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Studying Firm Locations: Survey Responses vs. Econometric Models

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1. Introduction

Industrial recruitment remains an important tool for state and local economic development practitioners (Loveridge 1996). Industrial recruitment is a tool by which development administrators attempt to entice to their area companies considering relocation or expansion. Officials in some areas - areas in need of jobs or where growth is otherwise actively sought - use this tool more actively by developing marketing brochures, advertising in site selection magazines, visiting likely prospects, etc. (Schoening and Sweeney 1992). In other areas which are "hot" for development or where growth is not particularly sought, practitioners have less need to actively recruit firms. In either case, a successful recruitment effort is influenced by a knowledge of the factors which make your area attractive coupled with an awareness of the types of firms for which these factors are most salient.

Industrial location researchers have identified factors which influence location decisions using two basic methods: surveys of companies, and statistical models. Survey research typically identifies one or more key respondents and asks them about the factors which influenced their location decision choice-proximity to markets, development incentives, labor force issues, personal reasons, etc. (Deloitte and Touche as reported by Bergsman 1993, Johnson 1991, Schmenner 1980). Statistical models, on the other hand, collect information on new economic activity, such as new plant openings or building permits; and variables which capture the essence of what may have influenced these new plant locations, such as land costs, relative wage rates, infrastructure spending, access to transportation, markets, etc. Models are then estimated to measure the relative influence of various factors on the plant location

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decision (Bartik 1991, Carlton 1983, Erickson and Wasylenko 1980, Gottlieb 1995, Kriesel and McNamara 1991, McGuire 1985, Wojan and Pulver 1995).

Surveys offer advantages over statistical models in some respects. First, they can report the stated significance of variables which are difficult or impossible to quantify, especially when one is examining multiple firms in dissimilar industrial sectors. Such variables include qualitative and subject factors such as "we wanted to locate near the owner's home" or "quality of life" factors. Studies have suggested that such personal or otherwise immeasurable reasons are at least as important, if not more, to the industrial location decision (Epping 1982). There also exists industry-specific characteristics such as "availability of inputs" which may be measurable for a small number of firms or industries, but when examining a range of firms or industries become too diverse to estimate. That is, since the type and quantity of inputs varies tremendously by industrial sector (e.g., sugar for candy-makers, paper for printers), statistical models have a difficult time dealing with such detailed information when examining several industrial sectors. One solution to this problem used by researchers is to use macro-level indicators of agglomeration economies generally, such as population or industrial density, but these aggregate indicators cannot give practitioners much detailed information.

In addition, surveys offer the researcher the opportunity to ask open-ended questions and thus perhaps identify factors not identified a-priori. While statistical models must by design decide beforehand *which* variables should be included in the study, to a certain extent, surveys can offer a list of variables thought to be important but also allow respondents to volunteer other important factors. In this way, firms can point out influences that otherwise might have been missed.

This is not to suggest that statistical models are not without their own advantages. Statistical models offer the advantage of being able to specify the size and direction of relationships among factors that would be difficult to inquire about in a survey-population density, for example. We may want to know whether population density drives out development, but a survey question worded, "did you avoid cities with high population densities?" would be awkward. In addition, plant managers do not always know the factors that directed them to choose a particular area - areas may have become attractive, and attracted *them*, for reasons unconnected to their particular situation. For example, airport access may have engendered a clustering of national shipping headquarters nearby. If a pre-printed forms manufacturing facility located nearby in order to be near the national shippers, it would not necessarily point to the airport as a "location influence" although the airport was the initial impetus for development. Statistical models in this way can account for factors influencing overall development, even if individual companies cannot point to these factors in a survey.

Yet the inability of statistical models to deal with such industry-specific and otherwise micro-level, detailed information, has led some to suggest that such models make generalizations which are too broad for use by local economic development practitioners (Bowlby 1988, Ritter 1990). The claim is that the site selection process is almost idiosyncratic, with the needs of individual companies and the characteristics of available locations combining in such a way as to make each location decision virtually unique. Surveys, although when reported in the aggregate can also give short shrift to the individual nature of the site selection process, have the advantage of being able to inquire about idiosyncratic elements and of gathering information "from the horse's mouth."

However, as much as surveys may give practitioners the specific information they desire, the validity of survey response answers has often been called into question. Answers to survey questions may be influenced by a firm's desire to sway development policy in its favor. For example, firms may report that a city subsidy or tax rates biased their decision to choose one municipality over another, in the hopes of affecting the availability of subsidies or the future level of taxes. In addition, for location decisions made far in the past, the memory of what affected location choices has faded, and responses are guesses based on what is perceived to be important to the firm's current operation. Another likely shortcoming is that often it is difficult to identify or find the person(s) responsible for making the decision. This person may have left the firm, or perhaps more than one person was responsible for making the location choice. The latter situation would require that more than one person be identified and participate in filling out the survey, a more costly and time-consuming task. Answers may also be biased in that those who do respond are likely to feel especially strongly about the question. However, it has been pointed out that respondents are unlikely to write in answers to open-ended questions (Dillman 1978, 58).

So, can economic development planners trust the information gleaned from surveys? What this paper does is to answer this question compare a set of survey answers to measured variables in order to explore the extent to which survey answers are valid and reliable. We have answers from 217 firms regarding reasons for choosing a particular city in the Chicago suburbs, and also information from a statistical database on the cities themselves, such as tax rates, highway access, distance to airport, etc. With these two sets of data, we can ask whether survey answers regarding the importance of various factors reflect firm behavior. For example, "did establishments which responded that highway access was important actually locate in a city with good highway access?"

