

Alkay, Elif

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What determines the relocation tendency of manufacturing firms?

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Assist. Prof. Dr. Elif ALKAY

***Istanbul Technical University, Department of Urban and Regional Planning,
34437 Taksim / Istanbul, TURKEY
Phone: 0212 2931300/2539,
Fax: 0212 2514895
E-mail: alkayel@itu.edu.tr***

What Determines the Relocation Tendency of Manufacturing Firms?

Abstract

Firms locate in different areas for different reasons. However, some of them tend to relocate in order to achieve alternative goals. For instance, the manufacturing survey in 2005 reflects that 30 per cent of the manufacturing firms in the Istanbul Metropolitan Area would like to relocate. Consistently, this paper considers the research question: which factors do increase the probability of relocation tendencies of manufacturing firms? Therefore, the aim of the study is to investigate what guides relocation decisions of manufacturing firms' in the Istanbul Metropolitan Area. Investigation is done by applying conditional logit model. In the first step, the reasons for relocation tendency are explored initially in association with the establishment characteristics such as the age of the manufacturing firm, duration-of-residence at the current production site and tenure. Added explanation then considers the internal economies of scale: capital, total employment, total size of the production site, and the age of the production site, the building type of the production site, and whether the production site is located at a planned industrial area. The analysis is expanded by adding external economies to scale in the third step. Location effect of input transport cost, location effect of output transport cost and location effect of labour market is analyzed to demonstrate how they increase the likelihood of a firm relocation decision. Further, problems related with current location are added to elaborate their impact on the probability of a firm relocation decision. It is expected that consistent variables would provide a significant source of explanation in any model.

Keywords: manufacturing firm, relocation, Istanbul

1 Introduction

Industrial location theory has been studied for years. The aim of these studies is to determine the point in a space for an industrial firm where it either maximizes the profit or decreases the cost to the least. Consequently, some factors such as transport cost, labour cost, agglomeration come to forth and are emphasized as main factors of optimum location choice.

However, the location choice of manufacturing firms could not be with their initiative in every time. For instance, from the beginning of the 1980s till now, manufacturing firms especially located within or around central areas have been forced to move out of the central areas in the Istanbul Metropolitan Area. Since 1980s, one of the most important strategies of metropolitan area development plans' is to relocate industrial areas out of the metropolitan area boundaries. Therefore, some vicinity areas have been recommended for industrial development. However, the profit maximization or the least cost is not guaranteed to manufacturing firms by these development plans. Moreover, firms are supposed to change their behaviours and relocate these areas as predictably. However, as emphasized in the literature, relocation depends on some external changes in technology, production techniques and transportation. Additionally, it incurs very significant costs. Information and uncertainty is the other problems with relocation. Considering the enforcements on manufacturing firms, in this study, it is analyzed the relocation tendency of manufacturing firms in the Istanbul Metropolitan Area. How huge part of the manufacturing firms is willingness to relocate? What could be the emerging factors of their relocation decision? In this study, assuming the actual location is the optimum location of a firm, it is explored the reasons of relocation tendency of a firm who informed its intention as relocating in a new production area.

2 Related Literatures

It is emphasized that there are three main approaches to industrial location theory: the least cost approach, market area analysis and the profit maximization approach (Balchin, Isaac & Chen, 2000). Cost minimization theories offer answers to questions such as the following: given the price and location of raw materials and the outlet market, where does the firm locate? How do location choices change when one hypothesis a place in which agglomeration economies exist? On the other side, profit maximization theories seek to answer questions such as these: given a

spatial distribution of demand, how do firms divide up the market? Once the firm's location has been defined, how does it change with variations in the initial production conditions or in the location choices of other firms?

The least cost approach was advanced by Weber (1909) who suggested that there were three principal factors that determine location: transport cost, labour cost and agglomeration and deglomeration economies. Weber location-production model bases on two main assumptions. The first, the firm is defined at a point in space, and the second, the firm aims to maximize its profits. Therefore, the question comes in forth is that at which location a firm will maximize its profits. In order to answer this question Weber developed the Weber location-production triangle. In such a triangle, since the firm will behave so as to maximize its profits, the minimum cost locations will be the actual chosen location of the firm. In other words, the location that ensures maximum profits are earned by the firm is the location at which the total input plus output transport costs are minimized. This is known as the Weber optimum location (McCann, 2001).

