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Microeconomic and Macroeconomic Influences on Entry and Exit of Firms

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Microeconomic and Macroeconomic Influences on Entry and Exit of Firms

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Abstract

We examine the entry and exit process in the Finnish manufacturing industry. Microeconomic explanations of entry and exit are derived from industrial organization theory and macroeconomic explanations from the theory of monetary transmission mechanism. Since the variables to be explained, the number of entering and exiting firms, are non-negative integers, we use Poisson and negative binomial models in the estimation. The data is a six year panel of three-digit industries. The results show that scale economies form a significant entry barrier, but the evidence on their role as an exit barrier is weaker. Concentration has a negative impact on entry, but this result is not robust to the choice of estimation method. Industry growth has a positive influence on entry and a negative influence on exit, but also variables describing the general economic climate have an influence on the entry-exit process. The variables describing the monetary transmission mechanism have an expected influence on entry. Credit supply has a positive and real interest rate a negative effect on entry. However, the role of the macroeconomic influences on exit is inconclusive. Past entry has a significant effect on exit, which reflects the displacement of old firms by new ones and the short life expectancy of new firms. Both entry and exit have almost unit elasticity with respect to industry size, measured by the number of firms in the previous period. Entry and exit rates are therefore practically independent of industry size.

Keywords: Entry, exit, monetary transmission mechanism.

Tiivistelmä

Tässä tutkimuksessa tarkastellaan yritysten markkinoille tuloa ja sieltä poistumista Suomen tehdasteollisuudessa. Mikrotaloudellisia selityksiä näille ilmiöille johdetaan toimialan taloustieteen teoriasta ja makrotaloudellisia selityksiä rahapolitiikan välittymistä käsittelevistä teorioista. Koska selitettävät ilmiöt, uusien tai poistuneiden yritysten lukumäärät, ovat ei-negatiivisia kokonaislukuja, estimoinneissa käytetään Poisson-mallia ja negatiivista binomimallia. Aineisto on kuuden vuoden kolminumerotasoinen paneeli teollisuuden toimialoista. Tulokset osoittavat, että

skaalatuotot ovat merkittävä markkinoille tulon este, mutta niillä on vähän vaikutusta markkinoilta poistumiseen. Keskittymisasteella on negatiivinen vaikutus markkinoille tuloon, mutta tämä tulos vaihtelee estimointimenetelmän mukaan. Toimialan kasvulla on positiivinen vaikutus yritysten syntymiseen ja negatiivinen vaikutus yritysten poistumiseen, mutta myös kokonaistaloudellista tilannetta kuvaavat muuttujat vaikuttavat niihin. Rahapolitiikan transmissiomekanismia kuvaavilla muuttujilla on odotettu vaikutus yritysten syntymiseen. Luotontarjonta vaikuttaa positiivisesti ja reaalikorko negatiivisesti uusien yritysten määrään. Rahoitustekijöiden vaikutus yritysten poistumiseen ei ole yhtä selvä. Aiemmalla markkinoille tulolla on merkittävä vaikutus yritysten poistumiseen, mikä johtuu vanhojen yritysten korvautumisesta uusilla ja uusien yritysten keskimäärin lyhyellä eliniällä. Sekä markkinoille tulon että sieltä poistumisen jousto edellisen periodin yritysten lukumäärän suhteen on lähes ykkösen suuruinen. Yritysten syntymis- ja poistumisasteet ovat siten lähes riippumattomia toimialan koosta.

Avainsanat: Uudet yritykset, yritysten lopetukset, rahapolitiikan välittyminen

Contents

1 Introduction

The turnover of the population of firms through the birth of new firms and the death of existing firms has been under much discussion during the last years both in academic research and in policy discussions in most industrial countries. In Finland the subject is very acute in light of the experience of fast growth with rapid expansion in the firm sector in the late 1980's and a deep recession with high rates of firm closures in the 1990's. The persistence of a high rate of unemployment has created hopes of solving the problem through job creation especially in newly established small and medium sized enterprises.