2. Method

This exercise draws on a survey of 217 branch firms we conducted in the Chicago metropolitan area in 1992-1994. Branch firms located in cities in the six-county Chicago metropolitan area, except the city of Chicago itself, were identified through *Duns Market Identifiers* file available in Illinois through the Illinois Department of Commerce and Community Affairs. DMI files have been routinely used in location studies to identify company listings (Carlton 1979, Carlton 1983, Wasylenko 1980, Schmenner 1982). Although not as accurate as some other commercially available sources, they are as comprehensive as most of these others (Carlson 1995) and are somewhat more readily available.

The DMI file identified 1,302 branch facilities which were new to the DMI file since 1980, were located in suburban Chicago cities with population over 2,500,[1] and were non-residentiary in nature-only manufacturing and business services industries.[2] The survey was mailed to a random selection of 334 of these branch operation, representing 104 cities. A total of 217 surveys, located in 85 cities, were returned for a response rate of 65%; 134 responded after our first mailing and another 83 after multiple calls and mailings.[3] Respondents had the option of checking one or more particular factor(s) if in their opinion it affected their location choice. They were also invited to write in answers. The survey questionnaire itself is available in Carlson (1997).

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[1] Due to the way firm listings were pulled from the master DMI file, several suburban cities located near Chicago were not included in our list of branches. In short, listings were selected using the county and zip code fields. City of Chicago zip codes all have the prefix 606, so the program to subset the data selected all *non* 606 prefix. Unfortunately the fact that eight cities bordering Chicago also have zip codes which begin with 606 was discovered too late for these cities to be included in the study. These cities are Calumet Park, Cicero, Elmwood Park, Evergreen Park, Lincolnwood, Niles, Norridge, and Riverdale.

[2] The Standard Industrial Classification Codes of these industries were: 2000-2999 (manufacturing); 7300-7389 (business services); and 8700-8748 (engineering and management services. We excluded consumer-oriented operations such as construction, transportation and public utilities, retail, wholesale, personal services, banking, education, and government. The location of these industrial sectors are influenced more by consumer demand factors such as population and income than by traditional "economic development" factors such as labor accessibility, taxes, and other site characteristics which can be affected by economic development efforts. We also excluded entirely place-bound sectors of agriculture and mining.

[3] Firms received a telephone call before the survey was mailed in order to verify whether the firm was still in operation, and whether the officer's name given by the DMI file was the person to whom the survey should be mailed (perhaps the officer was no longer there, or knew of someone else who had been more directly involved in making the location decision). In addition, we used this initial call to alert the proper person to the fact that a survey was in the mail in an effort to obtain an advance promise of cooperation. During this first screening process we discovered that 81 of our initial random choices from the DMI list were not in operation at the stated location and could not be otherwise found. Other listings, also randomly chosen, replaced these.

The survey asked about the decision to locate in the Chicago suburbs as well as the choice of a particular city. We asked separately about the choice of these areas because previous research has indicated that location decisions occur in stages, where the geographic area in question narrows at each stage (as reviewed by Blair and Premus 1987, see especially Schmenner 1982). Different factors come into play as the area under investigation narrows. For example, metropolitan regions will differ in terms of weather, or their proximity to raw materials, so that those factors come into play when a firm is deciding among metropolitan areas. However, once the choice of a particular metropolitan area has been made, other factors-which differ within metropolitan areas- will be more salient, such as land availability and costs.

We also assembled a municipal-level data-base containing quantifiable information about cities in the metropolitan area, such as employment levels, distance to the central city, highway access, taxes, etc. The relevant variables that were collected for the 85 cities are outlined in Table 1. Cities without any survey returns were not included in the analysis, because there was no way to judge whether its characteristics were advantages. All of the variables found in Table 1 have been used in econometric models of industrial location as cited above.

Since the surveyed firms all had located in their respective cities in the 1980s,[4] the relevant variables were measured as early in the decade as possible. City employment data are from 1980 from the Illinois Department of Employment Security Where Workers Work data series. This series publishes information on employment by place of work in the six-county metropolitan area, with a few excepted years, since the mid-1970s. The transportation access and distance to central city variables were coded by the author.

The labor force and city demographic variables were taken from 1980 census files. Since a labor force shed is typically larger than the city itself, the correct thing to do is to calculate labor force statistics for a larger surrounding area (this is also done by Wasylenko 1980, and Erickson and Wasylenko 1980). To draw in this larger area, five-mile rings were

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[4] We obtained listings from DMI for two years: 1979 and 1992. We eliminated all those from our 1992 file which were in the database in 1979, theoretically keeping all those which had located in the Chicago suburbs later than 1979. However, for the following reasons it may have been possible for firms to have located previous to 1980 and thus be erroneously included in our final data set. First, DMI may have picked up the firm as a listing during the 1980s, even though the company was not new. Secondly, the business may have become a branch in that it was *acquired* by another firm during the 1980s. In this instance, the company now appears as a "new" branch in the DMI file where previously it had been single-site or owned by another company. Third, the company may have changed its DMI identification number for some reason during the decade and thus our match of 1979-1992 data did not eliminate it.

drawn from the center of each city and each city which lay, even partially, within this five-mile radius was coded.

