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Transferring the Risk of Failure

Entrepreneurship and Firm Dynamics in Turkish Manufacturing

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Abstract
Firm and industry dynamics have received considerable attention in recent years. There are numerous theoretical and empirical studies that shed light on the processes of entry, exit, and growth of firms. These studies show that new firms start small, and small and young firms are less likely to survive. In all countries, a large proportion of new firms survive only a few years. We expect that entrepreneurs are also aware of these stylized facts, and take measures that reduce the costs of (potential) exit. Our study is focused on three mechanisms that can be used by entrepreneurs to transfer the risks of failure: borrowing from external sources (transferring the risk to creditors), reducing sunk costs (by renting/leasing building, machinery and equipment, transferring the risk to investors), and lowering the regular wage and compensating workers by bonus-type payments (transferring the risk to workers). In this paper, we analyze the evolution of these measures over the life cycle of new firms, and show that they are negatively correlated with survival probability in Turkish manufacturing, i.e., entrepreneurs are able to transfer some of the risks of failure.

Keywords: Industrial dynamics, exit, risk, entrepreneurship
JEL Codes: L2, D21, D83, M13

1. Introduction

Firm and industry dynamics have received considerable attention in recent years. There are numerous theoretical and empirical studies that shed light on the processes of entry, exit, and growth of firms. These studies show that, in almost all countries and sectors, the probability of failure is quite high. Establishing a new firm is a very risky activity.

Although there are a number of debated issues, the empirical literature has been successful in clarifying a number of stylized facts about firm dynamics (Geroski, 1995; Caves, 1998). First, entry is common. Large numbers of firms are established each year. Second, new firms usually start small. Entrants are much smaller than incumbents. Third, failure is also common. Most entrants fail in a few years.

In an evolutionary way of thinking, the processes of entry and exit are regarded as wasteful but necessary for keeping the dynamism of industries. Many researchers have studied firm- and industry-specific factors that determine the likelihood of survival. Two variables have received considerable attention in theoretical and empirical studies: firm size and age. Most of the studies found that current and start-up size has a significant impact on survival probability. Large (and rapidly growing) firms are more likely to survive (for a small set of empirical studies, see Dunne, Roberts and Samuelson, 1989; Mata and Portugal, 1994; Mata, Portugal and Guimaraes, 1995; Santarelli, 1998; Baldwin et al., 2000; Segarra and Callejon, 2002; Geroski, Mata and Portugal, 2003; Disney, Haskel and Heden, 2003; Taymaz, 2005; however, Wagner (1994), Audretsch, Santarelli and Vivarelli (1999) and Santarelli and Vivarelli (2002) found no effect of the start-up size on survival probability). Although firm age and size are positively correlated, and size has a significant positive impact on survival probability, the effect of firm age on survival is found to be significant even after controlling for firm size. There are various explanations for the effects of firm size and age. It is suggested that new firms start small because of difficulties in getting funding from external sources (the so-called imperfect capital market hypothesis), or prefer to start small to reduce the (sunk) costs of entry into an uncertain environment (the real options theory). Since small firms may have higher costs (if they operate at sub-optimal scale or pay higher interest on their debt), and they lack market power, they have low probability of success. If firm age is related with (both

market and technological) experience, we may expect a positive correlation between age and survival probability conditional on firm size.[1]

Although the emphasis has been on size and age, empirical studies are rich in terms of firm- and industry-specific variables used to explain industrial dynamics, and, specifically, the exit (survival) process. Researchers have studied the effects of a variety of factors, such as market structure, technological conditions, financial structures, geographical aspects, etc. However, we believe that there is a crucial missing factor: the perception of the entrepreneur about business opportunities, and his/her reaction to market conditions. We, economists and econometricians, know that failure rates of new firms are high, and failure may well come at a very high cost: personal losses as well as financial costs (loss of savings, social status, etc.). Of course, we should expect that entrepreneurs are also aware of these facts, and, therefore, they should take precautionary measures to reduce the costs of (potential) failure. Because of intrinsic characteristics of business environment, an entrepreneur cannot eliminate all the risk, but he/she can transfer a part of risks to other agents. In this study, we analyze three mechanisms that can be used by entrepreneurs to transfer the risks of failure: i) borrowing from external sources (transferring the risk to creditors), ii) reducing sunk costs (by renting/leasing building, machinery and equipment, transferring the risk to investors), and iii) lowering the base wage and compensating workers by bonus-type payments (transferring the risk to workers). These mechanisms (except the first one) have not received enough attention in the literature, and we found that they play a very important role in explaining survival dynamics.

