

# Size mobility and determinants of survival: An analysis of the major 250 industrial enterprises of Turkey, 1993-98.

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## Abstract

*This paper aims to examine the mobility, or turnover, among the 250 major industrialist enterprises of Turkey and its determinants between the periods of 1993 to 1998. This study suggests that being one of the largest 250 firms of Turkey can be attributed to both firm-specific and macroeconomic factors. In order to be able to explain these effects exclusively a series of probit type models were estimated. First of all, it is found, in this analysis, that the mobility ratio of the largest industrialist enterprises of Turkey has come about to be low and stable, about %14, between 1993 and 1998. Secondly, when the two subgroups, the largest 250 and 500 firms, are compared, it was found that the mobility among the largest 250 firms is higher than that of the largest 500 firms. Thirdly, it is found that the firm-specific factors; sales, exports, size, and ownership, have significant effects on the determination of the probability of firm survival in the largest 250 firm list. Private firms, including foreign owned firms, are more likely to be in the list of the 250 largest industrialist enterprises of Turkey as compared to state-owned firms.*

**Keywords:** Fortune 500 firms, ISO500, size distribution of firms.

**JEL Classification:** C41, L11.

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## **I. Introduction**

The aim of this study is to examine the mobility among the 250 major industrialist enterprises of Turkey and its determinants between the periods of 1993 to 1998. Although the economic importance of such a phenomenon is said to be controversial, the analysis of the mobility or the survival<sup>1</sup> of these firms is of some importance simply because, an increase in the ability of the largest firms to maintain their positions may be seen as evidence of hardening of the industrial arteries and decreased competition (Stonebraker, 1979: 968).

Although there is a huge literature on both the firm survival, or post entry performance, of the firms and its determinants, especially on the SMEs; and on the fortune 500 firms, none of them has studied the determinants of the survival, mobility, of the fortune 500 firms. Studies on the fortune 500 firms usually analysis the concentration of sales and assets of these firm's (see, for example, Nissan and Coveny, 1993 and 1988), or survival and mobility among the largest firms (Collins and Preston, 1961; Stonebraker, 1979; Hannah, 1998). To the best of my knowledge, this is the first attempt to examine the determinants of the mobility and survival of the largest firms.

The analysis is restricted to the top 250 of the largest 500 firms of Turkey and based on the listings published annually by the Istanbul Chamber of Industry and covers the period of 1993 to1998. The data, which can be said to be censored, includes the top 250 industrialist enterprises for each year, which makes up 334 firms in total.

This study suggests that being one of the largest 250 firms of Turkey can be attributed to both firm-specific and macroeconomic factors. In order to be able to

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<sup>1</sup> Survival here refers to the situation that an enterprise maintains its position as one of the 250 major industrialist enterprises of Turkey for a given year. Therefore, the concept of survival in this study may be referred as immobility as well.

explain these effects exclusively a series of random-effects Probit type model estimates is provided in this study.

The paper is organized as follows. Section two presents a descriptive analysis of the changes in the ISO 500<sup>2</sup> list. Section three develops the model to examine the determinants of firm survival in the ISO 250<sup>3</sup> list and presents the estimation results. Section 5 of the paper gives a brief summary and concludes.

## II. Mobility, survival, of the largest 500 firms

The mobility, or turnover, among the largest 500 industrialist firms of Turkey has been observed to be low and stable between 1993 and 1998. Table 1 presents the new entry/exit of the firms in the ISO 500 listing. The values in the Table 1 indicate that the average ratio of new entry/exit, or turnover ratio, is 14.6 and 13.6 for the largest 250 and 500 firms of Turkey between 1993 and 1998 respectively. This implies that mobility, or turnover, among the largest 250 firms is higher than that of the largest 500 firms. While the mobility is the smallest in the group of the top 250 firms in 1995, the smallest mobility in the top 500 list is recorded in 1996.

Table 1: The number and ratio of new entry/exit to the list of the largest 250 and 500 firms, 1993-1998.

Years	Number of new entry/exit in the top 250 listing	Ratio of new entry/exit (%) (turnover ratio)	Number of new entry/exit in the top 500 listing	Ratio of new entry/exit (%) (turnover ratio)
1993	37	14.8	66	13.2
1994	n.a.	----	n.a.	----
1995	30	12.0	75	15.0
1996	37	14.8	50	10.0
1997	35	14.4	69	13.8
1998	42	16.8	79	15.8
Average	36.2	14.6	67.8	13.6

Source: Adopted from the ISO-500 lists from 1993 to 1998.

<sup>2</sup> ISO 500, in this study, refers to the 500 major industrialist enterprises of Turkey published annually by Istanbul Chamber of Industry.

<sup>3</sup> ISO 250, in this study, refers to the 250 major industrialist enterprises of Turkey published annually by Istanbul Chamber of Industry.

