits. Regardless of the scale, any increases come at the expense of the region that the firms are leaving.

Firm relocations contribute to changes in the region's economic landscape (Reum and Harris, 2006). Various policies may motivate or discourage relocation, while simultaneously

⁺ The Western Rural Development Center provided partial funding for this research

* Hu is affiliated with the Department of Agricultural Economics, University of Kentucky at Lexington. Cox is affiliated with the Department of Natural Resource and Environmental Management, University of Hawaii at Manoa. Wright and Harris are affiliated with the Department of Resource Economics, University of Nevada at Reno.

Corresponding author: Linda Cox, University of Hawaii at Manoa, Department of Natural Resource and Environmental Management, C1920 Edmonson Road, FT 62, Honolulu, HI 96822. E-mail lc Cox@hawaii.edu

inducing changes in the policy-making process. Consequently, the interaction between governments' spatial policies and firm relocation decisions is also of great research interest (e.g., Wohlgemuth and Kilkenny, 1998). To understand the dynamics associated with business attraction and retention, the factors that affect a firm's decision to relocate must be examined.

This paper analyzes the relocation and expansion behavior of businesses across the U.S. using a framework that includes the past and future preferences for relocation and/or expansion of individual firms. The firm's propensity to relocate/expand is evaluated using a likelihood scale. Self-reported explanatory factors are used to measure the degree to which various factors affect a firm's decision to relocate. A review of the literature on firm relocation summarizes the factors that researchers have found contribute to a firm's decision to relocate and examines the methodologies that could be used to analyze the firm's decision. Following the literature review, the techniques used to collect the firm level data and a series of empirical models are presented. The results of the models are then presented, along with the conclusions and implications of the research.

2. LITERATURE RELEVANCY AND CONTRIBUTION

Research on firms' relocation decisions has evolved over the past forty years. Pellenbarg, van Wissen, and van Dijk (2002) and others refer to the 1970s as the golden age of firm relocation studies. In the 1980s, research in this area almost disappeared and did not revive until the late 1990s. Van Dijk and Pellenbarg (2000) conclude that relocation trends correspond with the economic cycles of regions where the in- and out-migration of firms occur. This conclusion is supported by the notion that firms are profit maximizing entities and they constantly seek optimal opportunities. These opportunities may include shifts in the product mix, changes in consumer preferences, technology advances, government regulations, and other demand and supply determinants. Van Dijk and Pellenbarg (2000), Pellenbarg, van Wissen, and van Dijk (2002), and Brouwer, Mariotti, and Van Ommeren (2004) review the theoretical frameworks that explain firm location and relocation, including the neo-classical approach, the behavioral approach, and the institutional approach.

The neoclassical approach essentially uses the principle of cost minimization or profit maximization to analyze relocation behavior. A firm is always assumed as fully rational with perfect information on relevant parameters. The behavioral approach takes firm-specific context variables into consideration, which may in turn limit the firm's ability to acquire full information. The context variables may include factors that are not commonly used in cost minimization. The institutional approach, however, recognizes both firm-specific context and the social, cultural, and political context under which the relocation decisions are made. The reviews conclude that the institutional approach is the most comprehensive because it integrates the first two approaches and offers further insights; they recommend that it be adopted more widely in empirical research. This study considers these suggestions by incorporating factors that represent the institutional impacts.

Given an appropriate theoretical framework, the focus then turns to those specific factors that contribute most to the firm's decision. The literature provides a series of candidates to be considered. Van Dijk and Pellenbarg (2000) group the factors into three categories: firm internal, firm external, and location. The first category includes internal factors such as management structure and employment. The second category incorporates external factors such as government policy and regional economic infrastructure. The last group contains location-

specific factors like market size and distance measures. The authors find that internal factors are the most important determinants. Schmenner (1980) and Mariotti (2005) also conclude that internal factors are likely to be the most powerful in determining relocation behavior.

Some studies, however, show that external factors may be equally important. The *Handbook of Regional and Urban Economics* (Vernon and Thisse, 2004) differentiates the role of natural advantages and related shipping/transportation costs, versus the role of agglomeration economies. De Bok and Sanders (2005) find that the distance to transportation facilities is the most important aspect. Pellenbarg, van Wissen, and van Dijk (2002), after studying firm relocation patterns in several European countries, discover that the distance to transportation is a key factor and note that more firms relocate within the same municipality rather than distant locations. Knoben and Oerlemans (2005) support the conclusion that the geographic features of various sites play a critical role in decisions to relocate. Despite the commonly held view that tax breaks or other local financial incentives are a major factor in a firm's relocation decision, Guimarães, Rolfe, and Woodward (1998) and Fisher and Peters (1998) find evidence that these benefits are not likely to motivate a firm's relocation. Fisher and Peters (1998) comment that such tax reductions do not lead to equality and a balanced distribution of wealth across a society. Wohlgemuth and Kilkenny (1998) identify mixed evidence of the effects of tax breaks on relocation decisions.

Several studies have evaluated the effect of some non-conventional factors on a firm's decision to relocate. Grolleau, Lakhal, and Mzoughi (2004) and Guimarães, Figueiredo, and Woodward (2004) consider the impact of ethical factors such as fairness and social balances, while Fernandez (2008) examines the effect of a potential site's ethnic and racial components to the firms' relocation decision. Similarly, Skiba (2006) shows that the composition of the workforce, with respect to immigrants, is likely an important factor in the location of production. To supplement their postulation that factors from all three types of approaches (neo-classical, behavioral, and institutional) are important, van Dijk and Pellenbarg (2000) argue that the land required and the recreational demands of employees be considered. These authors also raise the question of whether government policies not directly related to economic development, such as pollution control, may affect the decision. Guimarães, Figueiredo, and Woodward (2004), on the other hand, did not find a discernable relationship between environmental legislation and firm relocation behavior.

This paper contains an analysis of firm relocation that has several unique characteristics. Most of the previous studies use macro data to examine an overall trend for firm relocation and its impact on the local economy. The few studies that used micro data to explain individual firm relocation behavior analyzed either their past behavior or their future plans. This type of approach fails to capture the natural continuum in a firm's decision making by ignoring the interactions between decisions across different time frames. Except for an early study conducted by Schmenner (1980), which only used internal factors as explanatory variables, the current analysis is one of the very few that can offer a comprehensive view of a firm's relocation decision. In contrast to Schmenner's (1980) work, this paper considers the decisions to expand or to relocate to a different site jointly. Expansion usually also requires a large amount of resources; therefore, this consideration can provide more information to understand firms' migration behavior than considering just relocation alone (Schmenner, 1980).