The rest of the paper is organized as follows. A short discussion on risk transferring mechanisms is presented in Section 2. The data sources and main variables of interest are explained in Section 3. We test whether entrepreneurs are able to transfer some of the risks of failure to other agent by estimating a hazard function for new firms. Section 4 presents the model and estimation results. The last section summarizes main findings.

[1] The positive correlation between age and survival probability (conditional on firm size) can also be explained by selection bias driven by variations in firm quality, as in the case of the U.S. iron and steel shipbuilding. Thompson (2005) shows, in a recent study, that "the shipbuilding industry exhibits the usual joint dependence of survival on age and size, but this dependence is eliminated after controlling for heterogeneity by using preentry experience as a proxy for firm quality." Cooley and Quadrini (2001) developed an industry dynamics model in which "the combination of persistent shocks to technology and financial frictions can account for the simultaneous dependence of firm dynamics on size and on age".

2. Mechanisms for risk transfer

There are numerous studies that document the fact that business failures are common. Entrepreneurs, who may have also experienced failures in their earlier attempts, know very well that the probability of failure is not insignificant.[2] Therefore, one may expect that entrepreneurs should take some measures that can reduce the probability and cost of failure. We can envisage three measures that the entrepreneur can use: financing investment and operation through external funds ("debt mechanism"), reducing the fixed costs of firing and lay-offs ("wage mechanism"), and leasing the fixed capital ("leasing mechanism").

2.1. Debt mechanism

The effects of external finance on the establishment and subsequent survival of firms have been studied extensively.[3] There are two strands of literature that are related to our topic. The first literature deals with the role of external finance and liquidity constraints in establishing new firms. This issue was studied systematically the first time by Evans and Jovanovich (1989). They suggested that liquidity constraints are binding even in the US, and own capital is essential for starting a business.[4] Liquidity constraints restrict the size of the firm established by those with insufficient funds. Although the Evans-Jovanovich model does not explicitly address the link between external funding and survival, it has some implications: if the liquidity constraint is effective, financially constrained firms will be smaller than the optimal level, and tend to be in a disadvantageous position vis-à-vis those established by wealthy entrepreneurs.

The second literature deals with the default risk under adverse selection and moral hazard in debt financing (interactions between banks and borrowers), and was begun by the work of Stiglitz and Weiss (1981). They showed that the adverse selection effect arises if the interest rate acts as a device to screen "bad borrowers" from "good borrowers". In such a case, higher interest rates induce firms to undertake projects with lower probabilities of success but higher payoffs when successful.

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[2] Of course, as Camerer and Lovallo (1999) explain, entrepreneurs may overestimate the probability of success.
[3] We do not study here the related literature on investment under uncertainty with perfect and imperfect capital markets (for comprehensive reviews, see Hubbard, 1998; Carruth, Dickerson and Henley, 2000).
[4] For a critical assessment of Evans-Jovanovich paper, see Cressy (2000). For a recent study and review of the literature, see Åstebro and Bernhardt (2003).

Adverse selection can be used to explain the link between survival and external financing. Firms have usually limited liability on the debt they own: the owners are not responsible for debts that could exceed the capital they have invested in the firm.[5] Therefore, as shown by Gollier, Koehl and Rochet (1997), the optimum exposure to risk of the limited liability firm becomes always larger than under full liability, i.e., firms can take more risky activities if they are debt financed.

Limited liability has two major effects on firm dynamics. First, limited liability encourages entry by providing a kind of wealth insurance for potential risk averse entrepreneurs. Second, firms can enter into high risk projects that offer high returns. Those firms that borrow heavily will be less likely to survive because they will tend to perform risky activities. Thus, the extent of limited liability will determine both the rates of entry and exit.