Table 1. Descriptive Statistics City Variables

Variable*		Mean	Standard Deviation
Population and housing characteristics, 1980:			
CAVGHSVL	Average housing value ($1,000)	72.6	19.3
CCAPINC	Per capita income	2297.2	416.8
MHSINC	Median household income ($1,000)	24.4	4.5
CPOPDEN	Persons (1,000) per square mile	3.5	1.0
HOUSEDEN	Housing units per square mile	709.2	208.0
CPBLACK	% black population	4.7	10.3
PBLACK	% black in city and 5-mile surrounding cities	4.7	6.5
CITYAGE	Age of city in years	97.5	23.2
Employment per square mile, 1980:			
CMFGDEN8	Mfg employment	638.4	396.4
CTOTDEN8	Total employment	1782.7	1002.0
SMFGDEN8	Mfg emp. city and 5-mile surrounding cities	459.2	317.4
STOTDEN8	Total emp. city and 5- mile surrounding cities	1399.8	681.6
Transportation and distance:			
HIGHWAY1 (0,1)	Access ramps to interstate are in city	.68	
HIGHWAY2 (0,1)	Ramp less than 2 miles from city	.07	
HIGHWAY3 (0,1)	Ramp 2 to 5 miles	.03	
OHARE1 (0,1)	Distance to O'Hare airport: 0 -2 miles	.25	
OHARE2 (0,1)	O'Hare: > 2 miles to 10 miles	.15	
TOLOOP	Distance to Chicago's CBD	25.7	10.5
Labor force, 5-mile densities 1980:			
MEN_DEN	Density men 18-44	248.8	88.0
ELEM_DEN	Density elementary school only	199.8	107.8
COL_DEN	Density college graduates	104.5	58.2
n		85	

*Variables which refer to “5-mile” are variables which are calculated for the city plus all surrounding cities within a 5-mile radius. These variables generally begin with an “S”, while the corresponding variable for the city only begins with the letter “C.” See text for a more complete explanation.

From this database we then chose a set of variables from the database which in some way measured or were related to the factor in question and compared survey answers to the municipal data. To make this comparison, we divided the set of surveyed firms into two groups for each factor included in the survey: firms which indicated that the factor was important, and those which did not.[5] We then compared the means of a relevant city-level variable for the cities in which these two groups are located and performed a statistical test for the significance of the difference between means (a “t-test”, with reference to the proper F-test for homogeneity of population variances). For example, some firms indicated that tax rates were important while others did not. We compared,

[5] Although firms which did not choose a particular factor did not explicitly say "no, this factor was *not* important," I refer to them in later paragraphs as "no" firms. That is, the survey did not allow for a choice of “yes” or “no” but just asked “check all that were important.”

between groups, the mean tax rate for firms which said "yes, tax rates were important" and those which did not.[6]

Note that a city could have contained both firms which said "yes" and firms which said "no." In this case, the value of the variable for this municipality was included in the calculation of both means. For example, a firm which chose to locate in Des Plaines city may have said that being close to O'Hare airport was important, while a second firm who also chose Des Plaines did not say proximity to O'Hare was important. But note that what we are concerned with here is the overall mean of all cities in each group.

If we are to believe that survey answers reflect the true behavior of firms, the "yes" and "no" means for variables should be statistically different. That is, the mean tax rate should be lower for the group of respondents which said "yes, tax rates are important" than for those which did not say tax rates were important. Of course in some instances, the way in which the factor has been operationalized can be questioned. That is, as discussed above, statistical measures are sometimes imperfect in that they cannot fully capture the essence of what they are attempting to measure-how can we measure "markets," when markets vary so much among industries, or "land costs," when such micro-level data are not available? What we do here is to compensate for this by not relying only on a test of *one* measurable variable, but instead testing survey answers against a number of commonly-used statistical variables. If several of them do show statistical differences, then that supports the validity of survey responses. If *none* or few of them work, then we do have to suspect that survey answers do not always reflect firm behavior.

An extension of this exercise may also be possible if enough of our survey responses seem to reflect "reality," in that we may use survey responses to evaluate the operationalized measures. That is, inasmuch as several measures, or variables, can be used as proxies for any one concept, we may be able to judge which measures capture the concept best by looking for differences as compared to survey responses.

3. Findings

The relative means on selected variables, grouped by the factor under consideration, for firms which indicated the factor was important ("YES") and for those who did not check this factor ("NO"), are presented

[6] Some may suggest that a better test might be a logistic regression procedure, where the dependent variable is the dichotomous value "did / did not" check this factor, rather than the t-test we did employ. In a logistic regression, we might be able to control for the simultaneous effects of several variables. However, we specifically wanted to consider the city-level variables separately here, and examine each of their merits separately.

in Table 2. Also reported are the significance levels for a one-tailed difference-of-means test (with reference to the appropriate F-test for the homogeneity of variances), and the count of firms which were in the "yes" and "no" groups (n). The analysis here interweaves answers to questions which concerned factors affecting the choice of the Chicago suburbs in general, and answers to questions which pertained to the factors which led to the choice of a *particular* suburb among all Chicago suburbs. Let us begin by considering location factors which are easily quantified.