The earliest theories of location (Weber, 1909; Lösch, 1954; and Hotelling, 1929) were developed to explain the determinants of location choices of industrial firms (McCann, 2001). They sought to explain the location of industry by looking at the various factors of production from the standpoint of the individual producing enterprise. None of these models hypothesis that once the market has been divided up, the firms will consider the possibility of relocating. Once the firm has determined its optimum production technique and optimum location, the firm will not change its behaviour. In other words, unless there are external changes in technology, or changes in transportation technology, or externally determined changes in the location of input goods sources and output market points, the firm will always remain at the same location employing the same input-output production techniques.

According to these theories, if the actual chosen location of the firm is the minimum cost location, why some of the firms have intentions to relocate? What could be the emerging factors of relocation decision? In this study, assuming the actual location is the optimum location of a firm, it is explored the reasons of relocation tendency of a firm who informed its intention as moving a new production area.

Firms are constantly changing their input suppliers and output markets in response to changes in input and output market prices. Also, increases in the production capacity and changes in the production technologies are the main changes that firms face constantly (Fujita and Thisse, 2002). From the Weber analysis, these changes will also imply that the optimum location of the firm is continuously changing. However, firms in reality do not move very frequently. The reason why firms are not continuously moving is that the relocation process itself usually incurs very significant costs, such as the dismantling of equipment, the moving of people, and the hiring of new staff (Blachin *et al.*, 2000). Part of the transactions costs associated with relocation is also related to information and uncertainty. Relocation costs are the costs incurred every time a firm relocates. They can be very significant, comprising the cost of the real estate site search and acquisition, the dismantling, moving, and reconstruction of existing facilities, the construction of new facilities, and the hiring and training of new labour employed. Firms will move only when the factor cost advantages of alternative locations also compensate for these additional relocation costs as well as the increased transport costs.

In the presence of high relocation costs the firm will not move to a superior location even if the firm knows which alternative is superior. Rather, the firm will attempt to reorganize its factor allocations and activities between its current set of existing plants. The relocation of a plant, or the reorganization of multi-plant activities which involves either the closing or opening of a plant, will only be a last-resort strategy. On the other hand, where relocation costs are insignificant, the firm will be take advantage of spatial revenue and spatial cost differences and will be able to move to superior locations as a competitive strategy.

In the IMA, despite the high relocation costs, 30% of the manufacturing firms would like to relocate. The more remarkable than that the ratio above, relocation tendency raises up to 60% if the new area guarantees to supply special infrastructure for the manufacturing production or production site. In such a situation, specifically, in a place where about every one out of three manufacturing firm is willing to relocate, what could be the factors forcing them to make such a decision to relocate? Consistent with this research question, the aim of this paper is to explore the reasons of relocation decision of manufacturing firms in Istanbul. The investigation is done consistent with four main domains: the establishment characteristics, internal economies of scale, external economies of scale and environmental factors.

3 Data and Methodology

The data source comes from Manufacturing Survey that was conducted by Istanbul Greater Municipality in between 2005 and 2006. According to the Istanbul Chamber of Industry (ISO) (ISO, 2004) there are 12,836 officially registered manufacturing sector establishments in the IMA. The survey covered 3098 manufacturing sector establishments, about 24 per cent of the total establishments. The distribution of the survey is segmented with attention paid to the spatial (district) distribution as well as sectoral composition. However, the establishments for survey in these segments are chosen randomly.

The Manufacturing Survey consists of four main modules (1) internal economies of scale: the production site conditions such as the size of production site, open spaces and warehouses, the building type of the production site, infrastructure opportunities (2) external economies of scale: manufacturing inputs and labour market such as input transfer areas, market areas for end product, accessibility to labour market, total employment (3) the criteria for location choice and relocation tendency such as the factors affected actual location decisions, the problems faced with actual locations, firms relocation tendency, the locations that intended to move and (4) environmental conditions of current production site location. However, the survey data put some limitations. For instance, it does not provide any information about whether the location choices of current locations were associated with external economies: manufacturing inputs, labour market and knowledge spillovers, consistent with Marshall (1997) or any information about wages, public incentives or diseconomies. In this paper, the data are drawn from the relevant parts of the all modules.