These predictions are also supported by empirical studies. For example, Fan and White (2003) showed in the US case that higher bankruptcy exemption levels lead to more entrepreneurial activity.[6] They estimated that "the probability of households owning businesses is 35 percent higher if they live in states with unlimited rather than low exemptions." [7]

The failure rate is likely to be higher if the bankruptcy law provides higher exemptions (lower default risk). Persad (2005), in his study on the effects of loans provided under the US Small Business Administration 7(a) program, suggests that the default rate may rise because of two factors: adverse selection (if borrowers stand to lose less in the event of default, borrowers with riskier projects might apply), and moral hazard (borrowers with the same class of project risk exert less effort required to maintain solvency). He finds strong evidence that adverse selection rather than moral hazard explains higher default rates. Since adverse selection problems are quite sizable, he suggests that "the potential benefits of higher exemptions and

[5] In the case of sole proprietorship, business debts are also personal debts. However, even in such a case, the loss has a lower bound because of exemptions recognized by personal bankruptcy laws.
[6] The US data offer an opportunity for studying the effects of bankruptcy liabilities because bankruptcy exemption levels are set by the states and vary widely. For international evidence on the effects of bankruptcy regulations, see Claessens and Klapper (2005).
[7] Since higher exemptions lead to more entrepreneurial activity especially in high risk sectors, suppliers may hesitate to provide loans because lending becomes more risky. Thus, as Berkowitz and White (2004) found , "if small firms are located in states with unlimited rather than low homestead exemptions, they are more likely to be denied credit, and when loans are made, they are smaller and interest rates are higher."

guarantees in fostering entrepreneurship should be weighed against potential misallocation of credit and a higher cost to taxpayers."

To sum up, the effect of debt financing on failure probability may operate via three distinct channels:[8] 1) If liquidity constraint is binding, those entrepreneurs without sufficient own wealth may establish firms operating at sub-optimal scale, and face with cost disadvantages against large firms. Therefore, those that have to borrow more are likely to have lower survival probability. Note, however, that this effect may turn out to be insignificant if the firm size is controlled for. If liquidity constraint is not binding, all firms will be established at the optimum scale irrespective of entrepreneurs' wealth, and debt financing would have no effect on survival probability. 2) Debt financing will add a burden on operating costs, and the firm will be more likely to exit under unfavorable market conditions. The effect will be stronger if the cost of financing (the interest rate) increases by the level of leverage (debt/assets ratio). 3) With or without liquidity constraints, adverse selection and limited liability may cause entrepreneurs to demand more loans for riskier activities because the loss due to failure will be limited. If the entrepreneur observes an increase in business risks, he/she may tend to rely more on debt financing to pass over some of the risks to the creditors. This is basically the risk transfer mechanism we refer to.

There are a few studies that explicitly analyzed the effects of external financing on survival probability. Fotopoulos and Louri (2000) found that the degree of the debt burden of a firm as measured by the leverage ratio (the ratio of current and medium to long term liabilities over total assets) is "obstructive for the operation and eventually the existence of new firms" in Greek manufacturing in the 1982–1992 period. Ushijima (2005) also found that Japanese plants in the US belonging to more leveraged parents and having increased reliance on debts are less likely to survive. Vartia (2004) studied the impact of financial status on entry and exit dynamics of Finnish manufacturing plants. She used a number of financial ratios in her regression analysis and found that entrants and exits have higher debt to assets ratio than incumbents, and the debt burden (debt / asset ratio) decreases the probability of survival, whereas the coverage ratio (cash flow / interest expenses) enhances the survival probability. Åstebro and Bernhardt (2003) studied whether new small businesses having a bank loan are

[8] If the creditors can identify good, low risk projects, then those fims that receive loans could have higher survival probability. Here we assume that the entrepreneurs have better information about their business prospects.

more likely to survive than those having no bank loan by using the Characteristics of Business Owners surveys collected by the US Bureau of the Census. Although those having a bank loan had, on average, lower survival rates, a probit regression model of start-up company survival including variables on a number of industry and firm characteristics such as owner's human capital, loan sources, and wealth showed that having a bank loan has a positive impact on survival probability conditional on other explanatory variables. Åstebro and Bernhardt's findings are different than those of other researchers, but the variable they used is a dummy variable that does not reflect the burden of debt.

2.2. Wage mechanism

There are two competing explanations on the link between wages and business failures. First, some researcher (for example, see Hamermesh, 1988) suggested that the risk of business failure (or the risk of lay-offs) will generate higher wages, because the fear of unemployment has to be compensated in competitive labor markets (the compensating differentials hypothesis). Thus, if the firm operates in risky markets, workers will also face with the risk of losing their jobs, and will demand higher wages. Second, it is suggested that (for example, see Blanchflower, 1991) if wages are determined in bilateral bargain, the risk of being fired as a result of business failure will generate lower wages (the bargaining concessions hypothesis). Workers who wish to retain their jobs will accept lower wages to reduce the probability of bankruptcy.