Finally, the data shows that mobility is increased after 1996 and onward in the two groups. This may be attributed to the relative increase in the number of foreign firms, or more generally to the rise in the amount of foreign direct investments.

When the turnover, or mobility, of the largest 250 firms with respect to their ownership status is examined, it is found that there is a large difference between public and private firms (see Table 2). Average turnover ratio for private firms is quite larger than for public firms, %15.36 for the former and %9.82 for the latter. This finding may be attributed to the decreasing/increasing number of public/private firms in the list of the largest 250 firms probably due to privatization process during this period. However, the turnover ratio is much more stable in the group of privately owned firms as compared to state-owned firms.

Table 2: The number and ratio of new entry/exit for public and private firms to the list of the largest 250, 1993-1998.

Years	Number of new entry/exit in the top 250 listing		Number of firms		Ratio of new entry/exit (%) (turnover ratio)	
	Public	Private	Public	Private	Public	Private
1993	5	32	39	211	15.6	15.2
1994	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1995	2	28	33	217	6.1	12.9
1996	1	36	29	221	3.4	17.1
1997	2	33	25	225	8.0	14.7
1998	4	38	25	225	16.0	16.9
Average	2.8	33.4	30.2	219.8	9.82	15.36

Source: Adopted from the ISO-500 lists from 1993 to 1998.

Table 3 reports the top 10 of the ISO-500 firms for the six years. The implication of this table is that there has not been any significant change among the largest 10 firms during the period under the study. Nine firms of the first ten of 1998 were in the first ten list of 1993. In other words, the giants at the top of today are not much different than that of 1993. On the other hand, the top ten list may well be subject to changes in the long run as in the case of the American Business (see Hannah (1998) for details).

Table 3: The first 10 firms of ISO-500, 1993-1998.

ISO-500 Rank	1993	1994	1995	1996	1997	1998
1	Tüpraş	Tüpraş	Tüpraş	Tüpraş	Tüpraş	Tüpraş
2	Tek	Tedaş	Teaş	Teaş	Teaş	Teaş
3	Tekel	Tekel	Tekel	Tekel	Tekel	Tekel
4	Tofaş	Teaş	Petkim	Erdemir	Erdemir	T. Şeker F.
5	Arçelik	Petkim	Arçelik	Petkim	Arçelik	Philsa
6	Renault	T. Şeker F.	Tofaş	Arçelik	T. Şeker F.	Arçelik
7	T. Şeker F.	Arçelik	Erdemir	Tofaş	Petkim	Erdemir
8	Erdemir	Erdemir	T. Şeker F.	T. Şeker F.	Philsa	Renault
9	Petkim	Tofaş	Renault	Philsa	Ford Oto.	Tofaş
10	M.K.E	Isdemir	Philsa	Renault	Mercedes	Petkim

Source: Adopted from the ISO-500 lists from 1993 to 1998.

### III. Determinants of the survival of the top 250 firms of ISO-500

It is assumed that there are two types of factors influencing the availability of firms in the ISO-250 list. The first set of factors is the firm-specific factors such as ownership structure, size of a firm and so on. The other set of factors are the ones that reflect the conditions in the economy like price index changes, the amount of foreign direct investments and etc. This analysis makes use of random-effects probit model to estimate the determinants of survival of the largest 250 industrialist enterprises of Turkey between 1993 and 1998. The model can be written as follows (Maddala, 1983):

$$y_{it}^* = \beta'x_{it} + \varepsilon_{it} \quad (1)$$

$$y = 1 \quad \text{if the firm is in the ISO-250 list.}$$

$$y = 0 \quad \text{otherwise}$$

Here,  $y_{it}$  is the dependent variable taking the value of 1 if the firm is in the ISO-250 list, and zero if its not.  $\beta$  is the vector of coefficients that captures the firm-specific and macroeconomic effects on the probability of survival of the firms in the list.  $x_{it}$  is the column vector of explanatory variables.

The following variables are used as the explanatory variables in the estimation of the model above:

*Region:* This variable reflects the effect of the region that the firm is located on the probability of survival, and takes the value of 1 for Marmara region and 0 otherwise. It is expected a positive effect, positive coefficient, of this variable on the probability of survival because of the fact that most firms in the ISO-500 list are located in this region.

*Sales:* This variable is defined as the total sales of a firm, in logarithm form, and reflects the rank of a firm in the list. I expect a positive coefficient for this variable because the probability of survival should be higher for the firms that have larger sales. In other words, if a firm is in the top of the list it is likely to be in the list of the next period; on the other hand, the probability of being in the list of next period is smaller for the firms in the bottom of the list.