The turnover of firms is important also for other reasons. Entry of new firms helps to maintain competition and hence efficiency. Changes in the firm structure contribute to productivity growth since new firms typically represent newer technologies and exiting firms have older, lower productivity technology. Finally, the role of new firms is important in innovation. To promote industrial competitiveness and a structural change from traditional industries to high-tech fields, the creation of new firms is important. Since high rates of entry typically coincide with high rates of exit, one also has to consider exits when evaluating the impact of firm births.

It is important to understand how different microeconomic and macroeconomic factors affect the changes in the population of firms. Microeconomic explanations have typically been derived from the theory of industrial organization. Traditionally entry was not a topic of interest in empirical industrial organization, since the emphasis was more on the role of entry barriers on profitability. In theoretical work, there was more emphasis on strategic creation of entry barriers or on the role of potential entry than on actual entry. During the last decade, there has been a growing interest in empirical work in this area. One area of work has been the analysis of determinants of actual entry using industry level cross section or panel data (for surveys, see Siegfried and Evans, 1994, and Geroski, 1991). Another group of work has been based on large micro databases. The emphasis has been on the description and explanation of birth, growth and survival of firms (see e.g. Dunne, Roberts and Samuelson, 1988, Baldwin, 1995, Audretsch, 1995). A third approach is the study of births of firms from the point of view of the theory of enterpreneurship, either using aggregate time series or regional data or microdata on individuals (for a survey, see Storey, 1991).

The changes in the population of firms have attracted attention also in other fields of research. Entry and exit have been studied from the perspective of labor economics and regional economics, since changes in industrial structure have consequences on employment and there may regional differences in the changes. Also researchers in business administration have studied entrepreneurship, life-cycle of firms, and exits especially in the form of bankruptcies. Firm starts and survival have been studied also in a subfield of organizational sociology called organizational ecology (Hannan and Freeman, 1989). The statistical models used there are strikingly similar to those used in the industrial organization literature, although the explanations of the phenomena differ.

Macroeconomic influences on entry and exit have been studied less. One of the explanatory variables in the models of entrepreneurship is, however, unemployment. There is a large literature on the monetary transmission mechanism (see Kashyap and Stein, 1993), which deals with investment and even bankruptcies. Since starts of firms can be regarded as investments, it seems natural to extend the analysis to the study of financial influences on firm starts. Since exit can happen also through other ways than bankruptcy, it seems possible to study the monetary policy transmission effects on the entry-exit process.

The purpose of this paper is to study the determinants of entry and exit in the Finnish manufacturing industry by combining elements from microeconomic and macroeconomic models. Previous Finnish econometric work in this area has been very scarce. Tervo and Niittykangas (1995) have used regional data to study the influences of regional and macroeconomic factors on new business starts. Takala and Virén (1995) have used a long aggregate time series to study the macroeconomic determinants of bankruptcies.

The data in this study is a three-digit industry level panel that covers the years 1988–1993. Since entry and exit are discrete phenomena, we emphasize in the econometric work models that can deal with this kind of data. The structure of the paper is as follows. In Section 2 we survey the microeconomic and macroeconomic factors that can be expected to influence entry and exit. In Section 3 we explain the model and explanatory variables and in Section 4 the econometric methodology. We present the estimation results in Section 5 and Section 6 concludes the paper.

2 Explanations of entry and exit

2.1 Microeconomic influences

The traditional structure-conduct-performance framework explained profitability differences between industries with concentration and entry barriers. Different proxies were used for entry barriers, from judgmentally determined dummy variables to advertising/sales ratio or minimum efficient scale. All in all, the idea was that entry barriers are sufficient to slow down entry so that profits are not driven to zero. This traditional analysis has been questioned on one hand from the point of view of lack of basis in theory; basically different kinds of equilibria are consistent with concentrated market structures and market structure is jointly determined with profitability and influenced by firm efficiency differences. On the other hand, the model does not account for differences in actual entry between industries. This has created new empirical work, where the emphasis is on the interplay of profitability and entry.