Empirical studies found some evidence supporting the bargaining concessions hypothesis. For example, Blanchflower (1991) found that "fear of unemployment substantially depresses pay, more in non-union workplaces than union workplaces". In a recent study, Carneiro and Portugal (2003) estimated a simultaneous-equations model of firm closing and wage determination by using individual level data. Their findings indicate that the fear of job loss generates bargaining concessions instead of compensating differentials. Therefore, firms employing mostly minimum wage earners are more vulnerable to adverse demand shocks due to their inability to adjust wages downward. In the "firm-closing" equation, they found that higher wages lead to higher rates of failure. Campbell et al. (2004) used "subjective" measures of unemployment fear that predicts well future unemployment. They also found that high fears of unemployment are found to be associated with significantly lower levels of wage growth for men, but have no significant link with wage growth for women.

These studies analyze the link between the *level* of wages and business failures, but the *composition* of payments to workers could also be important. For example, wages payments in Turkey have four main components: regular wage, overtime payments, bonuses and premiums, and social contributions and payments in kind. Regular wage is a predetermined gross wage (including workers' social security contribution) that is paid to workers over regular intervals. Overtime wage includes gross payments for overtime work. Bonuses and premiums are extra-payments for workers that are based on individual or collective performance (for example, employee productivity, company profits, etc.). Social contributions and payments in kind include all other contributions provided by the firms to employees such as free meal, clothing, etc. The composition of wage payments is important because it determines the firing cost. In the Turkish case, the firm is required to pay one-month's wage for each year of employment as severance pay in the case of non-fault dismissals, and the "wage" used to calculate the severance pay does not include occasional payments such as overtime payments, bonuses and premiums. Therefore, the firm can reduce firing (and failure) costs by simply varying the *composition* of wages in favor of occasional payments even if it means an increase in the *level* of net wages. In such a case, the firm will transfer the risk of failure to workers who can accept the offer if there are asymmetries in information available to the firm and workers. This is the wage mechanism that can be used by firms to transfer the risks of failures to workers.

2.3. Leasing mechanism

It is well know, at least since Dixit's (1989) classical article on "Entry and Exit Decisions under Uncertainty", that even small sunk costs can lead to "hysteresis" in investment decisions and firm dynamics. An entrepreneur will take into consideration irreversible/sunk costs before starting a new business. He/she will establish a new firm if the expected product price exceeds the variable cost plus the interest on the entry cost and exit if the price is less than the variable cost minus the interest on the exit cost. The level of entry and exit costs is determined by the sunk costs of investment.

The entrepreneur can avoid some of the entry and exit costs by using various financial instruments to start the business. "Leasing" is one of the options to avoid the capital cost involved in investment.[9] In leasing, the equipment is an asset of the leasing company (the

[9] Leasing can be favorable compared to outright purchasing of investment goods due to tax regulations. But this issue is beyond the scope of our analysis.

investor/lessor) rather than the user firm (the lessee), and the firm will not bear most of the (sunk) investment costs in the case of failure. By leasing the investment goods, the entrepreneur can reduce its entry and exit costs, and make exit easier. In other words, exit (failure) could be more likely if the firm leases heavily. This is the leasing mechanism that can be used by the entrepreneur to start and to close down a business less costly.

3. The data and the model

We hypothesize that those firms operate under risky conditions tend to transfer their failure risks to creditors (by borrowing), to investors (by leasing) and to workers (by changing the composition of wages). If the risk of failure is higher, the firm will tend to transfer a larger part of the risks. Therefore, we would expect that firms that heavily borrow, lease a larger part of their equipment, and pay relatively low regular wages (and prefer more bonus-type occasional payments) will be less likely to survive. The hypothesis will be tested by estimating a Cox proportional hazards model as follows:

[1] $h(t_i) = h_o(t_i)\, exp(X_{it}\beta)$

where $h(t_i)$ is the hazard function (the probability that the firm i will exit at time t), h_o the "baseline" hazard, X a vector of explanatory variables, and β the vector of parameters to be estimated.

