DETERMINANTS OF FIRM EXIT IN TURKISH MANUFACTURING INDUSTRIES

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Abstract

The main purpose of this study is to investigate the determinants of firm exit in Turkish manufacturing industries. In this study we investigate 65 4-digit industries, covering the 1993-1999 period. Different from prior research, we grouped the independent variables as micro and macro variables so that we can see both the effects of market structure and the macroeconomic condition on firms’ exit decisions. We found that for Turkish manufacturing industries, macroeconomic environment is the primary factor that affects their exit behaviour rather than market structure.
1. INTRODUCTION

In market system, entry and exit works as a selection process. Entry brings new and efficient capital to the market while exit clears the old and inefficient ones. This selection process is affected by barriers to entry and exit and factors that trigger entry and exit. These barriers and incentives to entry and exit can be seen as effects of market and firm structure. Moreover, entry and exit take place in this process also by affecting each other.

Bain (1956) is considered as the beginning of the studies concerning barriers to entry. According to Bain, entry barriers can be described as; the conditions which enable existing firms to determine a price over minimum average costs without encouraging new firm entry. Bain states that scale economies, product differentiation and absolute cost advantages are the main determinants of entry. After the theoretical an empirical studies about entry barriers and especially after Caves and Porter (1976), exit started to draw attention from researchers as well.

The main purpose of this study is to examine the determinants of exit for Turkish manufacturing industries for the 1993-1999 period. The data used in the study includes 4-digit manufacturing industries. The reminder of this paper is organised as follows: Section 2 examines the theoretical framework underlined the firm’s exit behaviour. Section 3 introduces the variables that will be used and develops the exit equation. Section 4 shows the estimation results. Finally, section 5 concludes the study.

2. BACKGROUND

Exit barriers refer to the costs of a firm has to bear after exiting the market or the alternative costs of the possible future profits. Exit barriers specially occur when the firms’ capital cannot be recovered. By definition, sunk costs are among the most important exit barriers. (Rosenbaum and Lamort, 1992)

There is a powerful relationship between entry and exit. Exit barriers can also be seen as barriers to entry, because exit barriers reflect the cost that a firm should bear while exiting the market if it fails to survive (Caves and Porter, 1976; Shapiro and Khemani, 1987). Entrants do not need to pay attention to direct exit barriers by estimating the profit and not entering the markets with lower profits than the opportunity cost. However, the costs of potential errors are the most important factors determining entry because of imperfect foresight. As mentioned before, exit costs are related to the ability of a firm to shift its capital to alternative
markets. Some firms produce in a set of different markets using similar production technologies. For these firms, shifting the capital from one market to another is relatively easy (Gilbert, 1989). According to Judd (1985), entry to these markets are relatively easy, because new firm entry lowers the existing firms profit both in the market that it enters and also in the other markets that existing firms produce substitute goods. In these circumstances if the incumbents exits the market as a result of new firm entries, this will raise both firms’ profit. Therefore new firms are more likely to enter these kinds of markets where there is an expectation of existing firm to exit (Gilbert, 1989).

These entry and exit barriers can be classified into two groups as micro and macro factors. Micro factors are barriers to entry defined by Bain (1956). These barriers to entry can also be treated as exit barriers (Shapiro and Khemani, 1987). Macro factors consists push and pull factors. While pull hypothesis refers to macroeconomic conditions that attracts firms to enter a specific market, push hypothesis refers to factors that will trigger firm exit such as; recessions, rising inflation rates and macroeconomic instability. These push factors are expected to raise exit rate; however in some occasions, these conditions create a relatively cost effective environment for firms to invest and therefore trigger entry (Ilmakunnas and Topi, 1999). Recently, new firm births and old firm deaths have become a widely discussed topic in both economic and politic research because the issue of firm entry and exit is important for business creation and for the solution of high unemployment rates.