The analysis is conducted as following: estimates of the probability of relocation tendency as a function of the establishment characteristics: the age of the firm, duration-of-residence at the current production site and tenure. The model is expanded by adding factors corresponding to internal economies of scale: capital, total employment, total size of the production site, and age of the production site, the building type of the production site, and whether the production site is accommodate at an industrial area. The analysis is expanded by adding external economies in the third step. Location effect of input transport cost, location effect of output transport cost and location effect of labour market is analyzed to demonstrate how they increase the likelihood of a firm relocation decision. Further, problems emerged by

actual location are added to elaborate their impact on the probability of a firm relocation decision. Each model tests the contribution of each variable on the probability of manufacturing firm's relocation tendencies. The model is constructed for the IMA whole.

4 Analysis and Findings

4.1 The descriptive pattern of the whole sample

Before estimating the probability of relocation, some remarkable patterns of the sample are analyzed consistent with internal economies of scale, external economies and location opportunities.

The 33% of the firms employ 10-24 people, followed by firms employ 1-9 people (29%) and firms employ 25-44 people (21%), with remaining 17% from firms employ 50-99 people or more than 100 people. Most of the production sites are smaller than 1000m² (71%). 27 per cent of the production sites size range between 1000-10,000m², only the 2 per cent of the firms have production sites larger than 10,000m². 88% of the production sites do not have open spaces. 45% of them do not have warehouses, even the production sites having warehouses, 96% of their warehouses is smaller than 1000m². While only the 40% of the manufacturing firms are located in planned industrial areas, 32% of them are located in the areas not planned for industry but became industrially dense areas, and remaining 28% spread out across the metropolitan area within residential areas or trade areas or even in tourism areas. Almost every one out of three firms (28%) is owner of the production site; conversely, 72% of them are renter.

The huge percentage of the manufacturing firms (80%) gets their manufacturing inputs within the boundaries of the IMA. Similarly, the huge part of them (84.2%) sells their product within the boundaries of the IMA. These figures distinguish that the metropolitan area not only supplies manufacturing inputs but also provides a big market potential to the manufacturing sector itself. 30% of the manufacturing firms produce textile and wearing apparel, followed by firms producing metal equipments (14%), and plastic products (9.5%).

73 per cent (2266) of the manufacturing firms emphasize that actual location provides high locational advantages to them. They ordered the advantages of actual location as labour market accessibility (%34) (1060), distance to market area (22%) (683), external economies (co-location with other manufacturing firms) (11%) (327), environmental conditions (7%) (155) and

distance to manufacturing inputs (1%) (37). Moreover, the respondents are asked to order the reasons of the location decision of the current location. Respondents order them as external economies (co-location with other manufacturing firms) (45%), distance to market area (23%), labour market accessibility (15%), environmental conditions (8%), distance to manufacturing inputs (4%), and ownership (5%).

When they are asked whether they are willingness to relocate a new area 28.5% of them answered as “yes”. However, when they are asked whether they are willingness to relocate a new area where all technical infrastructures are supplied convenient with the industrial production, 62% of them answered as “yes”. This critical difference put the high demand for industrial parcel. Also, they ordered their expectations from a new place as high environmental quality (45%), good production site conditions (35%), distance to other manufacturing firms (7%), labour market accessibility (6%), and distance to market areas (4%), and distance to manufacturing inputs (3%).

4.2 The explorative pattern of the relocation tendency

In this study, the relocation tendency of manufacturing firms reflects mobility intentions of firms who planned to move in near future. The distribution of planned moves is evaluated according to the whole metropolitan area. The sample reflects that 28.5 percent of the firms would like to relocate in near future at the time of the survey. The results of the analysis are based on this rate.

Figure 1 reflects the distribution of the sample data and also the distribution of the manufacturing firms that have intention to relocate. While the red colour points are firms prefer to stay at the current location, blue colour ones prefer to relocate at a new production site. Firms that have intention to move to a new production site do not reflect a clear cluster. They all spread out the metropolitan area.