The starting point in most analyses of entry is that positive profits attract future entry into the industry, and losses encourage exit. However, there are both natural and strategically created barriers to entry that allow firms to increase prices above the competitive level and hence to earn positive profits without attracting entry. Typically these "natural" barriers are classified to scale economies, product differentiation advantages and absolute cost advantages, although some of these aspects may also be strategically created. We concentrate on the role of scale economies, since data limitations do not allow the measurement of other entry barriers. Entry in a scale smaller than minimum efficient scale (MES) would not be profitable, but if MES is large compared to the size of the market, post-entry supply would be so large that price can fall below average costs.

The theory of contestable markets brought into the analysis the element of sunk costs. If the role of sunk costs is small, there are low barriers to exit and hence also entry may be more attractive. The new firm can, if necessary, leave the industry without incurring high costs, and it is also easier to push some of the existing firms out of the industry. Often it is assumed that entry barriers are also exit barriers. Hence scale economies that hinder entry, also make it more difficult to leave the industry, since considerable sunk investments are involved. We therefore argue that both entry and exit should be negatively related to scale economies.

Strategically created entry barriers can be in the form of limit pricing or strategic investment in capacity, product proliferation etc. Often it is assumed that the scope for collusive coordination of entry deterrence increases with the concentration of the industry. Most formal models of entry deterrence deal with monopolies and do not actually deal with the question of collusion. There, has, however, been some discussion on oligopolistic entry deterrence. When there are several incumbent firms, there may be a free-riding problem in entry deterrence, since all firms benefit of one firm's actions. If an increase in concentration makes it easier to coordinate entry deterrence, entry should be negatively related to concentration. On the other hand, as Gilbert and Vives (1986) have shown, there is an opposite effect because a firm engaging in the entry prevention is in a better position than the other firms, since it has a greater output. Hence, there may actually be overinvestment in entry deterrence in oligopolies. This result is, however, not robust to the introduction of uncertainty (see Waldman, 1987). If the overinvestment result holds, collusive entry deterrence may actually be less effective than noncooperative efforts. In this case increasing concentration may not decrease entry.

Another analysis that leads to the conclusion that concentration may favor entry prevention is that of Bagwell and Ramey (1991). They have shown that under imperfect information there may be free-riding in limit pricing. Low-cost firms may want to signal high costs and hence low profits with high collusive prices, but free-riding results in low prices. Coordination of deceptive limit pricing may be easier when the industry is concentrated. Concentration may also influence exit, since opportunities for collusion allow firms to survive easier in periods of low demand. We therefore tentatively argue that entry and exit should be negatively related to concentration, although the theory does not give strong results on this.

Besides the factors that influence static profits that can be sustained without entry, there are factors that influence profits over time. Rapid growth in demand creates opportunities for firms to enter irrespective of the size of the entry barriers. Hause and Du Rietz (1984) have shown how this can arise when incumbent firms have adjustment costs so that their optimal capacity growth is smaller than the growth of the market. In growing markets, entry may also happen because it can be optimal for the incumbents to let firms enter in a small scale (so-called toehold entry) and once they have grown, they participate in further entry deterrence (see Malueg and Schwartz, 1991). We hence argue that entry should be positively related to industry growth. Since growth also allows firms to survive easier, we expect growth to be negatively related to exit.

Besides growth, also the size of the market is likely to influence the number of entering or exiting firms. Baldwin (1995) argues that the larger the number of firms, the more potential there is for displacement of old firms by new firms. Often empirical work on entry uses as a dependent variable the number of new firms divided by the pre-entry number of firms in the industry, i.e. the entry rate. This implicitly assumes that the elasticity of entry with respect to industry size is unity. We prefer to measure entry and exit by the number of firms and argue that both entry and exit are positively related to industry size, which we measure by the number of firms in the previous period. Hence we can test whether there is a unit elasticity of entry and exit with respect to industry size. However, as Shapiro and Khemani (1987) note, the number of firms is affected by past entry, indeed, it is the past cumulative net entry, and therefore it is likely to be correlated with the entry barriers. Therefore, while size may be important, one could proxy it by some other size indicator, e.g. value of shipments.