3. A MODEL OF EXIT

This study uses, gross exit rate as a dependent variable. Gross exit rate (EXT) is calculated as the share of firm exit in total number of firms at time t. This variable is widely used in economic literature, however has some disadvantages. For example, gross exit rate may not reflect all the feature of the firms that exit in the time period. First of all, this rate does not reflect the size of the firms that exit and also it does not reflect how long they have been in the market. New and relatively small firms tend to have a higher exit rate than big and older firms and exit decisions vary among these two groups. Besides, exit rate includes the takeovers made by incumbents. Therefore gross exit rate can be biased estimator. However Doi(1999) states that, regardless of these drawbacks gross exit rate is a widely used variable. Factors that affect exit rate are classified in the model as micro and macro variables. Micro variables include factors reflecting market and firm structure such as; industry growth rate,
profit rate and concentration rate. Macro variables include indicators of macroeconomic stability or instability such as; inflation rates, import and export rates.

**Micro Variables**

Industry growth rate is the most important variable that affects exit rate. Industry growth rate (IGR) is defined and calculated as; the change in industry output over a year. Industry demand has an important effect on exit. Low demand or a decrease in demand has an effect of raising the exit rate. Most studies support this relation between industry growth rate and exit (Doi, 1999; Austin and Rosenbaum, 1990; Kleijweg and Lever, 1996). A forecast of a decrease in demand or a decrease in the rate of growth of demand can result in an increase in exit rates.

A number of cross section studies show a negative correlation between gross exit rate and industry growth rate (Dunne and Roberts, 1991; Mayer and Chappell, 1992; Jeong and Masson, 1991). Most of the empirical works in the area have results showing that exit rate is relatively larger in the slow growing industries, however there are also contradicting results (Sigfried and Evans, 1994).

Continuous increases in demand attract firm entry regardless of entry barriers. Industry growth helps firms to stay in the market; therefore we expect a negative correlation between industry growth rate and exit rate.

Another important variable that is expected to affect exit rate is the concentration ratio. In this study, Herfindahl index is used to reflect concentration ratio (CONC). In industries with high concentration ratios, firms are protected against competition, therefore exit rate can be relatively low (Doi, 1999). Besides, in times of low demand, the chance of agreement, helps firms to survive (Ilmakunnas and Topi, 1999). Therefore, a negative correlation between concentration and exit rate is expected. However, high concentration rates make it hard to survive for new firms. As a result, the sign of the relation between concentration and exit rate is ambiguous.

Profits rate ($\pi$) is another variable that affects firms’ decision to exit. Profit rate is calculated as; the share of the difference of value added and payments to workers over total sales. According to Rosenbaum and Lamort (1992), firms take current profit rates into consideration while deciding to exit. High profit rates decrease exit rates, while low profit rates increase exit. Even when the gross present value of expected profit rates is positive, a
negative value on firm liquidity increases exit rates, because in this case firms may not survive until the expected profits are realized.

Profit rate is usually measured using price cost margin. According to Dunne and Roberts (1991) and Mayer and Chappell (1992), lower exit rates are observed in industries with a higher price cost margin (Sigfried and Evans, 1994).

Sunk costs are among the most important exit barriers. Therefore, four different variables are used in this study to represent sunk costs. First one of these variables is advertisement costs (ADV). Advertisement costs are entirely product specific, therefore when a firm exits a market there is no way of recovering these advertisement costs. Thus, a negative correlation between advertisement costs and exit rate is expected. Advertisement costs are calculated as; the rate of total advertisement costs over output.

Second variable among sunk costs is rental costs (RENT). Rental costs are considered negatively correlated with sunk costs; therefore a positive correlation between rental costs and exit rate is expected. This variable is calculated as a ratio; the rate of machine and equipment rental costs over capital.

Another variable used to represent sunk costs is capital requirement (CAP). Following Gunalp and Cilasun (2006), capital requirement is calculated as the log of the ratio of depreciation over number of workers. The expected sign of this variable is negative; because industry specific capital requirements cannot be recovered.