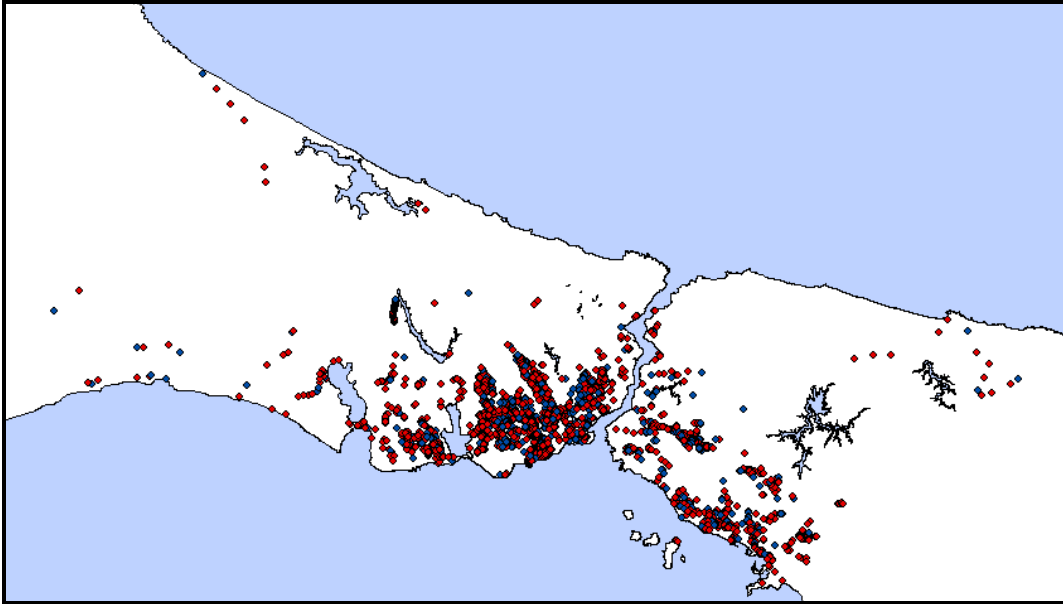


Figure 1. Manufacturing firms that have intention to relocate

When it is examined the preference area of manufacturing firms for relocation, it is seen that preferences spread out across the Istanbul. However, some parts of the city are preferred more than the other parts. Figure 2 reflects the places that are preferred by manufacturing firms according to 32 districts within the boundary of Istanbul Metropolitan Area.

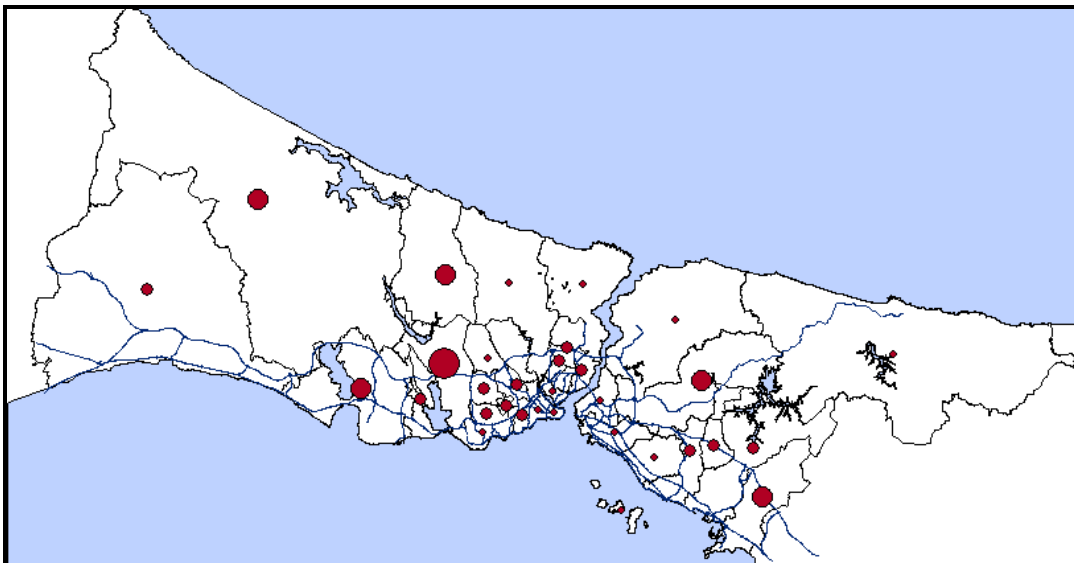


Figure 2. Preferred areas for relocation

In general, the highest rate of relocation tendency belongs to N.E.C. Machinery and Equipment (43%) sector. This is followed by Manufacture of Motor Vehicles and Trailers (38%), and Wood Products (Except Furniture) (37%) sectors. Food Products (13%) and Dressing of Leather (16%) sectors has the lowest intention to relocate. The other sectors rate of intention to relocate is between 25-35%.