Interestingly, the work in organizational ecology that has studied the growth of organizational populations has taken dencity dependence, i.e. dependence of entry on the number of firms, as a basic model. The background of this assumption is the hypothesis that the legitimacy of an organizational form increases with the size of the industry, but, on the other hand, competition increases with industry size. Entry is proportional to legitimacy, but inversely related to competition, so that the relationship between entry and size is possibly nonlinear. Exits, on the other hand, are directly related to competition and inversely related to legitimacy, again resulting in a possibly nonlinear relationship between exit and size of industry.

Finally, entry and exit are likely to be interrelated, possibly with a lag. One effect of entry is the displacement of some of the old firms by new firms (see e.g. Geroski, 1991, Baldwin, 1995, and Dunne, Roberts and Samuelson, 1988 for indirect empirical evidence). A positive correlation of entry and exit can also reflect the short life expectancy of new firms. There may also be opposite influences. If there are many exits, this leaves room for further entry. Johnson and Parker (1994) call these competition effects. It could be argued that it is potential rather than actual exit, which is more important for an entry decision. For example Shapiro and Khemani (1987) include potential exit in the entry equation and approximate this variable by the size of the industry. It is also possible that past entry influences future entry and past exits future exits, which Johnson and Parker (1994) call multiplier effects. In the organizational ecology literature this phenomenon is called rate dependence. The argument is that succesfull entry has an imitation effect on other possible entrants. Many exits, on the other hand, signal bad prospects and can harm the financing of the remaining firms.

Modelling the dynamics of entry and exit either in the form of true state dependence or autocorrelation of the entry and exit equations causes some econometric difficulties in panel data models. Therefore in the present paper the dynamics are confined to possible lagged values of the explanatory variables. We argue that past entry should influence exits, but the effect of potential exits on entry is taken into account by the industry size variable. More complicated dynamic modelling is left for future work.

2.2 Macroeconomic influences

Macroeconomic influences on entry and exit have received fairly little attention. They are discussed here especially concerning factors affecting Finnish manufacturing. The concept 'macroeconomic' implies that the same observation on each factor is used in all industries. The relevant macroeconomic factors are divided into three classes, which are somewhat interrelated. First, the general economic climate obviously has effects both on entry and exit. Aggregate demand changes and unemployment are essential factors determining the economic climate. Second, the conditions in financial markets, interest rates and changes in credit supply, also have consequences on entry and exit. In addition, the exchange rate developments affect entry and exit through their influence on the foreign trade prospects and the financing costs of foreign debt.

In the literature, twofold hypotheses have been presented about the influence of the economic climate on entry (e.g. Highfield and Smiley, 1987, and Storey, 1991). The traditional view, sometimes called the "pull" hypothesis says that entrepreneurs are more inclined to enter a market when demand is high and the state of the economy is expected to remain favourable. In other words, the "pull" hypothesis implies that a high growth rate of real GDP and a low unemployment rate improve the anticipated profitability of the possible entrants, and consequently increase the number of entries.

The alternative approach, also called the "push" hypothesis, is essentially based on the microeconomic theory of the supply of entrepreneurship. The "push" hypothesis carries conclusions opposite to the "pull" hypothesis by arguing that a fall in economic activity actually increases the number of new firms, since a higher unemployment rate reduces a potential entrant's opportunity cost of starting a new business. Although the business prospects are probably not bright during a recession, unemployment or even a risk of it may make self-employment appealing. In addition, a recession provides potential entrepreneurs with new opportunities, like lower labor and equipment costs or attractive niches created by earlier business failures or withdrawals of multiproduct enterprises from less profitable activities.

We argue that the two hypotheses are not substitutes, but a recession, for instance, carries both positive and negative influences on entry. The influences can, however, be analyzed better by distinguishing between unemployment and aggregate demand developments, since the comovements of the two are not inevitable. We argue that the positive influence of a recession on entry has more to do with unemployment since it increases the supply of entrepreneurship, and the negative influence of a recession on entry is more connected to aggregate demand and also to expectations on future developments.