The last variable used to represent sunk costs is the variable which represents number of workers (NOW). Number of workers in a firm affects the firms’ decision to exit. If a firm has large number of workers, it means the firm will have face high indemnity costs in case of exit. Therefore the expected sign of this variable is negative.

**Macro Variables**

Exit decisions of the firms are affected by macro variables as well as micro variables. The first macro variable used in this study is export rate (X), which is calculated as the ratio of export over industry output. The possibility of export in the industry means that the market share of a firm is relatively larger. Therefore firms in the industries with export possibilities have a higher probability of survival. Thus, we expect a negative correlation between export and exit rates.
Inflation rate (INF) is another variable that is expected to affect exit rate. Inflation rate is an important indicator of macroeconomic stability or instability of a country; therefore it is expected to have a significant effect on firms’ exit decisions. High inflation rate is seen as an indicator of macroeconomic instability, thus expected to trigger firm exit. The expected sign of the relationship between inflation rate and exit rate is positive.

The last one among the macroeconomic variables is import (M). This variable is also used as a ratio similar to export. Import increases competition in an industry. But the affect of this increased competition on the firms’ decision to exit is ambiguous. As a result of the rising competition in the industry, a firm may decide to exit; on the other hand it may become more efficient as a response to this competition.

Table 1 shows the description of the variables used and the sign expectation of these variables.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Sign expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXT (Exit rate, dependent variable)</td>
<td>The share of firm exit in total number of firms at time t</td>
<td></td>
</tr>
<tr>
<td>IGR (Industry growth rate)</td>
<td>The ratio of the difference between industry output at time t and output at time t-1 to output at time t-1</td>
<td>negative</td>
</tr>
<tr>
<td>CONC (Concentration ratio)</td>
<td>Herfindahl index</td>
<td>ambiguous</td>
</tr>
<tr>
<td>Π (Profit rate)</td>
<td>The share of the difference of value added and payments to workers over total sales</td>
<td>negative</td>
</tr>
<tr>
<td>ADV (Advertisement expenditures)</td>
<td>The ratio of advertisement expenditures to total industry output</td>
<td>negative</td>
</tr>
<tr>
<td>RENT (Rental expenditures)</td>
<td>The ratio of rental expenditures on machinery and equipment to depreciation</td>
<td>positive</td>
</tr>
<tr>
<td>CAP (Capital requirement)</td>
<td>The log of the depreciation over the number of workers</td>
<td>negative</td>
</tr>
<tr>
<td>NOW (Number of workers)</td>
<td>The ratio of number of workers to number of firms</td>
<td>negative</td>
</tr>
<tr>
<td>X (Export rate)</td>
<td>The ratio of industry exports to industry output</td>
<td>negative</td>
</tr>
<tr>
<td>INF (Inflation rate)</td>
<td>Inflation rate at time t</td>
<td>positive</td>
</tr>
<tr>
<td>M (Import rate)</td>
<td>The ratio of industry imports to industry output</td>
<td>ambiguous</td>
</tr>
</tbody>
</table>

The exit equation explained above is as follows:

\[
\text{EXT}_{i,t} = \beta_0 + \beta_1 \text{IGR}_{i,t} + \beta_2 \text{CONC}_{i,t} + \beta_3 \Pi_{i,t} + \beta_4 \text{ADV}_{i,t} + \beta_5 \text{RENT}_{i,t} + \beta_6 \text{CAP}_{i,t} + \beta_7 \text{NOW}_{i,t} + \beta_8 X_{i,t} + \beta_9 \text{INF}_{i,t} + \beta_{10} M_{i,t} + \epsilon_{i,t} \tag{1}
\]
4. EMPIRICAL RESULTS

Data on 4-digit manufacturing industries for the 1993-199 period consisting 66 Turkish manufacturing industries is obtained from Turkish Statistical Institute (TurkStat). The data is estimated with fixed effects panel data estimation method. Table 1 represents the result of the estimation of the exit equation.