Transportation Access

Proximity to O'Hare airport and the importance of highway access was asked about regarding the "particular city" choice. While only 9% of the firms which did not say access to O'Hare was important situated themselves in nearby cities (less than 2 miles away), fully 37% of those who did want to be near O'Hare are in cities lying within this ring (OHARE1). Municipalities with "yes" firms are also characterized by attributes which are true for cities near the airport: higher levels of employment densities (CMFGDEN8, CTOTDEN8, SMFGDEN8 and STOTDEN8), are closer to highways (HGHWAY1) and closer to Chicago's Central Business District (TOLOOP).

In terms of highway access, more firms that said this was important were located in cities with direct access to highway ramps (HGHWAY1) than firms which did not: 75%, vs. 50% who did not check "highway access." We can also report that other than direct access, mere proximity to highways doesn't seem to matter; that is, cities without direct access ramps but which are relatively closer to highways than are other cities don't better their chances at capturing more firms needing highway availability (difference of means tests for HIGHWAY2 and HIGHWAY3 were not statistically significant). This contradicts what is advanced by Forkenbrock and Foster (1996), who report that business managers feel that convenient proximity serves them as well as does direct access.

The significance of these easily-measured transportation variables gives us some reason to believe that survey responses do indeed reflect the actual locational behavior of firms. Unlike some other variables, "distances to" are easy to calculate and we may be sure that what we are measuring is what we want to measure. The fact that these distance measures relate so cleanly to the survey responses does offer hope that location surveys contain valid information. We can perhaps now move with some confidence into a discussion of concepts that are difficult to capture in quantifiable terms, and use the discussion to examine in preliminary fashion those variables that seem to "best" capture these qualitative concepts.

Land Availability and Costs

Room for expansion is a primary consideration for firms. We asked one question about general land availability and the suburban choice, then asked about land costs in terms of their selection of a specific city.

The findings here suggest that several measures differ for firms who responded that land costs and land availability influenced their locational choice. Respondents which were concerned with finding inexpensive, open land preferred to situate themselves in places farther from the central city. When land availability is an issue, companies on average located 32 miles from the central business district, compared to 24 miles for those for whom it was not (TOLOOP). Firms looking for low-cost land located an average of 30 miles outside the CBD. Housing costs (CAVGHSV) and incomes (CCAPINC and MHSINC) also differ for "yes" and "no" firms, with firms interested in land availability and costs locating in cities with less expensive housing and lower incomes. Surprisingly, cities containing firms concerned about land costs or land availability do not differ as to levels of population or housing density, although land costs seem to be related to areas of employment density (STOTDEN8).

These findings allow us to speculate on the use of these variables in the firm location literature as an attempt to measure land factors. For example, models such as Moses and Williamson 1967, Wasylenko 1980, and McGuire 1985 have used "distance to central business district" to proxy for land costs, and housing or population density for land availability. However, the analysis here suggests that "distance to central business district" captures both land costs and availability, while housing and population density is not associated with land availability.

Two additional factors associated with land costs are also worth mentioning here. Surprisingly, firms concerned about land costs went to cities with higher aggregate tax rates (AGGRAT_1). As we will see below, firms who were concerned about *labor* costs also went to cities with higher overall tax rates. Thus, the regard for costs, by firms, does not seem to extend itself to a consideration of tax rates. Perhaps this suggests that cities which are concerned about what they may feel to be their relatively higher tax rate need not worry about business attraction if land costs are competitive.

It is also interesting to note that the presence of African-Americans seems to be linked to lower land costs, (and as we will see later, lower labor costs) so that companies for which this was a factor tended to end up in cities with higher African-American populations (CPBLACK). Again, as above, this implies that cities which are concerned that the presence of minority populations may discourage firm locations, may be somewhat reassured if such costs are competitive.

Building Availability

However, firms concerned about *building* availability tended to avoid cities and areas with relatively high African-American populations and went to cities with lower tax ratesBand these are the only two variables associated with building availability. Building availability does not seem to be linked to location from the central business district, highways or the airport; nor to housing or population density, the density of other development, or income and housing values.

This is puzzling, because we would otherwise assume that we would be able to identify *some* variable related to building availability; for example, housing density because that might indicate less land area available for business development; or the density of business development, which would be an indication of general levels of commercial and industrial building. But perhaps this question was checked "yes" by a host of firms who differed considerably in their need for different types of buildings - some for commercial, some for industrial, some for old, some for new; so that there really is no way to account for it systematically, as we can with "highway access." When we subset the sample and run separate t-tests for manufacturing and non-manufacturing firms these findings do not change. It may also be the case that a specific building that met the company's needs just happened to be located in a particular municipality, but it was not "general" building availability which led the firm to seek out locations in any particular city - one building met its need, but there may not have been an "assortment" of buildings in the area. In this case, our variables, measured at the city level, cannot account for "specific" buildings. Or, we may have a situation whereby the variables we have available to us here just do not serve as reliable proxies for "building availability." A final interpretation may be that firms which checked "building availability" indeed did not necessarily choose cities based on this factor.