In addition, as Pellenbarg van Wissen, and van Dijk (2002) point out, the impact of internal factors is not likely to be well investigated. Factors relevant to the institutions and

policy should be given more focus than the neo-classical and behavioral approaches. Given the large number of factors suggested in the literature, collecting data relevant to all the potential aspects is not cost effective. In this paper, a self-reported rating framework is adopted which reduces the cost of the data collection process. Individual firms are queried about which factors play a role in relocation/expansion decisions; the firm leaders rate the importance of each factor. These ratings can then be analyzed to determine if any significant relationship can be found between a factor and the decision to relocate/expand. This approach has been used successfully in other types of research, such as consumers' purchasing decisions (Hu, 2006a). While any analysis considering only a fixed number of factors is likely to have considered only a subset of all the relevant factors and may suffer from the missing variable problem, this study greatly reduces the cost of data collection and decreases the likelihood of bias due to missing variables. The third unique feature of this study is that it incorporates the arguments of Guimarães, Rolfe, and Woodward (1998) and Fisher and Peters (1998) that government tax incentives may not accurately predict firm relocation. Thus, this paper does not directly focus on tax credits, although they are indirectly considered in the self-reported factor ratings.

3. DATA

The data used in this study were collected during 2003 and 2006, as part of a joint effort between the University of Hawaii, Manoa, Montana State University, and the University of Nevada. A pre-survey sample of 2,129 and 2,700 firms was purchased in 2003 and 2006 from Dun and Bradstreet, that contained a general description of U.S. firms including size, revenue, contact information, and CEO's or manager's name. A stratified approach was used to create the population sample for the surveys (questionnaires) that included firms from the fastest growing and highest paying four-digit NAICS industry sectors of the Dun and Bradstreet data sets. To select these firms, four-digit NAICS industry sectors were first ranked based on their percentage change of annual sales and employee salaries according to data published by the Bureau of Labor Statistics. Then the top 100 sectors were selected out of the total of 317 four-digit NAICS industry sectors. These essentially include firms in all two-digit NAICS industries. A more detailed classification (e.g., five- or six-digit NAICS code) of industry sectors could have been used, but a four-digit system gives a scope detailed enough to differentiate various sectors and also general enough to manage.

After the population sample had been created, sampling of firms for survey was conducted as follows. Five firms were selected at random from each of the four-digit NAICS industry codes in the sample. If a firm did not agree to participate (complete the questionnaire), the next firm on the list was contacted. If a firm did not provide any information on their past or future relocation/expansion activities, the response was deemed as unusable. If all five firms were contacted and not at least one usable survey was obtained, another list of five was compiled.

The total number of completed questionnaires, after screening off those that were not eligible or damaged, was 213 of 2,129 for the 2003 data (10.0 percent response rate) and 1,064 of 2,700 for the 2006 data (39.4 percent response rate), constituting a total response rate of 26.4 percent (1,277 of 4,829 firms). The geographic distribution of the firms in this sample is illustrated by Figure 1. In the first survey (2003), after the sample had been selected, the survey questionnaire was sent to the manager or the CEO of each firm. Following this first round of surveys, reminder cards were sent to those firms that had not returned their survey after 2 weeks.

FIGURE 1. Geographic Distribution of Firms in Sample

Due to the limited response from the mail survey, telephone surveys were conducted from sample groups until an adequate sample had been obtained. In 2006, all surveys were conducted by telephone.

The response rate was larger for the 2006 survey for a number of reasons. The 2003 mail survey often did not end up in the hands of the appropriate person and, therefore, was not returned. After we had more information regarding the response condition of the survey, we decided to switch to a telephone survey because that allowed the surveyors to connect with the right person more quickly and allowed them establish a relationship in the firm so that they could call back in order to collect all the necessary information. The 2006 data set did not include all subsidiaries and branch offices that were found in the 2003 data set, which allowed more small firms to be represented, and therefore, drawn in the 2003 sample. Small firms were more willing to participate, although this type of clarity is costly given the challenges of identifying the motivations behind expansion and relocation decisions. Dillman (2007) has concluded that a significant difference in response rate can be achieved by repetitive, more personal survey effort. It is possible that different data collection methods may introduce variations in interpretation. However, since we are not testing differences in firms' relocation/expansion behavior between the two sampling years, the impact is not expected to be directly relevant in this study. Nevertheless, readers are cautioned on this aspect of data collection.

The questionnaire contained four sections. The first section asked questions about the general status of the firm, including the firm's NAICS code (to ensure the intended firm has been contacted), contact information, size, revenue, and other internal information. An abbreviated survey questionnaire can be found in the Appendix Table A1 and the full survey can be requested from the corresponding author.

The second section elicited the self-reported rating for a series of factors in terms of their importance in the decision of relocation/expansion. These questions were introduced in a neutral way such that the factors were not specifically tied to either past or future relocation/expansion decisions. The wording emphasized how the respondents would rate the factors in their relocation/expansion decisions. The benefit of using a generic decision is that one set of ratings is sufficient for the purpose of analyzing both types of decisions. Although this reduces the length of the survey, respondents were then not able to express their opinions in various situations. Although the tradeoff used here is generic, researchers such as Gottlieb (1994) have pointed out the potential bias of this approach. This caveat should be considered when examining the results of this analysis.

Table A1 shows the detailed factors used in the self-reported ratings for relocation/expansion factors. Issues such as location, transportation, proximity to the market, natural resource supply, technology support, natural environment amenities, location size capacity, labor supply potentials, local tax benefit, employees' compensation plan and recreational opportunity, local residence security, and public service support are included. They were selected based on the literature review introduced previously and they incorporate elements in various conventional firm location theories as well as those mentioned in newly emerged practices. For example, some incorporate concerns raised from the purely economic perspective, such as proximity to the market. Others address factors that cannot be adjusted by the firms directly, such as natural environment amenities and factors related to the institution, such as local

tax benefits and public service support. Information on these important ratings was collected in Likert scales, where “1” represented unimportant and “4” stood for very important.

The third section contained the decision variables. The first question asked firms whether they had relocated/expanded to a different site in the past five years. The second question asked firms to indicate how likely they were to relocate/expand to a different site in the next five years. Respondents rated their firms’ propensity to relocate/expand on a scale from “1” to “4” where “1” represented very unlikely and “4” stood for very likely. Therefore, for each firm, the data contain two types of decisions: a binary response for the past relocation activity and an ordered response for future relocation decisions.

Combining the activity of relocation and expansion together is not without contention, since this approach will not allow researchers to understand each type of behavior separately. However, the cost associated with separating these intention questions is also high. First, it will increase the length of the survey. Second, if one specific type of activity is chosen to maintain statistical identification, the size of the sample may also have to increase to ensure that enough firms that have relocated, but not expanded, are included in the sample. Nevertheless, given this design of the decision variable, caution must be used when interpreting the results.

The last section of the survey contains several questions pertaining to a firm’s preference for a relocation site. Those firms that did not indicate any propensity to relocate or expand were not queried. In addition, since questions in this section are not directly relevant here, they are not described in detail. Some representative questions are included in Table A1 for interested readers.

Table 1 gives a list of variables that are to be used in the empirical analysis along with the mean or median (depending on whether the variable is continuous) and standard deviation. If respondents did not complete all questions, the missing responses were replaced by either the mean or median of the rest of the sample. Although the missing observations can be approximated using various statistical procedures, a conservative approach is to replace them with the sample average, especially when the proportion of missing data is relatively small. For each variable given in Table 1, the ratio of missing observations varies and was never more than one percent of the sample. Access to high speed internet (variable HSPINTNT) received the highest median importance rating among all other factors. This result supports the hypothesis that new technological infrastructures may receive more and more attention in a firm’s selection of relocation/expansion site than some of the conventional infrastructures, such as access to natural gas pipelines (variable NATGAS).