Table 2: Estimation results of equation (1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficients and values</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGR</td>
<td>-0.01196*** (-1.7208)</td>
</tr>
<tr>
<td>INF</td>
<td>0.00056* (5.8813)</td>
</tr>
<tr>
<td>X</td>
<td>-0.05249** (-2.0530)</td>
</tr>
<tr>
<td>NOW</td>
<td>0.52800* (3.0322)</td>
</tr>
<tr>
<td>π</td>
<td>-0.02122 (-0.6125)</td>
</tr>
<tr>
<td>M</td>
<td>-0.01010*** (-1.9125)</td>
</tr>
<tr>
<td>RENT</td>
<td>-0.00538 (-0.4235)</td>
</tr>
<tr>
<td>ADV</td>
<td>0.27981* (2.2148)</td>
</tr>
<tr>
<td>CAP</td>
<td>-0.02176*** (-1.7702)</td>
</tr>
<tr>
<td>CONC</td>
<td>0.19972** (2.4211)</td>
</tr>
<tr>
<td>COEF.</td>
<td>0.27829** (3.6508)</td>
</tr>
<tr>
<td>R²</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Notes:

1) Values in brackets shows t-statistics
2) *** and ** shows that the variables are statistically significant at 1,5 and 10% levels respectively.
3) Total number of observation: 455

As seen from the table, all variables are statistically significant except π and RENT. Also apart from, NOW, RENT and ADV, signs of the variables are as expected. When these results are examined for variable groups, there are two main results. First, all the variables with different signs than expected are variables used to represent sunk costs. Although the capital requirement (CAP) is statistically significant and has the expected sign, rental costs (RENT) are not statistically significant. Besides, advertisement expenditures which are entirely product specific is positive in sign, contradicting the expectations. Therefore we can
say that sunk costs have a weak effect on firms’ decision to exit in Turkish manufacturing industry. Thus we can also say that sunk costs are not primary factors in firms’ exit decision in Turkish manufacturing industry. Another result is that; all macro variables used in the study are statistically significant and consistent with the sign expectations. Therefore we can say that firms in Turkish manufacturing industry take into account the macroeconomic environment while deciding to exit.

When we further investigate the results for each variable, the negative sign of import (M) is noteworthy. We can interpret this sign as the increasing competition in Turkish manufacturing industries makes the firms produce more efficiently and therefore helps firms to stay in the market. Besides, the positive sign of CONC variable indicates that high concentration makes it hard for new firms to survive and therefore increases exit. The sign of export variable (X) is found to be negative. This shows that existing firms are not highly affected from a possible reduction in domestic demand because of the export possibility; therefore exit rate is lower when there are export possibilities in the industry. Furthermore, the positive sign of inflation variable (INF) shows that, economic instability raises the exit rate.

5. CONCLUSION

This study investigates the determinants of exit for Turkish manufacturing industry in the 1993-1999 period using 66 4-digit industries. In former studies exit is usually explained with micro variables such as industry growth rate and sunk costs. In this study we classified the explanatory variables into two groups; micro and macro variables. Therefore besides micro variables we have also investigated the effect of macroeconomic environment on firm exit.

The results show that, the macro variables used; inflation, export and import have significant signs. Therefore we can say that firms take into consider the macroeconomic environment. On the other hand sunk costs which is expected to have an important effect on firm exit are either not significant or have a different sign than expected. Thus this suggests that sunk costs are not highly effective on firms’ decision to exit in Turkish manufacturing industry.

Considering these results, it is possible to say that while examining the exit behaviour in Turkish manufacturing industry macro variables should also be considered as well as micro variables. Other than the import rate, export rate and inflation; real interest rates and GDP can be used to reflect macroeconomic environment in the country.
REFERENCES:


Bain, J. S., Barriers To New Competition: Their Character and Consequences in Manufacturing Industries. Cambridge, MA: Harvard University Press, 1956