First, the relocation tendency is explored whether it reflects a pattern in order to establishment characteristics. The age of the firm and duration-of-residence at the actual production site does not reflect a clear pattern. Figures show that relocation intention according to firms with different ages and varying duration-of-residence is concentrated around 30%. However, tenure reflects a clear pattern. Renters' relocation intention rate (32%) is remarkably higher than owners' rate (20%).

Second, the relocation tendency is analyzed consistent with the internal economies of scale. The frequencies show that the relocation intention is concentrated at around 30% in all capital groups: low capital firms (<100,000 TL), medium capital firms (100,000-500,000 TL) and high capital firms (>500,000 TL). The relocation tendency of firms according to their size of the production site reflects changing rates. While it is the lowest in the larger production sites (18%), it is the highest in the smaller production sites (30%). The relocation intention rate is the highest (32%) within firms employ 10-24 people. However, it is the lowest (23%) within firms employ 25-49 people. In other words, the planned mobility is dense at the medium size firms. The other groups rates (firms employ 1-9 people, 50-99 people, and more than 100 people) are concentrated at about 27%. The relocation tendency is higher in firms having a production site which built not specifically as a manufacturing building than that the firms having a production site which built specifically as a manufacturing building. Supporting, firms located in planned industrial areas have lower relocation intention (26%) than that the firms not located in planned industrial areas.

Exploration reflects that relocation intention changes according to different environmental problems. Firms who remark huge environmental problems within the current location have the highest relocation intention (66%). This is followed by firms who face with the problems related to the size of the production site. In general, small production site and insufficient warehouse area is emphasized as problems of these firms, and these firms tendency

to relocation is 13%. Firms have problems with low accessibility and insufficient labour market wish to relocate a new area 11% and 10%, respectively.

4.3 Models of Relocation

Models of relocation tendency are conducted in a four-step analysis. Models are developed for the metropolitan area whole as well as sub-samples -firms with varying employment sizes (1-9 workers, 10-24 workers, 25-49 workers, 50-99 workers, 100> workers) and varying sectors (according to 2-digit codes). However, the models for firms with varying employment sizes could not be estimated because of the data limitations. Only two out of fourteen sectors could be estimated. It is accepted that only two sectors estimation results neither put the differences nor reflect the similarities in a general manner, therefore these estimation results are not reflected in the paper.

In the first step model, relocation tendency is a function of the establishment characteristics. *Firm age, duration, and tenure* are variables that designed to reflect their affect on relocation tendency.

Variables of internal economies of scale are included in the second model to see whether they significantly increase the probability of relocation tendency. Some firms achieve significant economies of scale in their production simply by reason of their size. A large factory requires a large quantity of capital and a large labour force. *Capital, total employment of a firm, size of the production site, structure type of the production site* are designed to analyze the effect of capital and size on relocation tendency. The actual location behaviour of a firm is a result of a complex mix of price competition, uncertainty, information heterogeneity. However, generally observed feature of industrial location behaviour is that most industrial activities tend to be clustered together in space. Each of the firms in the same locality achieves significant economies of scale. The *accommodation* variable is designed to analyze this features affect on relocation tendency.

The impact of external economies is investigated in the third step of the model. Industrial concentration levels in the IMA shows high concentration (Alkay, 2009). Therefore, in this study, it is assumed that firms take advantages of locating in the IMA and achieve economies of localization. Consequently, instead of measuring and employing the localization economies variables in the model, their transport costs affect relative to the distance is measured and

employed in the model. Three variables are designed by following Weber¹ (McCann, 2001). In general, a firm will wish to reduce the higher total costs associated with shipping inputs. The firm can do this by reducing the value of distance to the input. On the other side, the market itself will display a pull affect on the location behaviour of the firm. Therefore, two variables are designed to correspond to this situation: These variables are *location effect of input transport cost* and *location effect of output transport cost*. They are expected to capture how distance based transport costs of manufacturing input and output can influence relocation tendency of manufacturing firms. The other distance related variable is the *location effect of labor market*. The survey does give proper and detailed information in order to design the variable: how many people are working in a firm; from where these people are coming; in what transportation vehicle is taken by each employee; the approximate journey time for each employee. It is designed alike the former two distance related variables.

In the survey, respondents are asked to define problems emerged by actual production site location. Therefore, problems included in the equations are based on personal assessments of conditions related with the actual production site that may influence relocation tendency. It is expected that problems will explain relocation tendency in a significant way. The variables created for the models can be followed by table 1.