The variables given in Table 1 closely resemble the questions asked in the second section of the survey, except for variables reflecting the importance of access to railroads and the availability of local colleges or universities. Each of these two variables is strongly correlated with several other variables in the dataset. Other empirical studies have encountered a similar multicollinearity problem in the estimation process (van Dijk and Pellenbarg, 2000) and thus the two variables were removed from the list prior to estimation. A check of the covariance matrix (see Appendix Table A2) between the rest of the variables in Table 1 reveals that the correlations are generally small, with a few being moderate (Cohen, 1988). Table 1 also presents the expected signs of the rating variables relative to the relocation/expansion decision variables. These expected signs are derived from relevant previous studies and “\” indicates the impact of a particular variable was either unavailable or unclear from previous literature. Since few existing

studies on firms' future relocation/expansion decision exist, the expected signs in Table 1 do not make such a distinction.

TABLE 1. Variable Definition and Descriptive Statistics

Variable	Definition	Mean/Median	Std. Dev.	Expected Sign
<i>Dependent Variables</i>				
Lfact*	has your company relocated or expanded in the last 5 years (binary choice)	0.608	0.488	n.a.
Lprop	will your company relocate or expand to an additional location in the next 5 years (ordered response)	2	0.032	n.a.
<i>Independent Variables</i>				
Sales*	annual sales in millions	252.82831	2496.844	\
Emptotal *	total employment in thousands	0.81926	6.456	\
Mfg*	whether a manufacturing company or not	0.756	0.430	\
Intstate	access to interstate	3	1.163	+
PkgFreit	access to package freight	3	1.212	+
RalFreit	access to rail freight	1	0.708	+
PngerAir	access to passenger air	2	1.160	+
PortHarb	access to port harbor	1	0.769	+
Supply	access to supplies	3	1.090	+
Customer	access to customers	3	1.148	+
ThrPhase	access to 3 phase power	3	1.248	\
NatGas	access to natural gas pipeline	1	1.159	\
IntTrdPt	access to intl trade port	1	0.811	\
FiberOpt	access to fiber optic lines	3	1.179	\
Hvolwat	availability of high volume water supply	1	0.946	\
Hwatdisp	aval of high volume waste water disposal	1	0.826	\
SlidDisp	aval of solid waste disposal	1	0.960	\
Stillite	aval of satellite transmission	1	1.041	\
Hsplntnt	aval of high speed internet	4	0.860	+
PubTrans	aval of public transmission	1	1.075	\
PondStrm	access to ponds and streams	1	0.555	\
Expsite	possibty for future expansn at site in add to current capacity	3	1.073	+
Manag	aval of managerial workforce	3	1.090	+
Skilled	aval of skilled workforce	3	1.046	+
Technicl	aval of technical workforce	3	1.129	+
Unskled	aval of unskilled workforce	2	1.024	\
LLCost	favorable local labor costs	3	1.037	+
WTaxRate	favorable workers' compensation tax rate	3	0.991	\
LocTax	favorable lcoal tax rate	3	0.931	+
Training	aval of job traning programs	2	1.016	\
Fincing	aval of long or short term financing	2	1.111	\
Crime	low crime rate	3	0.795	\
Housing	aval and affordability of housing	3	0.980	+
EnvQual	high env quality	3	0.930	+
Outdoor	outdoor recreation opportunities	2	1.051	\
social	social and cultural opport	3	0.993	\
Shopping	retail shopping opport	2	0.978	\
EdSys	quality educational system	3	1.019	-
Hlthcare	aval of quality health care	3	0.828	-
fire	aval of fire protection	3	0.804	\
Attract	ease of attracting skilled workers	3	0.986	+
N = 1277				

* Mean is reported.

4. EMPIRICAL MODELS

Since a relocation/expansion decision has two possible outcomes, yes or no, a binary choice model can be applied to these decisions. Two groups of choice models are commonly seen in the literature: the logit models and the probit models. Schmenner (1980) used a binary choice model, while Guimarães, Rolfe, and Woodward (1998) analyzed site choices using a nested logit model. Van Dijk and Pellenbarg (2000) constructed ordered logit models for their firm relocation study. Both theoretical and empirical results show that the results of using either model are highly consistent, and most of the differences between them center on empirical implementation issues (Train, 2003; Hu, 2006b). In this application, probit models are used.

Suppose variable y_i where $y_i = 1$ indicates that firm i relocated/expanded in the past five years; and $y_i = 0$ indicates that firm i had not done so. Further assume that the decision is determined by the relative benefit associated with either action, which can be written as U_{ij} where j indexes the option of relocation ($j = 1$ for the decision to relocate and $j = 0$ otherwise). The benefit U_{ij} cannot be observed without noise. If an error term ε_{ij} is used to represent the noise and appended to V_{ij} , the deterministic portion of U_{ij} that can be observed with certainty in Equation (1) is:

$$(1) \quad U_{ij} = V_{ij} + \varepsilon_{ij} = \mathbf{X}_{ij}\boldsymbol{\beta} + \varepsilon_{ij}, \forall i$$

Vector $\mathbf{X}_{ij}$ contains explanatory variables collected in the survey. Together with the unknown coefficients, vector $\boldsymbol{\beta}$ V_{ij} can be further decomposed as in (1). If the benefits of relocation/expansion are larger than the benefits of not doing so, then $y_i = 1$ and

$$(2) \quad \text{Prob}(y_i = 1) = \text{Prob}(U_{i,j=1} > U_{i,j=0})$$

If ε_{ij} is assumed to have an iid normal distribution, Equation (2) can be written as a binary probit model:

$$(3) \quad \text{Prob}(y_i = 1) = \Phi(\mathbf{X}_{ij}\boldsymbol{\beta})$$

where $\Phi(\cdot)$ is the standard normal distribution function.

For the question about the likelihood of relocating/expanding, a similar analytical procedure can be used. Thus, $y_i = 1, 2, 3$ or 4 the answer of firm i could range from very unlikely to very likely. Then, the probability of observing these different values associated with y_i can be written according to the benefit firm i expects to obtain:

$$(4) \quad \begin{aligned} \text{Prob}(y_i = 1) &= \text{Prob}(U_i < \lambda_1) \\ \text{Prob}(y_i = 2) &= \text{Prob}(\lambda_1 < U_i < \lambda_2) \\ \text{Prob}(y_i = 3) &= \text{Prob}(\lambda_2 < U_i < \lambda_3) \\ \text{Prob}(y_i = 4) &= \text{Prob}(U_i > \lambda_3) \end{aligned}$$

where the λ 's are unknown cut-off parameters to be estimated. To ensure that the model can be identified, one of the λ 's needs to be normalized and in this study λ_1 is normalized to zero. If the noise term ε_i is assumed to have an iid normal distribution, the result is an ordered probit model written in the standard normal distribution function $\Phi(\cdot)$:

$$(5) \quad \text{Prob}(y_i = k) = \Phi(\lambda_k - \mathbf{X}_i\boldsymbol{\beta}) - \Phi(\lambda_{k-1} - \mathbf{X}_i\boldsymbol{\beta}), \quad k = 1, 2, 3, 4 \quad \text{and} \quad \Phi(\lambda_0) = \Phi(\lambda_4) = 0$$