Labor Costs

Firms which stated they were concerned about labor costs tended to go to older cities (CITYAGE), farther from the Loop, with larger minority populations, and lower household and per capita incomes (CCAPINC and MHSINC). These cities were situated in labor market areas with lower overall employment densities (CTOTDEN8, STOTDEN and SMFGDEN). City age may be associated with lower labor costs because of the historical manufacturing nature of older industrial towns surrounding Chicago. These towns, both within the first suburban ring, and farther away in the Fox River Valley (such as Elgin and Joliet, which had a relatively independent economic base until transportation improvements and growth of the core city drew them into the metropolitan

economy), have an economic history in heavy manufacturing sectors such sectors as steel and industrial machinery. The industrial restructuring of the 1980s hit these towns harder than newer, more "bedroom suburban" communities and thus were more apt to experience higher unemployment rates and associated falling wages.

Distance to the central city (TOLOOP) is a commonly accepted, though imperfect gradient measure of both land and labor costs. Companies concerned with wages located an average distance of 34 miles from the Loop, compared to 25 miles for those which did not say labor costs mattered. Median household incomes are lower in towns where these firms went: about $23,000 (in 1980 dollars), compared to $27,000 for firms which did not say labor costs were a factor.

Those who said their choice of the suburbs and of a particular city was influenced by wage considerations also tended to choose municipalities with higher percent black populations. Even though it may merely be the company's *perception* that minorities correlate with lower wages and not in fact the case, it is still interesting to note that firms who wish to pay lower wages will situate themselves in minority communities. It also may be that older industrial towns, as discussed in the preceding paragraph, are characterized by larger minority populations, and thus it is not minority populations specifically for which firms are seeking, but cities with higher-than-average unemployment rates. It also may be the case that minorities are concentrated in areas with lower per capita and median household incomes, variables also associated with respondents who said lower labor costs mattered.

Firms concerned about their labor costs also situated themselves in towns with less dense employment, probably because development indicates a competition for labor and thus a higher wage bill. It is interesting to note that it is total employment and not solely manufacturing employment which appears to signal higher wages for these firms. Population-based variables that we might think would be associated with wages are not significant (density of prime-working-age men and density of workers with elementary-school-only educations). Population densities have often been used as a measure of labor costs, but here we find that firms which were concerned about costs did not necessarily choose cities situated in areas with denser working-age or less-educated populations. What this might mean is that "population density" measures may be capturing the effects of two simultaneous but contradictory influences on location choices. Denser populations on the one hand indicate the presence of more plentiful labor, which acts to drive wages down; but also indicate more competition for land, which drives land prices up. In fact, companies concerned about their wage bill avoided towns with higher housing densities. Therefore, perhaps one should be

cautious when using population densities to predict development in statistical models.

Available Labor Force

The question regarding the importance of general labor force availability was only asked regarding the "suburbs" decision. Population density, indicating the general supply of "people," is significant, supporting the use of these measures by those such as McGuire 1985. Industrial development and distance to the central city did not matter.

Two variables regarding *labor characteristics* which matter in this instance is median household income and percent black. Companies who responded "yes" to "labor availability" located in municipalities with lower median household incomes ($24,500 versus $26,800 for those who said "no"), and higher minority populations, but did not choose places with workers at particular education levels. Since median household income and minority populations are both also related to labor cost concerns, it probably is the case that firms interpret a survey question regarding "available labor force" as meaning "available, *low-cost*, labor."

Access to Suppliers and Customers

Used by many, a popular indicator of agglomeration economies and economic linkages is "employment density." Here, however, respondents interested in proximity to suppliers did not necessarily locate in cities with higher total employment or manufacturing employment densities. In fact, the extremely odd finding is that those companies looking to locate near suppliers went to cities located in areas with *less* development (SMFGDEN8 and STOTDEN8). They cities they located in are also characterized by lower housing values and incomes, and more minority populations. We may conclude that in this instance, as with building availability, firms did not actually choose a location based on the factors they checked in the survey. An alternative interpretation, similar to that above for "building availability" is that our measure cannot capture "the presence of suppliers" perhaps because companies differ widely with regard to the specific kinds of suppliers needed, so that our general measure does not suffice. Or, it may be the case that there are other considerations which outweigh "access to suppliers," so that the t-test for this variable is not significant. In fact, the low "ranking" of supplier access is suggested by relatively low number of respondents which checked this factor (only 30 firms, the lowest N of all factors).

Similar limitations seem to be at work for the factor "access to customers." The employment density variables do not vary between "yes" and "no" firms, indicating either that our measure is not correct, for the reasons discussed in the previous paragraph; or that respondents which

checked this factor did not then chose locations based on this factor. What does vary is proximity to central city: firms which wanted to be near customers tended to locate closer to the central city than those that did not (25 miles vs. 28 miles).

Quality of Life Factors

It appears that a number of variables typically associated with quality of life concerns do indeed differ on the basis of whether the respondent firms said quality of life mattered. Both firms which stated they chose the suburbs in general and those which chose a particular suburban city because of quality of life considerations chose to locate farther from areas of high congestion; that is, away from the airport and from Chicago's central business district ("the Loop"), and in cities and areas with less industrial development. Only 9% of firms which said quality of life factors affected their location decisions located near the airport, while 24% of those who did not check "quality of life" did so. On average, "yes" firms located in cities 29 miles from Chicago's central business district (TOLOOP) and in towns with about 1550 workers per square mile (CTOTDEN8), while firms for which these issues were less important were in cities 25 miles away with about 2100 workers per square mile. These firms also chose cities (CMFGDEN8) and areas (SMFGDEN8) with lower levels of manufacturing employment density.