There are some limitations of the models. For instance, the increase in the price of the land will reduce the profitability of all of the firms at that location. The increase in the local land prices will mean that the living cost of the labour employed will also go up. In order to maintain the local labour supply the firms will also have to increase wages once again, this will reduce the profitability of all the firms in the area. However, any land price and wage variable are designed to analyze relocation tendency. Another limitation is that any urbanization economies related variable is employed in the model. Urbanization economies accrue to firm across different sectors and they are city-specific. Because of high concentration levels of all sectors in the IMA (Alkay, 2009), it is assumed that it is achieved high urbanization economies and any urbanization economies related variable are employed in the model.

¹ If the firm is able to locate anywhere, then assuming the firm rational, the firm will locate at whichever location it can earn maximum profits. The location that ensures maximum profits are earned by the firm is the location at which the total input plus output transport costs are minimized. This is known as the Weber optimum location. By applying the logic, for instance, *location effect of input transport cost* is counted by following the formula $C = \sum m_i t_i d_i$ where C defines cost, m_i is the monetary term of the manufacturing input, t_i is the transportation cost of input per each km, and d_i shows the distance from production site to input site. m_i is shifted to o_i (total output of a firm in a year) by counting the *location effect of output transport cost*, and to l_i (number of working people) by counting the *location effect of labor transport cost*.

Table 1. Definition of variables included in the models

Variable	Description
Willingness to relocate	Whether firms consider to relocate in near future at the time of the interview (1=yes)
Firm_age	Age of a firm [(firm_age=the year of the interview – the establishment year)]
Duration	Duration-of-residence at the current production site [(duration=the year of the interview – the year of actual move)]
Tenure	If a firm is owner of the production site=1, otherwise=0
Capital	Total capital of the firm at the time of the interview (in TL; 2005)
Total_employment	Number of total working people
Size	The total size of the production site including open spaces, warehouses (m ²)
Type	The type of the manufacturing building (1=if the building is built specifically as a manufacturing building, otherwise=0)
Accomodation	The characteristics of the accommodated area (1=if the production site is located in an industrial area where other similar firms are in the same locality, otherwise=0)
LEITC	Location effect of manufacturing input transport cost [(C= $\sum m_i t_i d_i$)]
LEOTC	Location effect of output transport cost [(C= $\sum o_i t_i d_i$)]
LELTC	Location effect of labor transport cost [(C= $\sum l_i t_i d_i$)]
Problems^a	Ordered problems of the current production site (1= distance to manufacturing inputs ^a , 2= distance to market area, 3= labor market accessibility, 4= external economies (co-location with other manufacturing firms), 5= insufficient environmental conditions)

^areference category in the equation is *distance to manufacturing inputs*

Logistic regression model for the estimation process is applied. The dichotomous nature of the dependent variable made logistic regression an appropriate estimation procedure. Table 2 reveals the logit estimates for relocation tendency for manufacturing firms. The Hosmer-Lemeshow tests support the models as being acceptable. The tests statistics of the estimated logistic regressions indicated an adequate fit to the data (in all equations, significant values are greater than 0.05). The pseudo R² statistics are acceptable (it ranged between 0.039 and 0.087). The estimation results of the logit models can be seen in table 2.

In the first step model, all the variables are significant in predicting relocation tendency. However, their impacts on relocation are in different directions. While the duration-of-residence at the current production site increase the probability of relocation tendency, the age of a firm and being an owner of the production site negatively affect the relocation tendency. Model emphasizes that the duration-of-residence at the current production site has the most important contribution by explaining relocation tendency. It is significant in all models and the values of Wald Test show that it is the major factor influencing the relocation tendency (it is 18.229, 17.060, 17.815, and 17.811 in models, respectively). Following, the second most important factor that affects the probability of relocation is tenure (the values of Wald Test are 13.391,

13.629, 14.552, and 14.483 in models, respectively). Tenure is significantly included in all models with negative signs, and shows that being an owner of the production site decreases the probability of relocation.