5. RESULTS

The top portion of Table 2 cross-tabulates firms' past and future relocation/expansion decisions as an initial step of the analysis. Several significant differences are found across categories, based on Z-tests of proportions. For example, of the 770 firms that relocated/expanded in the past five years, 275 of them said that they were very unlikely to relocate/expand again in the next five years. On the other hand, among the total of 500 firms that had not, 291 firms indicated that they were very unlikely to relocate/expand in the next five years.¹ Clearly, the ratio of firms not wishing to relocate/expand is much higher among those that had not relocated/expanded previously and this difference is significant. On the other hand, the ratio of firms very likely to relocate/expand in the future is significantly higher for the group that had relocated/expanded previously than for the group that had not done so in the past. This finding is consistent with the notion of footloose firms (King and Welling, 1992) in that those firms that moved in the past are more likely move in the future.

The lower portion of Table 2 provides information about the hypothesis that firms in different sectors may behave differently in terms of their relocation/expansion strategies. The past and future decisions are separated based on whether a firm was in a manufacturing industry. The manufacturing sector accounts for a significant portion of the US economy and is often a general indicator of economic health (Stutely, 2003; Reum and Harris, 2006). In addition, comparing conditions across all available sectors is not feasible. Table 2 indicates that except for the category of "don't know" or "no response," the ratios do not vary significantly for past or future decisions. These results partially support the argument that within the scope of fast-growing and high-paying sectors, firms in different economic segments do not exhibit differences in their relocation/expansion decisions.

Table 3 gives the coefficient of correlation between the importance rating variables and the two relocation/expansion decision variables (the past and future decisions). This simple correlation analysis allows one to examine the relationship between relocation/expansion decisions and each factor considered in the survey. As Table 3 indicates, all correlations are fairly small (Cohen, 1988). The majority of the relationships are positive; in other words, when a factor is considered important (receives higher score in rating), the firm is more likely to have relocated/expanded in the past and in the future. The direction of correlations is also consistent for past and future relocation/expansion decisions. Although it may be informative, this analysis only reveals one-to-one relationships while ignoring all other factors. As discussed previously, factors in firm relocation/expansion decisions are very likely to be interdependent with each other and to function as a group rather than individually. The modeling effort displayed in Tables 4 and 5 considers the inter-relationships between these factors.

¹ Sum of the number of firms in these two groups does not equal to the full sample size of 1,277. This is because seven firms did not indicate whether they had relocated/expanded previously.

TABLE 2. Cross Tabulation of Relocation/Expansion Decisions

<i>Compare past decisions and future propensities</i>						
Past Decision	Future Propensity					Total
	very unlikely**	unlikely*	likely**	very likely**	DK/NR	
Yes	275	147	158	184	6	770
No	291	116	56	35	2	500
Total	566	263	214	219	8	1270
<i>Compare relocation decisions in manufacturing versus non-manufacturing industries</i>						
Past Decision	Manufacture	Non-manufacture	Total			
Yes	577	193	770			
No	383	117	500			
Total	960	310	1270			
Future Propensity	Manufacture	Non-manufacture	Total			
Very unlikely	424	144	568			
Unlikely	217	48	265			
Likely	156	59	215			
Very likely	165	56	221			
DK/NR**	3	5	8			
Total	965	312	1277			

* and ** show the two numbers in the column or row are significantly different based on the 10% and 5% significance levels respectively.

Table 4 contains the binary probit analysis of firms' past relocation/expansion decisions. The overall model is significant based on the F-test, although many variables are not statistically significant. This result is typical in firm relocation studies (van Dijk and Pellenbarg, 2000). A VIF test shows the model is robust over multicollinearity. Signs of the parameters are generally consistent with the expected signs reported in Table 1. The three variables related to issues internal to the firm: annual sales, total employment, and manufacturing industry membership, are all insignificant. In particular, the dummy variable representing whether a firm belongs to a manufacturing industry is not significant, a result that is consistent with those in Table 2.

A different approach that could be used to identify the impact of firms belonging to different sectors is a fixed effects model, where a separate constant term is created for each economic sector and tested to determine if they are significantly different from zero and each other. This approach, however, suffers from at least two potential problems. First, the NAICS code uses more than one digit to identify the sector, making any determination of how many digits to include in the fixed effect analysis arbitrary. Second, if all sub-sectors are individually captured by a constant in the model, many corresponding additional parameters have to be estimated, which will greatly reduce the degree of freedom. Nevertheless, several attempts were made to distinguish the potential impacts of sector memberships. For example, a separate model was estimated that incorporated the fixed effects from manufacturing, mining, and retail sectors and did not show any significant results.

TABLE 3. Correlation between Importance Variables and Past and Future Relocation/Expansion Decisions

Importance Variables	Past Decision	Future Decision	Importance Variables	Past Decision	Future Decision
SALES	0.065	0.110	EXPSITE	0.256	0.273
EMPTOTAL	0.071	0.132	MANAG	0.208	0.217
MFG	-0.019	-0.008	SKILLED	0.154	0.192
INTSTATE	0.151	0.169	TECHNICL	0.142	0.157
PKGFEIT	0.108	0.048	UNSKLED	0.074	0.100
RALFREIT	0.041	0.066	LLCOST	0.137	0.177
PNGERAIR	0.211	0.175	WTAXRATE	0.079	0.119
PORTHARB	0.083	0.032	LOCTAX	0.073	0.134
SUPPLY	0.052	0.047	TRAINING	0.118	0.080
CUSTOMER	0.104	0.126	FINCING	0.057	0.039
THRPHASE	0.119	0.124	CRIME	-0.036	-0.037
NATGAS	0.069	0.054	HOUSING	0.083	0.084
INTTRDPT	0.044	0.052	ENVQUAL	0.005	0.001
FIBEROPT	0.219	0.205	OUTDOOR	-0.008	-0.008
HVOLWAT	0.037	0.070	SOCIAL	0.044	0.009
HWATDISP	0.052	0.062	SHOPING	0.039	0.040
SLIDDISP	0.097	0.071	EDSYS	0.070	0.051
STLLITE	0.087	0.128	HLTHCARE	0.016	0.064
HSPINTNT	0.200	0.133	FIRE	0.043	0.019
PUBTRANS	0.074	0.131	ATTRACT	0.180	0.169
PONDSTRM	0.050	0.042			

Positive relationships were found between the decision to relocate/expand in the past and the variables representing access to passenger air (*PNGERAIR*) and harbor (*PORTHARB*), access to fiber optic lines (*FIBEROPT*) and high speed internet (*HSPINTNT*), the possibility of future on-site expansion (*EXPSITE*), and the availability of job training programs (*TRAINING*). This implies that firms who consider these factors important in their decision-making were more likely to move. On the other hand, the variables representing access to rail freight (*RALFREIT*), supply of material (*SUPPLY*), access to international trade port (*INTTRDPT*), availability of high volume water supply (*HVOLWAT*), a low crime rate (*CRIME*), access to outdoor recreational opportunities (*OUTDOOR*), and the availability of quality health care (*HLTHCARE*) have a significant negative impact on past decisions to relocate/expand. This suggests that firms who believe these are important relocation factors were not as likely to relocate/expand as other firms. Overall, the most significant factors in the decision of a firm to relocate/expand are related to resource availability and technological support. Firms that required fiber optics, and relatively new transportation and production technologies, such as passenger air and high speed internet were more likely to relocate/expand. Conversely, firms that required established transportation methods (such as rail freight) and support from local public services (such as outdoor recreational opportunities and health care) were less likely to relocate/expand.