However, these variables are also commonly thought to serve as a proxy measure for land prices inasmuch as they reflect distance from the central city (where both land prices as well as wages fall as one moves farther from the center, as given by standard monocentric models; see Muth 1969 and Mills 1972), or densities of land use (see discussion in Bartik 1991). Yet since other measures of development densities--housing and population densities in the city (CPOPDEN and HOUSEDEN) are not significant, we may tentatively conclude that such firms are seeking quality of life factors.

What is also interesting is that for firms concerned about "quality of life," avoiding areas with minority populations seems to be part of the concern when choosing to locate in the suburbs over the central city. Firms which said quality of life considerations dictated their choice of a suburban location over a Chicago location located in areas with lower levels of minority populations. However, firms which said that they chose *among* suburban locations because of quality of life considerations did not locate in cities with fewer minorities. Therefore, it seems as though "quality of life" is sometimes a synonym for a concern about the presence of minority populations in the central city and a reason for a suburban location in general.

However, other variables which attempt to measure the presence of higher-income populations and so believed to capture quality of life concerns are not significant. For example, Charney 1983 suggested that the presence of low-income households is a proxy for quality of life issues and included in her model a measure of low-income households. Yet here, firms which checked this factor do not seem to favor towns with wealthier households (MHSINC), nor cities with more expensive housing (CAVGHSVL). This could reflect the fact that cities with higher-income households are more apt to zone out industrial development. If the data allowed us to consider the choice among cities that accept industrial development, we may have found that firms did favor the higher-income places among this subset of cities (as is suggested by Wasylenko 1980). In addition, it may be as Charney suggests, that households outbid businesses for access to "quality of life" factors in cities with such amenities.

A Note on Tax Rates

An unfortunate typographical error meant that the survey neglected to ask specifically about tax rates as a factor in location decisions. However, five of our 217 respondents specifically mentioned tax rates in the open-ended questions which asked about "other reasons" for choosing the suburbs or a particular city in the suburbs. Three of these were manufacturers and two were business services. What is interesting is it does not seem as though these firms were aggressive about searching out the lowest rates available: of these five, three moved to cities where the tax rate was actually *higher* than the average for all cities. However, since higher tax rates are often correlated with a higher level of services, this may not be a significant finding.

4. Conclusions

This exercise has suggested that responses to location surveys may be trusted in many instances. Firms which responded yes to the importance of particular factors, as a group, tended to locate in municipalities and areas which differed in terms of the factor (see Table 3 for a summary of the difference-of-means-tests for our factors). We saw this most clearly in terms of variables which are the easiest to quantify; specifically, with regard to transportation access variables, where firms which said access to highways and O'Hare airport *did* locate near these transportation links more so than firms which did not check this factor on the questionnaire. In addition, the variable "distance from the central city" behaves as we expect, positive for land and labor costs (Table 3), indicating

a typical land and labor gradient; and positive for the group of firms concerned about quality of life factors.

Yet the variables for concepts which are more difficult to quantify did not, in a few instances, show the pattern we might expect given their previous use in econometric studies of location decisions. Whether this is because survey answers are invalid, that is, companies do not locate according to factors they indicate on surveys; or whether it is because our available measures do not adequately capture the concepts, it is somewhat difficult to say. On the basis of the fact that the easily-quantified transportation access variables behave "well" and that many other variables fall out as expected, let us examine other variables which differed with regard to "yes/not yes" answers to other, less-easily measured factors. We may then offer some preliminary suggestions regarding the validity of variables which attempt to stand as proxy measures for concepts that are more difficult to capture. Some measures seem to be more appropriate than others.

For example, land availability, low land costs, and low labor costs, are all concepts which seem to be captured by "distance from central city," "less expensive housing" and "lower incomes" as we might have predicted; but population and housing densities did not seem to capture these concepts. The fact that companies concerned about land and labor resources were not necessarily driven away from more crowded municipalities suggest that econometric studies which use these factors to proxy for land or labor costs may not be capturing these concepts. In fact, residential densities seem to be associated with labor availability, but little else. Instead, it seems to be the density of *employment* that matters for companies concerned about labor costs.

Employment densities also seem to matter for firms looking for "quality of life" considerations, as is distance to the central city and the presence of minority populations. However, however housing values and median incomes do not seem to be an appropriate measure of this concept, where we might have expected that firms looking for a "quality of life" might choose places with higher incomes and housing values. One might be tempted to speculate that we found no difference for these firms because high income places tend to zone out business development, but remember, cities in the t-test sample must have had at least one firm location. So, cities that zone out development were not in the sample. In this case, we might expect that "quality of life" firms would perhaps at least have chosen the "highest" income/housing values municipalities available to them.