Table 2. Survey logit estimates for relocation tendency

Relocation tendency (N=3098)	Model 1		Model 2		Model 3		Model 4	
	β	P	β	P	β	P	β	P
Firm_age	-0.306	0.007	-0.313	0.007	-0.318	0.356	-0.319	0.356
Duration	0.500	0.000	0.488	0.000	0.500	0.827	0.500	0.827
Tenure (1)	-0.645	0.000	-0.652	0.000	-0.677	0.085	-0.676	0.085
Capital			0.145	0.004	0.141	0.005	0.141	0.006
Total_employment			0.046	0.639	0.150	0.188	0.150	0.188
Size			-0.220	0.012	-0.214	0.016	-0.213	0.016
Type			0.163	0.339	0.184	0.282	0.183	0.285
Accommodation			-0.167	0.330	-0.141	0.415	-0.142	0.413
LEITC					0.019	0.700	0.014	0.778
LEOTC					-0.065	0.222	-0.069	0.194
LELTC					-0.103	0.091	-0.079	0.201
Problem (1)							-0.665	0.370
Problem (2)							0.691	0.362
Problem (3)							-0.221	0.771
Problem (4)							-0.306	0.673
Constant	-0.900	0.000	-1.312	0.008	-1.059	0.047	-0.936	0.302
Percentage correctly classified	70.6		70.5		70.5		71.4	
Pseudo R ²	0.039		0.055		0.061		0.087	
2-likelihood log	1289.563		1276.316		1271.979		1250.966	

Adding the internal economies of scale variables in the second step increases the pseudo R² values. Among the variables, only the capital and total size of the production site is significantly included in the model. The model results suggest that an increase in the production site size implies a decreasing probability of relocation. A larger production site may provide some opportunities to renew production site according to new production techniques or reorganize the site by following new technologies. On the other hand, an increase in capital implies an increasing probability of relocation. High capital may strengthen the firm to tackle with relocation costs. The remaining variables are not included in the model significantly. However, model puts that total employment of a firm and to build up the production site as a manufacturing building have potentials to increase the probability of relocation. Reversely, accommodating in an industrial area has a potential to decrease the probability of relocation.

In the third step, external economies impact is explored. Adding variables does not change the affect of variables of the first two steps. However, the addition of these new variables increases the explanatory power of the models. As opposed to expectation, the location effect of manufacturing input transport cost and the location effect of output transport cost are not included in the model significantly. However, the location effect of labour transportation cost is included in the model significantly and shows that an increase in the labour transport cost decreases the probability of relocation tendency. These results are important by reflecting how inflexible firm relocation tendency against to labour market cost and how flexible input and output transport cost on relocation decision. Supplying 84% of the manufacturing input within the metropolitan area boundaries, and likely, selling the 80% of end product within the metropolitan area boundaries may be acceptable reasons that support the model results.

In the fourth step, problems with actual production site location are elaborated to reflect how they increase or decrease the probability of relocation. Likely, the addition of these new variables increases the explanatory power of the models. However, adding these variables changes the affect of location effect of labour transportation cost variable and after the new variables it is not included in the model significantly. None of the problems are included in the model significantly. However, they are expected to triggering effect on relocation tendency. Although none of them significantly included in the model, it can be understand that while labour market accessibility has positive potential to increase the relocation tendency, distance to market area, external economies (co-location with other manufacturing firms) and insufficient environmental conditions has negative potential on relocation decision according to distance to manufacturing inputs.

In summary, some of the model results are consistent with expectations. For instance, as emphasized formerly, the renter's relocation intention is higher than the owners'. Therefore, the negative impact of being an owner of the manufacturing firm on relocation tendency is acceptable. Similarly, the impact of total size of the production site on relocation tendency reflects consistency with explorative statistics. As emphasized while the moving intention is lower in the larger production sites, it is higher in the smaller production sites.

5. Concluding Remarks

In this study, it is investigated what determines the relocation tendency of manufacturing firms? The investigation is done for the Istanbul Metropolitan Area by applying logistic regression. Models results provide that some establishment characteristics have remarkable impact on relocation tendency. For instance, while the duration-of-residence at the current production site increases the probability of relocation, being an owner of the site decreases the probability of relocation at a new area. Similarly, internal economies reflect remarkable impact on relocation decision. The capital and total size of the production site is significantly included in the model while the former increasing, the latter decreasing the probability of relocation. The impact of external economies on relocation tendency is weaker than expected. Only the location effect of labour transportation cost is included in the model significantly and shows that an increase in the labour transport cost decrease the probability of relocation tendency. The other unexpected result is that none of the problems related with current location is included in any models. However, it is expected that these problems have a strong impact on relocation tendency.

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