TABLE 4. Estimation Result of the Binary Past Relocation/Expansion Decision

Variables	Coeff.	P-value	Variables	Coeff.	P-value
Constant	-1.101	0.000	EXPSITE	0.264	0.000
SALES	5.232E-05	0.389	MANAG	0.061	0.184
EMPTOTAL	0.004	0.797	SKILLED	0.011	0.831
MFG	0.044	0.645	TECHNICL	-0.038	0.400
INTSTATE	0.044	0.235	UNSKLED	0.012	0.780
PKGFEIT	0.052	0.149	LLCOST	0.073	0.156
RALFREIT	-0.135	0.030	WTAXRATE	-0.067	0.254
PNGERAIR	0.148	0.000	LOCTAX	0.019	0.745
PORTHARB	0.203	0.006	TRAINING	0.086	0.060
SUPPLY	-0.072	0.085	FINCING	-0.018	0.657
CUSTOMER	0.059	0.118	CRIME	-0.191	0.002
THRPHASE	0.024	0.512	HOUSING	0.081	0.114
NATGAS	-0.013	0.739	ENVQUAL	-0.006	0.920
INTTRDPT	-0.175	0.009	OUTDOOR	-0.129	0.012
FIBEROPT	0.142	0.000	SOCIAL	0.067	0.237
HVOLWAT	-0.138	0.024	SHOPING	-0.075	0.131
HWATDISP	0.042	0.547	EDSYS	0.039	0.446
SLIDDISP	0.068	0.217	HLTHCARE	-0.181	0.004
STLLITE	-0.058	0.173	FIRE	0.075	0.213
HSPINTNT	0.141	0.006	ATTRACT	0.066	0.217
PUBTRANS	-0.062	0.123	LL	-736.882	
PONDSTRM	0.120	0.112	Adj. ρ^2	0.138	

Table 5 displays the results of the ordered probit model analyzing firms' decision on how likely they are to relocate/expand in the future. The two cut-off parameters λ 's are both significant and have the correct sign. The results in Table 5 reveal a general pattern that is consistent with those in Table 4, although some distinct differences are apparent. Variable *LFACT* is significantly positive, suggesting a positive link between firms' past and future decisions, which is consistent with the results in Table 2 and in support of the hypothesis regarding footloose firms. Similarly, the three variables related to internal factors are not significant. Other variables that are positively significant are *INTSTATE*, *PNGERAIR*, *FIBEROPT*, *EXPSITE*, *SKILLED*, *LLCOST*, and *LOCTAX*, which indicates that these firms value access to interstate highways, airports, and fiber optic lines; the possibility of future on-site expansion; and the availability of a skilled workforce, favorable local labor cost, and tax rate.

The key difference between factors associated positively with a firm's past decision to relocate/expand and those that affect the decision in the future is that skilled labor, local tax rates, and cost benefits were given much stronger weights in future decisions. This finding is supported by earlier studies in which local financial incentives were found to be effective in convincing firms to consider relocation (e.g., Papke, 1987). Only the variables *PORTHARB* and *CRIME* have a significant negative relationship with the decision to relocate/expand in the

future. The effect of the variable CRIME is consistent with that describing the actual behavior: firms that believed a low local crime rate was an important factor were less likely to relocate/expand in the past. The finding suggested by Table 5 is that the factors important in future relocation/expansion decisions may not be the same as those that were important in past decisions.

The differences in the self-reported factors for past and future relocation/expansion decisions have some interesting implications. For example, as Schmenner (1980, 1982) pointed out, sufficient and cheap labor supply and proximity to markets and consumers were two types of crucial factors in firms' relocation decisions in the last century. However, as indicated by variables *INSTATE* (interstate highway), *SKILLED* (skilled labor supply), and *LLCOST* (low labor cost) in Table 4, none of these factors were significant in firms' relocation/expansion occurring during the turn of the century (time of survey minus 1 to 5 years). Rather, new

TABLE 5. Estimation Result of the Ordered Future Relocation/Expansion Propensities

Variables	Coeff.	P-value	Variables	Coeff.	P-value
Constant	-1.906	0.000	MANAG	0.084	0.199
Lfact	0.699	0.000	SKILLED	0.150	0.048
SALES	4.226E-05	0.124	TECHNICL	-0.002	0.981
EMPTOTAL	0.016	0.240	UNSKLED	0.045	0.461
MFG	0.134	0.325	LLCOST	0.143	0.053
INTSTATE	0.127	0.017	WTAXRATE	-0.123	0.154
PKGFEIT	-0.061	0.234	LOCTAX	0.194	0.022
RALFREIT	-0.012	0.885	TRAINING	-0.106	0.091
PNGERAIR	0.105	0.061	FINCING	-0.031	0.572
PORTHARB	-0.169	0.075	CRIME	-0.241	0.004
SUPPLY	-0.080	0.172	HOUSING	0.041	0.582
CUSTOMER	0.082	0.127	ENVQUAL	0.022	0.781
THRPHASE	-0.002	0.974	OUTDOOR	-0.040	0.593
NATGAS	-0.059	0.286	SOCIAL	-0.084	0.307
INTTRDPT	0.081	0.354	SHOPING	0.005	0.948
FIBEROPT	0.125	0.023	EDSYS	-0.043	0.560
HVOLWAT	-0.023	0.786	HLTHCARE	0.072	0.410
HWATDISP	0.056	0.555	FIRE	-0.116	0.170
SLIDDISP	-0.073	0.334	ATTRACT	-0.003	0.969
STLLITE	0.057	0.328	λ_1	1.034	0.000
HSPINTNT	0.052	0.500	λ_2	2.091	0.000
PUBTRANS	0.084	0.130	LL	-1520.196	
PONDSTRM	0.046	0.641	Adj. p2	0.080	
EXPSITE	0.318	0.000			

technological infrastructure, such as the availability of high speed internet, was highly significant.

In comparison, Table 5 suggests that high speed internet would no longer be an important factor in firms' relocation/expansion decisions, despite the fact that this factor was regarded as an important aspect to consider in Table 1. This may indicate that those firms who thought the availability of high speed internet access was important were more likely to relocate/expand in the past. However, when considering similar decision in the future, firms would already have high speed internet or high speed internet is likely to be available already at most locations. Thus, whether high speed internet is available may be important in determining *where* to relocate/expand, but not *whether to do so*. High speed internet has likely become recognized as a fundamental necessity for any business. In Table 5, the traditional infrastructure variables suggested by Schmenner have once again become significant (e.g., variables *INSTATE*, *SKILLED*, and *LLCOST*). These results support the argument that in this age, where new technologies emerge faster than ever before, researchers should revisit firms' relocation/expansion decisions constantly in order to obtain a clear and current assessment.