We use four variables as proxy for risk transfer behavior. BONUS is measured by the share of bonus-type payments, social contributions and payments in kind in total gross wage.[10] This variable is used to capture the effects of risk transfer to workers. If the entrepreneur anticipates a high risk of failure, he/she will tend to substitute occasional payments (such as bonuses, premiums, etc.) to reduce firing (and, therefore, exit) costs. Second variable, INTEREST, is the ratio of interest payments to sales revenue. Since there is no data available on debt stock and the value of assets, this variable is used as a proxy for indebtedness or debt burden of the firm. As noted before, higher value of interest implies that the firm operates in a risky environment in which the probability of survival is lower. There are two variables for

[10] We experimented with only the share of bonus-type payments in total gross wage but the results were qualitatively the same.

the leasing mechanism. LEASING is the ratio between leasing expenditures on machinery and equipment and sales, and RENT the ratio between rent payments (for building) and sales. These two variables are expected to have positive (negative) impact on the hazard (survival) probability.

There are some other factors that could influence the hazard probability. The (log) number of employees, LL, is used to control for firm size. Since there could be a (log) non-linear relationship between survival probability and firm size, the quadratic term of the LL variable, LL2, is also included in the model. As noted in the previous section, the wage level could have an impact on survival probability, too. The (log) level of wages relative to the industry average, RELWAGE, is used to check if wages have any influence on survival. Average employment growth rate since entry (LGR) is added into the model to control for the effects of learning and past performance, whereas capital intensity variable (KL, log value of real depreciation allowances per employee) is expected to control for capital intensity and sunk costs. The share of female employees (WOMEN) is a proxy for the characteristics of production ("feminized" activities) and the composition of the labor force. Since female workers are paid lower than male workers, firms employing mostly female workers will not be able to adjust wages downward, and will tend to exit under adverse conditions.

There are two sector- and region-specific control variables. REGGR is measured as annual regional industrial output growth[11], and is used to capture the effects of demand shifts. If the demand increases rapidly, firms in that market will be more likely to survive. The sectoral entry rate, ENTRATE, is defined as the share of new entrants in total number of firms in the same industry. If entry makes competition tougher, the hazard probability will be higher.

The data source is the *Annual Surveys of Manufacturing Industry* conducted by the State Institute of Statistics (SIS). The survey covers all private establishments employing 10 or more people and all public establishments. We use the data for the period 1992-2001. At the time of writing this paper, the data after 2001 were not yet available. Since there is a change in the survey questionnaire for small firms employing 10-24 people in 1992, we do not use the data for pre-1992 period. (The SIS conducted the Census of Manufacturing Industries in

[11] "Region" is defined at the province level. "Industry" and "sector" refers to ISIC (Revision 2) 4-digit industries.

1992.) There are about 11000 firms[12] each year in the period 1992-2001. Since the initial (1992) and end (2001) years' data are used to define entrants and exits, the analysis is performed for the period 1993-2000.

Figure 1 presents the data on survival rates for small (those firms smaller than the geometric mean of the sample) and large firms. As it is the case in all other countries, the hazard rate is quite high in Turkish manufacturing industries. About half of small entrants (i.e., those firms that employed 10-48 people when they were first established) exit from the market in less than five years. The survival rate is somewhat higher for large entrants (66 percent survives until the age of five), and the equality of survivor functions is rejected at the 1 percent level by the log-rank test, i.e., there is a statistically significant difference in survival rates of small and large firms.

The average values of risk transfer variables by firm size and age are shown in Table 1. The share of bonus-type payments in total gross wage (the BONUS variable) monotonically increases by firm size. The share of bonus-type payments is only 2 percent for new firms employing 10-24 people whereas it is more than 20 percent for those start-ups employing more than 500 people. The strong correlation between bonus-type payments and firm size indicates that large firms tend to use these types of payments for other purposes as well. It seems that older (5-years old) large firms reduce the share of bonus-type payments to some extent, but there is not much difference between young and old small entrants. Low share of bonus-type payments in small entrants is also due to the fact that most of small entrants never pay bonuses, whereas this type of payment is common among large firms.

Interest payments to sales ratio (the INTEREST variable) also increases by firm size for small and medium-sized firms up to a certain threshold (250 employees). Moreover, as the firm gets older, the interest rate ratio tends to increase, albeit to a small extent. It is equal to only 1.1 percent for small start-ups (employing 10-24 people), and increases to 2.1 percent for small, 5-years old firms. [13] For those firms that employ more than 500 people, the share of interest

[12] The data are collected at the establishment level, which is the main decision-making unit. We use the terms "establishment" and "firm" interchangeably.