In earlier studies, the positive influence of unemployment on entry has gained support in time series analyses and interview studies, but more conflicting evidence has been found in cross sectional analyses (see Storey, 1991). On the other hand, Yamawaki (1991) presents evidence on the positive influence of the rate of growth in real gross national product on the net entry rate.

In the research that concentrates on the role of unemployment on entry, the influences have been modelled in more complicated ways than that presented above. For instance, in their regional analysis of new firm formation, Tervo and Niittykangas (1995) argue that a rise in unemployment increases new firm formation, but a high rate of unemployment per se is negatively related to the number of entries. Hamilton (1989) suggests a nonlinear relationship between unemployment and the number of entries.

The influence of aggregate demand on exit seems to be simpler, and is to some extent parallel to the analysis of the effects of business cycle on bankruptcies (see e.g. Takala and Virén, 1995). We argue that the growth in real GDP reduces the number of exits, since a rise in demand improves the profitability of firms and thereby prevents bankruptcies and other forms of withdrawals from business. However, since aggregate demand is supposed to have effects on entry, its influence on exit may be more complex as entry and exit are strongly correlated.

On the other hand, we argue that the number of exits is not related to unemployment in the same manner as the number of entries is. The correlation between the change in the unemployment rate and the number of exits is positive in our data, and it seems more probable that high exit figures lead to unemployment than vice versa.

Monetary conditions and their transmission to the economy have some particular effects on entry and exit beyond the influences of the business cycle. Research has been done on several issues somehow related to entry and exit. Concerning recent Finnish experience, for instance, Saarenheimo (1995) has examined the influence of financial factors on investments, and Takala and Virén (1995) have analyzed the relationship between financial factors and bankruptcies. Both of these studies and other literature (see e.g. Kashyap and Stein, 1993, for a survey) point out that the amount of credit supply has real effects which are additional to the influence of the market real interest rate. Here we consider the influence of the traditional monetary transmission mechanism on entry and exit, and complement it by discussing the role of bank credit constraints and how they affect the births and deaths of firms.

According to the traditional view (money channel), tight monetary conditions, e.g. due to a reduction in the supply of monetary base, decrease the amount of demand deposits issued by the banking sector. Consequently, money supply declines and unless prices fully adjust without delay, excess demand of money raises real interest rates. A rise in real interest rates in turn has a negative influence on investments and production. Real interest rates affect the number of entries analogously since starting a new business generally involves some expenditures and thereby requires some form of finance. On the other hand, the effects of the real interest rates are opposite on the exits of firms, since higher real interest rates increase financing costs and thereby increase the likelihood of business failure or voluntary withdrawal from business. According to Young (1995) the unanticipated movements in real interest rates are relevant for bankruptcies. We argue that the real interest rates have a negative effect on entry and a positive effect on exit.

Because of imperfections in the financing system, the banking sector is the sole form of external finance for some significant parts of the economy, especially many new enterprises. This special role of the banking sector in the monetary transmission mechanism implies that the banks' credit supply has an influence on some borrowers' activities, independent of the market real interest rates. If the monetary conditions are transmitted to credit supply, the monetary policy makers have an additional way to affect the real economy (credit channel). Credit supply may be influenced by the monetary conditions in at least two manners. The reserve requirement mechanism (Bernanke and Blinder, 1988) simply says that unless the banking sector fully replaces a fall in deposits, e.g. due to tighter monetary policy, by other borrowing, credit supply must decrease. The balance sheet mechanism (see e.g. Kashyap and Stein, 1993), on the other hand, is linked with collateral and its role as a condition for bank loans. As interest rates rise due to tighter monetary conditions, a decline in the value of collateral may emerge, which reduces credit supply.