6. CONCLUSION AND IMPLICATIONS

Firms' decisions to relocate/expand have important implications for factor, labor, and financial markets. In addition, these decisions tend to interact with local, regional, and federal governments' spatial policies and ultimately adjust the distribution of wealth. Using data collected from existing US firms, this study examines firms' relocation/expansion decisions in order to determine what factors influence these decisions both in the firms' past management history and in their future development.

The literature review suggests that this study contains several unique features. First, rather than focusing on location-specific characteristics, this study collected firm leaders' subjective view on various features of a potential new location. This eliminates the problems associated with the use of an endogenous choice set. Second, the self-reported rating framework allows leaders to evaluate a list of factors that may be relevant to their relocation/expansion decisions in a short period of time. Therefore, a larger number of factors that incorporate a firm's own internal features and characteristics of the new location, together with a series of institutional factors that are not greatly affected by the firms' commercial activities are considered. Finally, this study examines both preferences based on past actions and preferences for the future, which is rare in the literature. This allows a direct comparison between the factors that affect these two types of decisions.

The results show that factors important to past and future relocation/expansion decisions are generally consistent. Firms' internal features such as sales, employment and whether a firm belongs to a manufacturing industry are not vital in their decision making. Rather, the availability of materials, transportation options, and high-tech support are found to be key factors. The results of this study also support the footloose hypothesis that firms which relocated/expanded in the past are more likely to do so in the future. Some distinguishable differences exist between the factors that explain past and future decisions. Local supply of skilled labor, local tax structures, and lower relative labor costs are found to be significant in firms' future relocation /expansion decisions but are not significant in their actual past behavior.

These results offer important implications on the policy front as well. A government should be aware of what factors may have contributed to firms' relocation/expansion in the past and consider policies that will improve or eliminate the deficiencies. At the same time, factors important to firms' future decisions also need to be examined so local governments can maximize the outcome of the effort to avoid firm outflow and to attract new firms. Given these differences, studies examining reasons why these differences have occurred could be of interest as well.

While significant insights into firms' relocation/expansion behavior are provided here, opportunities for future research exist. In this analysis, firms that have relocated/expanded in the past, provided information on whether they thought some factors were important in their decision making (e.g., access to rail freight). One can examine the characteristics of the actual site where they have relocated/expanded to see whether the factors were indeed available (e.g., access to rail freight). More importantly, since all firms in the sample were asked about their future relocation/expansion propensities, a natural extension of the current analysis is to conduct follow-up surveys and examine whether these firms did as they said they would. This type of extension will require a major research effort which is beyond the scope of the current study. Once completed, it would generate a dataset capable of supporting a macro analysis of firms' relocation/expansion trend based on aggregated factors in addition to the current micro-based study. An added benefit of this continuing research effort, as Pellenbarg et al. (2002) pointed out, is related to the advantage of using longitudinal data to improve prediction. The augmented dataset would help refine the survey questionnaire, correct bias, and establish foundations for further studies.

Secondly, as it has been mentioned previously, one may further deconstruct the dependent (and independent) variable currently used in this study into several more detailed questions. Although this attempt may increase the data collecting effort significantly, the detailed information obtained from these questions would be invaluable. A researcher will need to exert careful thoughts on the tradeoffs involved in this extension.

REFERENCES

- Brouwer, Aleid E, Ilaria Mariotti, and Jos N. Van Ommeren. (2004) "The Firm Relocation Decision: An Empirical Investigation," *Annals of Regional Science*, 38, 335–347.
- Cohen, Jacob. (1988) *Statistical Power Analysis for the Behavioral Sciences*, 2nd edition. Lawrence Erlbaum Associates: Hillsdale, New Jersey.
- De Bok, Michiel and Frank Sanders. (2005) "Firm Relocation and Accessibility of Locations: Empirical Results from the Netherlands," in *Monograph, Transportation and Land Development*. Transportation Research Board: Washington, DC.
- Dillman, Don A. (2007) *Mail and Internet Surveys: The Tailored Design, Second Edition-2007 Update*. John Wiley Publisher: New York.
- Fernandez, Roberto M. (2008) "Race, Spatial Mismatch, and Job Accessibility: Evidence from a Plant Relocation," *Social Science Research*, 37, 953-975
- Fisher, Peter S. and Alan H. Peters. (1998) *Industrial Incentives: Competition among American States and Cities*. W. E. Upjohn Institute: Kalamazoo, Michigan.

- Gottlieb, Paul D. (1994) "Amenities as Economic Development Tools: Is There Enough Evidence?" *Economic Development Quarterly*, 8, 270–285.
- Grolleau, Gilles, Tarik Lakhal, and Naoufel Mzoughi. (2004) "Does Ethical Activism Lead to Firm Relocation," *Kyklos*, 57, 387–402.
- Guimarães, Paulo, Robert J. Rolfe, and Douglas P. Woodward. (1998) "Regional Incentives and Industrial Location in Puerto Rico," *International Regional Science Review*, 21, 119–138.
- Guimarães, Paulo, Octavio Figueiredo, and Douglas P. Woodward. (2004) "Industrial Location Modeling: Extending the Random Utility Framework," *Journal of Regional Science*, 44, 1–20.
- Harris, Thomas R., J. Scott Shonkwiler, George E. Ebai, and Peter Janson. (2000) "Application of BEA Economic Areas in the Development of the Great Basin Fiscal Impact Model," *Journal of Regional Analysis and Policy*, 30, 77–94.
- Henderson, J. Vernon and Jacques-Francois Thisse. (2004) *Handbook of Regional and Urban Economics, Volume 4: Cities and Geography*. Elsevier B.V.: Amsterdam.
- Hu, Wuyang. (2006a) "Exploring Heterogeneity in Consumers' Meat Store Choices in an Emerging Market." *Journal of Agribusiness*, 24, 155–170.
- . (2006b) "Use of Spike Models in Measuring Consumers' Willingness to Pay for non-GM Oil," *Journal of Agricultural and Applied Economics*, 38, 525–538.
- King, Ian and Linda Welling. (1992) "Commitment, Efficiency, and Footloose Firms," *Economica*, 59(233), 63–73.
- Knoben, Joris and Leon A. G. Oerlemans. (2005) "The Effects of Firm Relocation on Firm Performance: A Literature Review," European Regional Science Association Annual Meeting.
- Mariotti, Ilaria. (2005) *Firm Relocation and Regional Policy: A Focus on Italy, the Netherlands, and the United Kingdom*. Unpublished Ph.D. dissertation, Department of Spatial Sciences, University of Groningen.
- Papke, Leslie E. (1987) "Subnational Taxation and Capital Mobility: Estimates of Tax-Price Elasticities," *National Tax Journal*, 40, 191–203.
- Pellenbarg, Piet H., Leo J. G. van Wissen, and Jouke van Dijk. (2002) "Firm Relocation: State of the Art and Research Prospects," *Systems, Organizations and Management Research Institute Research Report*, University of Groningen.
- Reum, Alison Davis and Thomas R. Harris. (2006) "Exploring Firm Location Beyond Simple Growth Models: A Double Hurdle Application," *Journal of Regional Analysis and Policy*, 36(1), 45–67.
- Schmenner, Roger W. (1980) "Choosing New Industrial Capacity: On-Site Expansion, Branching, and Relocation," *Quarterly Journal of Economics*, 95, 103–119.
- . (1982) *Making Business Location Decisions*. Prentice Hall: Englewood Cliffs, NJ.
- Skiba, Alexandre. (2006) "Immigration, Firm Relocation and Welfare of Domestic Workers." 6th Annual Missouri Economics Conference Selected Papers, March 31-April 1, 2006, Columbia, MS.