[13] The proportion of small start-ups (employing 10-49 people) that borrowed external funding is about 35 percent, whereas for large start-ups, the same rate is more than 60 percent. Although the survey does not differentiate between different types of debt, it is likely to cover only interest payments to formal financial institutions. If this is the case, the proportion of small firms using bank credit in Turkey is similar to the

payments in sales is 3.9 percent, and it gradually rises to 4.5 percent in five years. Although these figures seem to be low, one should also look at the share of interest payments in value added. Since the average share of value added in sales is about 30-35 percent, new Turkish manufacturing firms transfer about 10 percent of their value added as interest payments to financial institutions.

Leasing payments/sales and rents/sales ratios (the average values of LEASING and RENT variables) are quite small. Leasing payments are around 0.1 percent of sales for small entrants employing 10-24 people, and reaches to mere 0.3 percent for large entrants employing more than 500 people. The proportion of firms that use leased machinery and equipment is also low (about 5 percent for small entrants, and 30 percent for large entrants). Moreover, there is not any noticeable change in the leasing ratio over the life of new firms. We observe a completely different pattern for rent payments for buildings. Small firms are more likely to rent buildings: the ratio of rent payments to sales decreases by firm size, from 0.8 percent for the smallest entrant category to 0.2 for the largest entrant category, and the ratio does not change much over time, at least during the first five years of new firms.

New firms (at age zero and five) and the incumbent firms[14] are compared in Table 2. The stylized fact on the size of entrants is observed in the Turkish case as well. Entrants are small, much smaller than the incumbents. The number of people employed by an average entrant is almost 50 percent less than the number of people employed by an average incumbent. As may be expected, the share of bonus-type payments and interest payments/sales ratio are significantly higher in incumbents than new firms, whereas the incumbents seem to rely less on leased machinery and equipment and rented buildings than the new firms do. Incumbents pay higher wages (20 percent more than the start-ups), but, as Brown and Medoff (2003) observe, the difference could be insignificant when other firm characteristics (most importantly, firm size) is controlled for. Those new firms that survive grow quite rapidly. If a new firm survives until age five, it will achieve, on average, 8 percent employment growth each year.

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proportions observed in the US and Canada. For financial status of small firms in Canada and the US, see Baldwin, Gellatly and Gaudreault (2002), and Small Business Administration (2003), respectively.

[14] "Incumbent" refers to those firms that were established before 1993.

There is not much difference in terms of capital intensity and the share of female workers. New firms are established in those regions/sectors where the demand increases rapidly, and certain sectors attract more entry. The annual regional industrial growth rate is very high for start-ups, more than 20 percent, whereas the average growth rate for incumbents that operate in all regions and sectors reflects the average industrial growth rate in the country (7.5 percent).

As noted before and shown in Figure 1, small firms have lower survival probability than large firms but, contrary to our *a priori* expectations, large firms tend to use some of the risk transfer mechanisms (bonus-type payments and external funding) more intensively. The strong correlation between firm size and the share of bonus-type payments and interest payments suggests that there could be other factors that encourage firms to use these instruments. For example, it could be more difficult for large firms to monitor the intensity of work at the workplace, and, therefore, large firms may tend to use more extensively performance-based bonus-type payments. Moreover, if the capital markets are not perfect, then it may be easier for large firms to get funding from the financial system so that large firms could have higher ratio of interest payments to sales. Thus, in order to understand the links between risk transfer mechanisms and survival prospects, we need to control for other factors like the firm size. In the following section, we will study if firms do use these mechanisms in a multivariate context by estimating a Cox proportional hazard function.

4. Determinants of survival: estimation results

We have estimated the Cox proportional hazard function (Equation 1) for all establishments established in the period 1993-2000 in Turkish manufacturing industries.[15] There are about 7500 establishments established in that time period and almost 40 percent of these establishments exited from the market in the same period. There are, on average, 3.5 observations per establishment.

The first model estimated includes only four risk transfer variables (BONUS, INTEREST, LEASING and RENTS, see Model 1 in Table 3). The BONUS and LEASING variables have negative

[15] As noted before, the data do not include micro-establishments employing less than 10 people.

and statistically significant coefficients, whereas RENTS has a positive and significant coefficient. In other words, those firms that pay (proportionally) more bonus-type payments and interest are more likely to survive, whereas those paying more rent are more likely to exit. The negative coefficient for the BONUS variable reminds us the fact that it is positively correlated with firm size, and its effect on survival incorporates the size effects as well. The INTEREST variable has positive but insignificant coefficient.