*Exports:* This variable shows the amount of exports, in logarithm, of a firm. The export variable is introduced into the model since the firms in the ISO-250 list are expected more likely to export than other firms do. Therefore, a positive correlation between the probability of firm survival and the amount of exports is expected.

*Size:* The variable is defined as the number of employees, in logarithm, and measures the size of a firm. Obviously, a positive effect of size variable is expected on the probability of survival.

*Ownership:* This variable is defined as the proportion of shares held by public and private national or foreign firms. It is a dummy variable which takes the value of 1 if 51% or more shares of the firm is held by the public and 0 for private national or foreign firms.

*GDP*: This variable is the GDP of Turkey, in logarithm, and introduced into model to see if any changes in GDP level contribute to the probability of firm survival in the ISO-250 list negatively or positively.

*FDI and FDIDummy*: FDI is the amount of annual Foreign Direct Investments coming to Turkey for the period under the study. *FDIDummy* is a dummy variable which takes the value of 1 for year of 1996 and onward and 0 for 1995 and backward. These variables are used to examine the effect of Foreign Direct Investments on the composition of ISO-250 list.

*WPI*: This is the annual Whole Sale Price index for the period of 1993 to 1998. The coefficient of this variable measures the effect of price changes on the probability of survival of the largest 250 firms.

The estimates of six probit models of the likelihood of survival are presented In Table 4.a-b<sup>4,5</sup>. According to the estimation results, all variables are significant except the ownership and FDI variables. In fact, an insignificant effect of ownership structure has not been expected. I believe that the collinearity between the *region* and *ownership* variables might lead to such an outcome, since it was not possible to determine the region of the public firms and they, thereby, were included into the non-Marmara group of firms.

The other unexpected finding that the estimation results provided is that the amount of *foreign direct investment* being ineffective on the probability of being one of the largest 250 firms of Turkey. Interestingly, if we take foreign direct investments into account after 1996, with the use of *FDIDummy* variable, it turned out be that foreign direct investments made after 1996 has significant negative effect on the likelihood of survival. In other words, relative increase in the amount of FDI after 1996 has resulted in changes in the composition of the top 250 firms.

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<sup>4</sup> Unless otherwise stated, all affects are statistically significant at the 5 percent significance level, two-tailed test.

<sup>5</sup> Note that, since a probit model is concerned, the signs and significance of the estimated coefficients are of interest, rather than the magnitude of the coefficients.





Table 4.a.: Determinants of survival among the largest 250 industrialist enterprises of Turkey, 1993-98, (Random-effects Probit model)

Variable	Model I			Model II			Model III		
	Coef.	Std. Err.	Prob.	Coef.	Std. Err.	Prob.	Coef.	Std. Err.	Prob.
<b>Region</b>	0.2172	0.0782	0.0050						
<b>Sales</b>	0.3101	0.0400	0.0000	0.3129	0.0400	0.0000	0.3113	0.0398	0.0000
<b>Exports</b>	0.0946	0.0233	0.0000	0.0966	0.0232	0.0000	0.0964	0.0232	0.0000
<b>Size</b>	0.5097	0.0785	0.0000	0.4902	0.0780	0.0000	0.4911	0.0780	0.0000
<b>Ownership</b>	-0.1442	0.1277	0.2590	-0.2748	0.1191	0.0210	-0.2755	0.1191	0.0210
<b>GDP</b>	4.2647	1.2412	0.0010	4.2730	1.2378	0.0010			
<b>FDI</b>	0.3849	0.8499	0.6510	0.3816	0.8481	0.6530			
<b>FDIDummy</b>							4.3200	1.2342	0.0000
<b>WPI</b>	-4.5086	1.3044	0.0010	-4.5155	1.3006	0.0010	-4.5178	1.3015	0.0010
<b>Cons</b>	-12.7246	3.1613	0.0000	-12.5691	3.1512	0.0000	-11.6400	2.3864	0.0000
<b># of firms</b>	334			334			334		
<b># of obs</b>	2004			2004			2004		
<b>chi<sup>2</sup></b>	767.5100		0.0000	759.8300		0.0000	759.6200		0.0000
<b>Log Likelihood</b>	-855.9301			-859.7707			-859.8722		
<b>Pseudo R<sup>2</sup></b>	0.3096			0.3065			0.3064		

Probability values refer to the statistical significance level, two-tailed test.