- Stutely, Richard. (2003) *Guide to Economic Indicators: Making Sense of Economics*. Bloomberg Press: Princeton, NJ.
- Train, Kenneth. (2003) *Discrete Choice Methods with Simulation*. Cambridge University Express: Cambridge, MA.
- Van Dijk, Jouke and Piet H. Pellenbarg. (2000) "Firm Relocation Decisions in the Netherlands: An Ordered Logit Approach," *Papers in Regional Science*, 79, 191–219.
- Wohlgemuth, Darin and Maureen Kilkenny. (1998) "Firm Relocation Threats and Copy Cat Costs," *International Regional Science Review*, 21, 139–162.

APPENDIX: QUESTIONNAIRE AND COVARIANCE MATRIX OF RATING VARIABLES

TABLE A1. Abbreviated Version of the Firm Relocation/Expansion Questionnaire

Section I: Firm General Information	
NICS code	CEO first name
Duns number	CEO last name
Company name	Sales
Zip	Employee total
Area code	Whether manufacturing industry
Telephone number	Base sales
	Qualification for foreign trade
Section II: Factor Importance Rating Questions	
<i>The following questions were asked for importance (1 for not important at all; 4 for very important)</i>	
<i>Questions were introduced in a generic manner--not particularly tied to past or future actions</i>	
Access to interstate highway	Availability of managerial workforce
Access to package freight	Availability of skilled workforce
Access to railroad	Availability of technical workforce
Access to passenger air/direct flights	Availability of unskilled workforce
Access to port/harbor	Favorable local labor costs
Access to supplies	Favorable worker's compensation tax rate
Access to customers	Favorable local tax rates
Access to 3-phase power	Availability of job training programs
Access to natural gas pipeline	Availability of long and short term financing
Access to international trade port	Low crime rate
Access to fiber optic lines	Availability and affordability of housing
Availability of high volume water supply	High environmental quality
Availability of high volume waste water disposal	Outdoor recreation opportunities
Availability of solid waste disposal	Social and cultural opportunities
Availability of satellite transmission	Retail shopping opportunities
Availability of high speed internet access	Quality educational system
Availability of public transportation	Availability of local college or university
Access to ponds and streams	Availability of quality healthcare
Possibility for future expansion at site	Availability of fire protection
	Ease of attracting skilled workers
Section III: Relocation History and Propensity	
Company relocated or expanded in the last 5 years	
(1 for yes and 0 for no)	
Likelihood of relocating or expanding in the next 5 years	
(1 for very unlikely; and 4 for very likely)	
Section IV: Site Expectation (only for firms at least slightly intend to relocate or expand)	
Size of land required	
Building space required	
Expected purchase price per acre of vacant land	
Expected development cost per square foot	
Percentage of employees who are managerial	

TABLE A2. Covariance Matrix of Importance Rating Variables

Variables	Sales	Emptotal	Mfg	Intstate	PkgFreit	RalFreit	PngerAir	PortHarb	Supply	Customer	ThrPhase	NatGas	IntTrdPt	FiberOpt	Hvolwat
Sales	1.000														
Emptotal	0.674	1.000													
Mfg	0.007	-0.033	1.000												
Intstate	0.045	0.064	-0.062	1.000											
PkgFreit	0.001	-0.015	-0.087	0.323	1.000										
RalFreit	0.048	0.076	-0.084	0.193	0.160	1.000									
PngerAir	0.015	0.059	0.001	0.260	0.277	0.121	1.000								
PortHarb	-0.015	0.014	-0.065	0.194	0.138	0.328	0.154	1.000							
Supply	0.022	0.018	-0.109	0.235	0.324	0.103	0.163	0.133	1.000						
Customer	0.030	0.000	0.018	0.229	0.156	0.150	0.095	0.075	0.386	1.000					
ThrPhase	0.023	0.070	-0.239	0.253	0.193	0.194	0.129	0.122	0.247	0.185	1.000				
NatGas	0.070	0.109	-0.209	0.144	0.158	0.193	0.081	0.100	0.179	0.149	0.411	1.000			
IntTrdPt	0.012	0.050	-0.062	0.197	0.209	0.270	0.181	0.658	0.152	0.077	0.168	0.163	1.000		
FiberOpt	0.032	0.079	0.032	0.206	0.153	0.111	0.327	0.085	0.114	0.178	0.212	0.187	0.132	1.000	
Hvolwat	0.100	0.132	-0.121	0.149	0.121	0.301	0.125	0.219	0.222	0.172	0.324	0.340	0.211	0.220	1.000
Hwatdisp	0.091	0.125	-0.124	0.154	0.120	0.245	0.094	0.203	0.187	0.166	0.273	0.336	0.238	0.173	0.685
SlidDisp	0.054	0.097	-0.134	0.165	0.153	0.222	0.133	0.164	0.217	0.172	0.301	0.370	0.187	0.190	0.563
Stllite	-0.010	0.025	0.072	0.145	0.146	0.089	0.252	0.077	0.128	0.198	0.152	0.133	0.129	0.333	0.197
Hsplntnt	-0.009	0.011	0.081	0.174	0.210	0.040	0.351	0.037	0.119	0.108	0.110	0.071	0.062	0.405	0.036
PubTrans	0.041	0.071	0.023	0.173	0.124	0.096	0.234	0.122	0.145	0.146	0.159	0.126	0.188	0.240	0.271
PondStrm	-0.026	-0.026	-0.005	0.024	0.081	0.086	0.136	0.099	0.102	0.070	0.051	0.063	0.120	0.082	0.193
Expsite	0.029	0.072	-0.130	0.210	0.128	0.164	0.159	0.139	0.170	0.160	0.270	0.194	0.138	0.233	0.205
Manag	0.060	0.080	-0.095	0.230	0.203	0.177	0.249	0.164	0.161	0.221	0.288	0.221	0.211	0.284	0.202
Skilled	0.038	0.085	-0.071	0.145	0.108	0.128	0.207	0.067	0.160	0.181	0.250	0.206	0.108	0.230	0.200
Technicl	0.038	0.074	-0.013	0.106	0.166	0.080	0.331	0.049	0.199	0.160	0.199	0.140	0.065	0.265	0.161
Unskled	0.010	0.037	-0.233	0.185	0.158	0.204	-0.025	0.190	0.141	0.148	0.293	0.236	0.165	0.056	0.196
LLCost	0.010	0.070	-0.206	0.229	0.190	0.158	0.091	0.177	0.244	0.211	0.348	0.266	0.181	0.169	0.221
WTaxRate	0.031	0.059	-0.146	0.197	0.132	0.130	0.076	0.171	0.226	0.186	0.300	0.274	0.162	0.170	0.213
LocTax	0.019	0.047	-0.106	0.206	0.146	0.102	0.068	0.144	0.234	0.150	0.256	0.228	0.117	0.143	0.157
Training	0.083	0.102	-0.065	0.164	0.144	0.159	0.121	0.079	0.192	0.133	0.231	0.232	0.157	0.169	0.215
Fincing	-0.041	-0.073	0.023	0.149	0.156	0.102	0.033	0.115	0.211	0.141	0.151	0.143	0.137	0.126	0.153
Crime	-0.010	0.001	0.004	0.121	0.158	0.012	0.054	0.036	0.129	0.098	0.095	0.082	0.066	0.131	0.096
Housing	0.023	0.046	-0.059	0.138	0.150	0.072	0.152	0.031	0.153	0.120	0.192	0.165	0.073	0.183	0.139
EnvQual	-0.016	0.019	0.013	0.062	0.179	0.047	0.129	0.057	0.164	0.113	0.090	0.084	0.077	0.127	0.170
Outdoor	-0.016	-0.005	-0.026	0.090	0.148	-0.003	0.177	0.018	0.115	0.061	0.067	0.132	0.019	0.129	0.122
social	-0.009	0.017	0.043	0.076	0.110	0.015	0.222	-0.009	0.091	0.098	0.029	0.086	0.020	0.216	0.095
Shopping	-0.004	0.019	-0.023	0.103	0.171	0.056	0.180	0.043	0.129	0.113	0.105	0.130	0.077	0.210	0.113
EdSys	0.012	0.028	-0.028	0.107	0.132	0.059	0.218	0.033	0.125	0.121	0.125	0.134	0.067	0.214	0.130
Hlthcare	-0.009	0.013	-0.005	0.112	0.166	0.039	0.141	0.049	0.142	0.168	0.163	0.123	0.066	0.198	0.132
fire	-0.004	-0.001	-0.018	0.130	0.165	0.068	0.060	0.058	0.207	0.191	0.193	0.170	0.081	0.164	0.188
Attract	0.018	0.067	-0.042	0.176	0.143	0.091	0.244	0.047	0.142	0.210	0.230	0.148	0.076	0.266	0.163