Table 2. Means and Significance Levels for Difference of Means Tests on Selected City Variables, For Firms Reporting "Yes, Factor was Important," vs. "No"

	YES	NO	(p)
TRANSPORTATION ACCESS			
Close to Airport			
CAVGHSV	82.5	79.6	.468
CCAPINC	2390.5	2291.7	.536
MHSINC	26.2	25.9	.763
CPOPDEN	3.4	3.3	.673
HOUSEDEN	683.3	639.5	.309
CPBLACK	2.8	4.2	.209
PBLACK	3.2	5.6	.001*
CITYAGE	82.0	87.0	.269
CMFGDEN8	853.8	641.1	.068*
CTOTDEN8	2279.6	1734.1	.006*
SMFGDEN8	603.2	441.6	.000*
STOTDEN8	1748.2	1353.5	.000*
HGHWAY1	.744	.496	.000*
OHARE1	.372	.088	.000*
TOLOOP	24.3	28.5	.013*
MEN_DEN	271.8	240.7	.001*
ELEM_DEN	195.1	183.5	.355
AGGRAT_1	7.7	8.0	.178
n	78	137	
Close to Highway			
CAVGHSV	82.9	77.5	.170
CCAPINC	2329.3	2325.1	.178
MHSINC	26.7	25.0	.080*
CPOPDEN	3.2	3.6	.106
HOUSEDEN	647.2	666.8	.661
CPBLACK	3.1	4.5	.261
PBLACK	4.4	5.2	.396
CITYAGE	81.0	91.1	.012*
CMFGDEN8	729.0	703.3	.821
CTOTDEN8	1948.9	1908.5	.835
SMFGDEN8	522.4	469.4	.236
STOTDEN8	1991.0	1421.3	.199
HGHWAY1	.748	.500	.031*
OHARE1	.216	.156	.258
TOLOOP	26.7	27.2	.777
MEN_DEN	256.8	245.4	.309
ELEM_DEN	189.0	185.8	.814
AGGRAT_1	7.9	7.9	.772
n	125	90	
Suburban Available Land			
CAVGHSV	73.7	83.8	.015*
CCAPINC	2219.2	2376.3	.012*
MHSINC	24.6	26.6	.054*
CPOPDEN	3.1	3.5	.120
HOUSEDEN	615.9	673.9	.215
CPBLACK	4.4	3.5	.516
PBLACK	5.6	4.4	.192
CITYAGE	87.4	84.4	.501
CMFGDEN8	801.0	677.5	.342
CTOTDEN8	1824.2	1981.8	.438
SMFGDEN8	490.7	504.7	.766
STOTDEN8	1388.2	1547.3	.133
HGHWAY1	.514	.623	.134
OHARE1	.129	.219	.089*
TOLOOP	32.3	24.5	.000*
MEN_DEN	230.3	261.9	.008*
ELEM_DEN	184.9	189.1	.765
AGGRAT_1	7.9	7.9	.795
n	70	146	

(Table 2. Continued)

	YES	NO	(p)
City Land Costs			
CAVGHSV	73.4	85.3	.001*
CCAPINC	2237.8	2385.1	.000*
MHSINC	24.6	26.9	.008*
CPOPDEN	3.4	3.3	.830
HOUSEDEN	643.7	662.8	.671
CPBLACK	5.5	2.6	.038*
PBLACK	5.6	4.2	.111
CITYAGE	86.0	84.8	.776
CMFGDEN8	758.3	692.6	.569
CTOTDEN8	1829.2	1997.9	.389
SMFGDEN8	478.6	514.1	.433
STOTDEN8	1386.8	1567.2	.077*
HGHWAY1	.524	.626	.142
OHARE1	.179	.198	.719
TOLOOP	30.3	24.8	.003*
MEN_DEN	240.6	259.3	.100
ELEM_DEN	183.0	190.7	.564
AGGRAT_1	8.1	7.7	.090*
n	84	131	
Building Available			
CAVGHSV	82.7	78.8	.322
CCAPINC	2366.9	2292.0	.405
MHSINC	26.4	25.6	.448
CPOPDEN	3.3	3.4	.662
HOUSEDEN	654.5	656.2	.969
CPBLACK	2.7	4.7	.089*
PBLACK	3.9	5.5	.051*
CITYAGE	83.8	86.5	.515
CMFGDEN8	738.8	699.8	.729
CTOTDEN8	1995.4	1874.8	.529
SMFGDEN8	509.6	491.7	.686
STOTDEN8	1533.5	1463.5	.484
HGHWAY1	.569	.602	.624
OHARE1	.186	.195	.876
TOLOOP	27.6	26.3	.451
MEN_DEN	252.0	252.1	.992
ELEM_DEN	185.7	189.5	.768
AGGRAT_1	7.7	8.0	.071*
n	102	113	
LABOR			
Suburban Low Labor Costs			
CAVGHSV	68.2	84.3	.000*
CCAPINC	2148.2	2380.2	.000*
MHSINC	22.9	26.9	.000*
CPOPDEN	3.3	3.4	.766
HOUSEDEN	612.0	668.4	.274
CPBLACK	6.6	2.9	.040*
PBLACK	5.9	4.5	.178
CITYAGE	91.7	83.4	.058*
CMFGDEN8	604.9	752.4	.262
CTOTDEN8	1576.2	2040.3	.021*
SMFGDEN8	397.8	531.8	.005*
STOTDEN8	1170.3	1596.3	.000*
HGHWAY1	.471	.624	.059*
OHARE1	.078	.224	.004*
TOLOOP	33.9	24.9	.000*
MEN_DEN	222.6	260.7	.008*
ELEM_DEN	174.6	191.8	.261
AGGRAT_1	8.3	7.8	.031*
n	51	165	

(Table 2. Continued)