When the firm size variables are controlled for in Model 2 (log number of employees and its square, LL and LL2 variables), the coefficient of the BONUS variable switches its sign but becomes statistically insignificant. The interest variable has now a significant positive coefficient: as expected, high interest payments/sales ratio leads to high hazard probability. The LEASING parameter still have negative and significant coefficient that indicate that leasing machinery and equipment reduces the probability of business failure. A comparison between Model 1 and Model 2 shows clearly that the firm size needs to be controlled for to understand the effects of risk transfer variables on hazard (survival) probabilities.

The third model includes all other control variables, which have all statistically significant coefficients (at least at the 5 percent level). The relative wage variable (RELWAGE) has a negative coefficient: those firms that pay lower wages are the ones that are more likely to fail. As Blanchflower (2001) suggests, fear of unemployment due to business risks and failures reduces wages. Thus, our data supports the bargaining concessions hypothesis. The growth rate of the firm has a positive (negative) impact on survival (exit) probability. This finding is consistent with that of Troske (1996) who found that "firm exit is characterized by failing mean growth rates and mean relative firm size for a number of periods prior to exit".

Capital intensive firms are less likely to exit (the capital/labor ratio variable, KL) whereas those firms that rely on home-based, feminized activities (the WOMEN variable) have higher hazard rates. The growth rate of regional demand (REGGR) has the expected positive impact on survival prospects. The "revolving door" metaphor seems to be valid as well. If a large number of new firms enter into the market (ENTRATE), their exit rates will get higher as well.

The estimates for risk transfer variables in Model 3, which is the preferred model, provide strong support for our hypothesis. The BONUS, INTEREST, and RENTS variables have positive and statistically significant coefficients. In other words, *ceteris paribus*, those firms that tend

to pay (proportionally) more bonus-type payments, interest payments and rents have higher failure probability. The only exception is the LEASING variable: it has a negative coefficient that is statistically different from zero at 10 percent significance level. It seems that leasing machinery and equipment enhances survival probability, possibly by reducing the cost of capital.

Leasing could play a more important role if capital intensity and sunk costs are higher. Although there is no data available to measure sunk costs of investment, one may suggest that they are correlated with capital intensity. We test the interactions between capital intensity and leasing by adding the interaction term into our model (the KL*LEASING variable). Similarly, risk transfer through bonus-type payments and interest payments could depend on firm size: large firms may tend to use these mechanism more intensively because they are likely to be constrained by more rigid employment practices, and they can relatively easily borrow from financial institutions. Two additional interaction terms, LL*BONUS and LL*INTEREST are used to check if there is a difference between small and large firms in terms of using these two risk transfer mechanism.

When three interaction variables are included in the model, all three risk transfer variables (LEASING, BONUS and INTEREST) become insignificant because of multicollinearity problem. Among the interaction terms, only the LL*BONUS variable has a statistically significant coefficient (but at only 10 percent level). Moreover, the log-likelihood test for joint significance of interaction variables does reject the null hypothesis that the coefficients of three interaction terms are all equal to zero ($\chi^2_{(3)} = 4.30$, smaller than the critical value at 10 percent level, 6.25). Thus, we conclude that the interaction terms do not increase the explanatory power of the third model.

5. Conclusions

There is an extensive literature that studies firm and industry dynamics (the processes of entry, exit, and growth). Empirical studies show that new firms start small, and small and young firms are less likely to survive. In all countries, a large proportion of new firms survive only a few years. However, the empirical literature has not paid sufficient attention to how

entrepreneurs act in response to business risks, and has a tendency to ignore strategic reactions.

In this paper, we suggest that entrepreneurs are also aware of the stylized facts uncovered by economists and econometricians, and they take measures to reduce the costs of (potential) exit. This study is focused on three mechanisms that can be used by entrepreneurs to transfer the risks of failure: borrowing from external sources (transferring the risk to creditors), reducing sunk costs (by renting/leasing building, machinery and equipment, transferring the risk to investors), and lowering the regular wage and compensating workers by bonus-type payments (transferring the risk to workers). Our empirical analysis has shown that those firms that tend to pay

- more bonuses and premiums (over the regular wage) to their workers,
- more interest to their creditors, and
- more rent to their landlords

are more likely to exit. We also found that leasing machinery and equipment has a positive impact on survival prospects. Our findings provide evidence for the hypothesis that entrepreneurs in Turkish manufacturing industries are able to transfer some of the risks of failure to creditors, investors, and workers.