TABLE A2. Covariance Matrix of Importance Rating Variables (Cont'd)

Variables	Hwatdisp	SlidDisp	Stillite	Hsplntnt	PubTrans	PondStrm	Expsite	Manag	Skilled	Technicl	Unskled	LLCost	WTaxRate	LocTax	Training
Hwatdisp	1.000														
SlidDisp	0.606	1.000													
Stillite	0.193	0.254	1.000												
Hsplntnt	0.033	0.069	0.250	1.000											
PubTrans	0.277	0.215	0.193	0.180	1.000										
PondStrm	0.176	0.143	0.165	0.061	0.157	1.000									
Expsite	0.143	0.208	0.211	0.132	0.161	0.086	1.000								
Manag	0.197	0.269	0.210	0.230	0.263	0.068	0.343	1.000							
Skilled	0.177	0.238	0.198	0.181	0.235	0.090	0.308	0.512	1.000						
Technicl	0.186	0.207	0.244	0.255	0.246	0.096	0.236	0.439	0.590	1.000					
Unskled	0.153	0.231	0.061	-0.054	0.104	0.051	0.226	0.223	0.072	0.013	1.000				
LLCost	0.194	0.255	0.149	0.072	0.140	0.077	0.322	0.414	0.365	0.236	0.382	1.000			
WTaxRate	0.178	0.227	0.159	0.034	0.121	0.094	0.298	0.301	0.319	0.189	0.290	0.593	1.000		
LocTax	0.145	0.191	0.140	0.076	0.114	0.058	0.233	0.281	0.255	0.163	0.234	0.497	0.678	1.000	
Training	0.222	0.245	0.177	0.105	0.287	0.096	0.227	0.351	0.386	0.333	0.176	0.269	0.280	0.250	1.000
Fincing	0.150	0.187	0.158	0.082	0.135	0.091	0.209	0.265	0.257	0.191	0.121	0.251	0.259	0.283	0.331
Crime	0.090	0.091	0.157	0.118	0.108	0.077	0.156	0.152	0.174	0.149	0.047	0.198	0.254	0.287	0.196
Housing	0.107	0.139	0.195	0.163	0.157	0.099	0.249	0.254	0.214	0.196	0.127	0.283	0.307	0.308	0.215
EnvQual	0.130	0.146	0.177	0.143	0.171	0.173	0.138	0.176	0.176	0.237	0.013	0.160	0.210	0.249	0.230
Outdoor	0.073	0.125	0.164	0.117	0.085	0.203	0.153	0.076	0.096	0.140	0.043	0.137	0.132	0.161	0.175
social	0.048	0.048	0.204	0.204	0.185	0.118	0.134	0.162	0.140	0.207	-0.056	0.058	0.064	0.107	0.159
Shoping	0.095	0.099	0.211	0.146	0.140	0.088	0.182	0.199	0.162	0.170	0.074	0.177	0.161	0.187	0.159
EdSys	0.096	0.145	0.190	0.173	0.125	0.099	0.201	0.246	0.231	0.255	0.055	0.213	0.216	0.220	0.252
Hlthcare	0.101	0.146	0.164	0.181	0.154	0.086	0.212	0.233	0.219	0.213	0.094	0.251	0.311	0.287	0.218
fire	0.146	0.169	0.126	0.150	0.132	0.044	0.174	0.201	0.196	0.175	0.157	0.235	0.300	0.291	0.222
Attract	0.163	0.219	0.171	0.237	0.220	0.066	0.320	0.472	0.596	0.513	0.098	0.348	0.292	0.242	0.345

TABLE A2: Covariance Matrix of Importance Rating Variables (Cont'd)

Variables	Fincing	Crime	Housing	EnvQual	Outdoor	social	Shoping	EdSys	Hlthcare	fire	Attract
Fincing	1.000										
Crime	0.233	1.000									
Housing	0.182	0.431	1.000								
EnvQual	0.198	0.486	0.481	1.000							
Outdoor	0.143	0.297	0.399	0.486	1.000						
social	0.162	0.280	0.372	0.437	0.626	1.000					
Shoping	0.168	0.245	0.410	0.310	0.444	0.521	1.000				
EdSys	0.170	0.330	0.475	0.406	0.467	0.516	0.473	1.000			
Hlthcare	0.204	0.359	0.391	0.415	0.324	0.366	0.300	0.520	1.000		
fire	0.254	0.380	0.264	0.355	0.203	0.222	0.274	0.307	0.481	1.000	
Attract	0.257	0.221	0.299	0.274	0.195	0.245	0.241	0.331	0.317	0.266	1.000