	YES	NO	(p)
City Low Labor Costs			
CAVGHSV	68.4	85.3	.000*
CCAPINC	2137.8	2399.3	.000*
MHSINC	23.3	27.0	.000*
CPOPDEN	3.1	3.4	.241
HOUSEDEN	584.8	682.1	.048*
CPBLACK	6.0	2.9	.048*
PBLACK	6.1	4.2535	.069*
CITYAGE	92.5	82.5	.014*
CMFGDEN8	670.1	736.5	.598
CTOTDEN8	1596.5	2058.9	.030*
SMFGDEN8	405.9	535.9	.008*
STOTDEN8	1187.3	1613.7	.000*
HGHWAY1	.458	.635	.022*
OHARE1	.136	.212	.175
TOLOOP	34.1	24.2	.000*
MEN_DEN	220.5	263.9	.002*
ELEM_DEN	178.0	191.3	.363
AGGRAT_1	8.1	7.8	.160
n	59	156	
Chose Suburbs for Labor Availability			
CAVGHSV	73.9	84.6	.004*
CCAPINC	2350.2	2570.7	.023*
MHSINC	24.5	26.9	.009*
CPOPDEN	3.6	3.2	.048*
HOUSEDEN	723.7	612.3	.013*
CPBLACK	5.5	2.8	.044*
PBLACK	5.2	4.6	.485
CITYAGE	88.5	83.4	.208
CMFGDEN8	851.2	634.1	.082*
CTOTDEN8	2065.2	1846.8	.263
SMFGDEN8	503.1	498.4	.917
STOTDEN8	1493.6	1497.1	.973
HGHWAY1	.590	.586	.955
OHARE1	.169	.203	.534
TOLOOP	27.6	26.7	.601
MEN_DEN	252.3	251.3	.927
ELEM_DEN	194.9	183.3	.386
AGGRAT_1	8.0	7.8	.231
n	83	133	
Close to Suppliers			
CAVGHSV	70.4	82.3	.032*
CCAPINC	2188.6	2350.1	.018*
MHSINC	24.0	26.3	.090*
CPOPDEN	3.4	3.3	.731
HOUSEDEN	649.4	656.3	.914
CPBLACK	8.4	3.0	.054*
PBLACK	7.0	4.4	.061*
CITYAGE	94.9	83.6	.038*
CMFGDEN8	693.1	722.4	.857
CTOTDEN8	1832.0	1948.2	.673
SMFGDEN8	392.3	517.7	.017*
STOTDEN8	1212.4	1542.8	.021*
HGHWAY1	.600	.584	.868
OHARE1	.100	.205	.102
TOLOOP	31.6	26.2	.104
MEN_DEN	238.9	254.1	.320
ELEM_DEN	188.4	187.6	.967
AGGRAT_1	8.4	7.8	.090*
n	30	185	

(Table 2. Continued)

	YES	NO	(p)
Close to Customers			
CAVGHSV	84.2	078.8	.250
CCAPINC	2327.1	2327.8	.277
MHSINC	26.9	25.5	.228
CPOPDEN	3.4	3.3	.523
HOUSEDEN	659.1	653.4	.901
CPBLACK	4.7	3.2	.307
PBLACK	5.7	4.2	.078*
CITYAGE	84.9	85.4	.922
CMFGDEN8	748.2	702.6	.700
CTOTDEN8	2074.5	1857.3	.280
SMFGDEN8	499.5	500.6	.981
STOTDEN8	1540.8	1473.6	.522
HGHWAY1	.649	.553	.174
OHARE1	.162	.206	.443
TOLOOP	24.9	28.0	.061*
MEN_DEN	263.6	245.9	.113
ELEM_DEN	196.9	182.8	.305
AGGRAT_1	8.1	7.8	.243
n	74	141	
QUALITY OF LIFE			
Chose Suburbs for Quality of Life			
CAVGHSV	83.9	78.7	.204
CCAPINC	2557.9	2446.9	.308
MHSINC	26.8	25.5	.188
CPOPDEN	3.1	3.5	.173
HOUSEDEN	628.8	669.4	.376
CPBLACK	4.3	3.5	.553
PBLACK	3.6	5.4	.021*
CITYAGE	87.5	84.2	.435
CMFGDEN8	514.0	828.0	.001*
CTOTDEN8	1550.2	2127.3	.000*
SMFGDEN8	421.3	543.0	.004*
STOTDEN8	1312.4	1595.2	.003*
HGHWAY1	.526	.621	.181
OHARE1	.092	.243	.003*
TOLOOP	29.5	25.7	.031*
MEN_DEN	232.3	262.8	.007*
ELEM_DEN	157.5	204.1	.000*
AGGRAT_1	7.8	7.9	.646
n	76	140	
Chose Particular City for Quality of Life			
CAVGHSV	84.2	79.3	.263
CCAPINC	2304.7	2336.2	.367
MHSINC	26.8	25.7	.346
CPOPDEN	3.2	3.4	.446
HOUSEDEN	627.3	666.0	.433
CPBLACK	4.2	3.6	.618
PBLACK	4.2	5.0	.407
CITYAGE	89.6	83.6	.188
CMFGDEN8	459.4	816.2	.000*
CTOTDEN8	1528.5	2084.6	.002*
SMFGDEN8	406.9	535.5	.002*
STOTDEN8	1302.6	1570.1	.009*
HGHWAY1	.542	.603	.426
OHARE.	.085	.231	.004*
TOLOOP	29.6	25.9	.081*
MEN_DEN	238.0	257.3	.103
ELEM_DEN	167.4	195.4	.055*
AGGRAT_1	7.9	7.9	.861
n	59	156	

*Significant at the 1% level

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