Evolutionary economists have shown, at least since the early writings of Schumpeter, that the processes of entry and exit are wasteful but necessary for keeping the dynamism of industries. Entry and exit constitute essential components of any experimentally-organized economy (Eliasson, 1991). The possibilities for transferring and diffusing the risks of failure will certainly encourage (potential) entrepreneurs to establish new firms, but any measure that artificially prolong the life of firms that are doomed to fail will weaken the selection process and raise social costs. Risk transfer mechanisms that involve severe informational asymmetries could be detrimental to effective functioning of the selection process.

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Table 1. The extent of risk transfer, by firm size and age, 1993-2000
(percentage)

	Current size (number of employees)					
	10-24	25-49	50-149	150-249	250-499	500+
New firms (age 0)						
Bonus payments	2.0	3.5	6.4	12.0	16.9	20.8
Interest payments	1.1	1.8	3.3	3.7	4.3	3.9
Leasing payments	0.1	0.3	0.3	0.2	0.5	0.3
Rents	0.8	0.8	0.6	0.4	0.3	0.2
5-years old firms (age 5)						
Bonus payments	2.4	3.3	6.7	11.9	12.2	15.8
Interest payments	2.1	2.1	3.6	5.3	3.1	4.5
Leasing payments	0.2	0.3	0.3	0.4	0.3	0.3
Rents	0.8	0.8	0.6	0.3	0.3	0.3

Table 2. Descriptive statistics (1993-2000 average values)

Label	Description	Entrants			Incumbents
		Age 0	Age 5	All obs	All obs
BONUS	Bonus-type payments/gross wage bill	3.45	4.69	3.96	9.67
INTEREST	Interest payments/sales	1.64	2.71	2.06	2.76
LEASING	Leasing payments for machinery/sales	0.19	0.23	0.23	0.15
RENTS	Rent payments for building/sales	0.74	0.70	0.71	0.55
LL	Number of employees[a]	24.26	39.48	29.88	50.92
RELWAGE	Relative wages	-15.27	-5.45	-11.50	6.47
LGR	Average employment growth rate since entry		8.24	8.55	
KL	Depreciation allowances per employee (1997 prices)[a]	17.32	21.38	19.10	19.61
WOMEN	Share of female employees	19.69	20.47	20.29	19.38
REGGR	Regional industrial growth rate	21.90	15.66	17.23	7.51
ENTRATE	Sectoral entry rate	30.91	8.62	16.31	8.92
n	Number of observations	10140	1410	31520	56025

a Geometric average

Table 3. Cox proportional hazard model estimation results

	Model 1		Model 2		Model 3		Model 4	
	Coeff	Std dev	Coeff	Std dev	Coeff	Std dev	Coeff	Std dev
BONUS	-1.34	0.23 **	0.02	0.23	0.65	0.24 ***	-0.62	0.76
INTEREST	0.20	0.29	1.33	0.26 ***	1.35	0.27 ***	1.34	0.90
LEASING	-10.63	2.47 ***	-4.99	2.19 **	-3.50	2.09 *	13.51	12.91
RENTS	9.12	0.99 ***	6.22	1.01 ***	2.50	1.14 **	2.51	1.14 **
LL			-2.38	0.13 ***	-2.30	0.15 ***	-2.22	0.15 ***
LL2			0.23	0.02 ***	0.23	0.02 ***	0.22	0.02 ***
RELWAGE					-0.30	0.04 ***	-0.30	0.04 ***
LGR					-0.44	0.06 ***	-0.44	0.06 ***
KL					-0.15	0.01 ***	-0.15	0.01 ***
WOMEN					0.34	0.07 ***	0.34	0.07 ***
REGGR					-0.11	0.04 ***	-0.11	0.04 ***
ENTRATE					0.36	0.16 **	0.37	0.16 **
KL*LEASING							-5.40	4.20
LL*BONUS							0.36	0.21 *
LL*INTEREST							0.00	0.24
Number of observations	21294		21294		20434		20434	
Number of firms	7494		7494		7314		7314	
Number of failures	2971		2971		2776		2776	
Wald test	279.3 ***		1159.0 ***		1549.5 ***		1558.0 ***	
Log pseudo-likelihood	-25084.1		-24676.7		-22754.2		-22752.1	

Note: All models include time dummies. Robust standard errors are used.

***, ** and * mean statistically significant at 1 %, 5 % and 10 % level, respectively.

Figure 1. Survival rates for small and large firms, 1993-2001