Table 4.b.: Determinants of survival among the largest 250 industrialist enterprises of Turkey, 1993-98, (Random-effects Probit model)

Variable	Model IV			Model V			Model VI		
	Coef.	Std. Err.	Prob.	Coef.	Std. Err.	Prob.	Coef.	Std. Err.	Prob.
<b>Region</b>	0.2134	0.0786	0.0070				0.2445	0.0732	0.0010
<b>Sales</b>	0.4079	0.0471	0.0000	0.4113	0.0470	0.000	0.4085	0.0471	0.0000
<b>Exports</b>	0.0937	0.0235	0.0000	0.0956	0.0234	0.000	0.1025	0.0221	0.0000
<b>Size</b>	0.4887	0.0794	0.0000	0.4692	0.0789	0.000	0.4588	0.0748	0.0000
<b>Ownership</b>	-0.1433	0.1286	0.2650	-0.2717	0.1200	0.024			
<b>GDP</b>	8.9620	1.6144	0.0000	8.9958	1.6100	0.000	8.9863	1.6143	0.0000
<b>FDI</b>									
<b>FDIDummy</b>	-0.2923	0.0649	0.0000	-0.2942	0.0648	0.000	-0.2926	0.0649	0.0000
<b>WPI</b>	-8.5488	1.5870	0.0000	-8.5778	1.5824	0.000	-8.5716	1.5868	0.0000
<b>Cons</b>	-22.4179	3.3807	0.0000	-22.3329	3.3714	0.000	-22.4536	3.3812	0.0000
<b># of firms</b>	334			334			334		
<b># of obs</b>	2004			2004			2004		
<b>chi<sup>2</sup></b>	787.9200		0.0000	780.5900		0.0000	786.6900		0.0000
<b>Log Likelihood</b>	-845.7227			-849.3905			-846.3404		
<b>Pseudo R<sup>2</sup></b>	0.3178			0.3148			0.3173		

Probability values refer to the statistical significance level, two-tailed test.

The estimation results showed also that the amount of *exports* is an important factor influencing the probability of being in the top 250 list. The coefficient of the export variable came out to be significant and positive, meaning the larger the amount of exports, the higher the probability of maintenance of position in the list for any firm.

The *ownership* variable has a negative coefficient and significant in the models, Models II, III, and V, in which the region variable excluded. The ownership structure has an important implication that the probability of maintaining in the largest 250 industrial enterprises list for the private firms, including foreign owned firms, is higher than for state-owned firms.

One of the interesting implications of the estimations obtained is the significance of the *GDP* variable in all estimated probit models. The results suggest that GDP is positively related to the likelihood of firm survival. This may be explained by the fact that a change in GDP may reflect a change in overall demand, and as demand increases/decreases the probability of survival for any firm may positively/negatively be affected. It, therefore, leads to the conclusion that this finding supports Friendland's hypothesis that changes in the size distribution and rankings of giant firms simply reflected differences in the rates of growth of demand (Stonebraker, 1979:971).

Finally, the other striking finding is the relationship between the likelihood of survival and the *Wholesale Price Index*. The estimated coefficient is statistically significant and has a negative sign, that is, the probability of being in the ISO-250 list falls with the wholesale price increases.

#### **IV. Conclusions**

This analysis suggests that the mobility, or turnover, ratio of the largest industrialist enterprises of Turkey has come about to be low and stable, about %14, between 1993 and 1998. Secondly, when the two subgroups, the largest 250 and 500 firms, are

compared, it was found that the mobility, or turnover, among the largest 250 firms is higher than that of the largest 500 firms. An other important finding of this study is that mobility is increased especially after 1996 and onward in the both groups. This may be attributed to the relative increase in the number of foreign firms, or more generally to the rise in the amount of foreign direct investments.

It is realized, in this work, that the giants at the top of today are almost the same as that of 1993, that is to say, there has not been any significant change among the largest 10 firms during the period under the study.

Our findings on the survival of the firms in the largest 250 industrialist enterprises list of Turkey can be summarized as follows: First of all, it is found that firm-specific factors; sales, exports, size, and ownership, have significant effects on the determination of the probability of firm survival in the largest 250 firm list. Private firms, including foreign owned firms, are more likely to be in the list of the 250 largest industrialist enterprises of Turkey as compared to state-owned firms. This is an expectable outcome of the dominance of private firms over public firms in both ISO-250 and ISO-500 lists of Turkey for the period under analysis.

The other firm-specific factors; namely the rank of a firm which was proxied by the firm's total sales, the amount of firm's exports, and the size of firms, have also positive effects on the probability of maintenance of position in the list. More explicitly, the larger the size of a firm and its exports and the higher the rank of a firm in the list, then the higher the probability of being in the top 250 list.

Secondly, the overall condition of the economy also affects the likelihood of maintaining the position of a firm in the largest firms list. In this set of factors, while GDP growth positively affects the probability of being in the top 250 list, changes in the amount of foreign direct investments and in wholesale price index helped in reshaping the largest firms list in Turkey between 1993 and 1998.

In spite of the fact that it isn't possible to derive any policy proposal from this study, it should be emphasized that it is not desirable to have immobile, or stable composition of largest firms simply because of the advantages of having more competitive and dynamic structure of the business for any given economy.

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