New enterprises generally start in a small scale, and their access to capital markets may be limited except for the cases where the new firm benefits from the reputation of its owner. Therefore, we argue that a rise in credit supply has a positive influence on entry even after the effects of the interest rate are taken into account. This view is supported e.g. by Evans and Jovanovic (1989) who have found that potential entrepreneurs face liquidity constraints.

Furthermore, the influence of credit constraints on entry in different industries may vary with the possible entrants' access to capital markets. This results from the fact that the liquidity constraints do not affect entry if the potential entrants have free access to capital markets. The degree of access to capital markets at the industry level can be approximated by the average firm size (Gertler and Gilchrist, 1994, have suggested this measure), which can also be seen as an indicator of the start-up size. We therefore argue that the positive effect of an increase in credit supply on entry diminishes with the typical firm size which we measure by the median firm size in the industry.

As far as exit is concerned, we argue that the effects of an increase in credit supply are negative since a decline in credit supply causes liquidity problems for the firms with poor credit ratings. The effects of a credit supply change may, however, be more complicated. For instance, an increase in credit supply assumedly has a positive effect on entry and thereby creates more potential exiters. The effects of a credit constraint on exit may also vary with the potential entrants' access to capital markets.

Real exchange rates may also have a significant role as a determinant of entry and exit especially in small open economies. As long as the Marshall-Lerner condition applies, i.e., the sum of export and import elasticies exceeds one, a depreciation of the home currency, ceteris paribus, has a positive total effect on trade surplus (abstracting from the fact that the exchange rate change effects are not immediate). A depreciation contributes to an increase in export demand, but it also improves the competitiveness of home firms exposed to foreign competition. Other things equal, an appreciation has opposite effects on trade figures. Exchange rate changes also influence the home currency financing costs of the firms with foreign currency denominated debt. A depreciation increases the home currency denominated amount of foreign debts and respective interest expenditures, and an appreciation has again an opposite influence.

The competitiveness effect of real exchange rate changes seems to be more important in investigating entry. Since the Finnish manufacturing industry is relatively open to foreign competition, changes in the exchange rate directly alter the expected profitability of potential new firms. As far as the effects of exchange rates on financing costs are concerned, only the expectations on future fluctuations in exchange rates can affect the entry decision. Since the effect of a depreciation on competitiveness is positive and the respective effect of appreciation is negative, we argue that an actual depreciation has a positive combined effect on entry and an actual appreciation has an opposite effect. On the contrary, the profitability of potential exiters depends on the developments of both the financing costs and the trade figures caused by exchange rate changes. The overall influence of exchange rate changes on exit remains therefore an empirical question.

2.3 Recent economic developments in Finland

During the past decade or so, the Finnish economy has undergone drastic changes which have also had influences on the developments in the firm structure in Finland. We briefly review here the changes in the Finnish economy to clarify the relative importance of different macroeconomic factors in the firm formation process.

Financial markets had traditionally been largely regulated in Finland, but the process of deregulation began before the mid-1980's due to both international and domestic pressures. The deregulation concerning firms had been effectively completed by 1988 apart from international short term capital movements. Deregulation essentially reduced the ability of monetary policy to influence the liquidity of financial markets during the fixed exchange rate regime. Therefore, a huge rise in the size of the banking sector's total balance sheet became possible at the end of the 1980's. The share of the demand deposits in the balance sheet was diminished as the banks' borrowing from the international markets and the domestic money markets grew. As credit constraints seemed nonexistent, there was a huge increase in the indebtness of Finnish companies.

Among other things, the developments in financial markets contributed to an expansion in the Finnish economy during the latter part of the 1980's. The growth rates were high and the unemployment rates relatively low. Bright aggregate demand prospects, low real interest rates, and lack of credit constraints created favorable conditions for the firm formation, but also led to increasing indebtedness. Real exchange rates, however, appreciated and led into competitiveness difficulties. The economy was overheated at the turn of the decade, and then dived into a deep recession at the beginning of the 1990's. Besides the internal reasons, the simultaneous collapse of Finland's exports to Soviet Union and the beginning of the recession in the Western markets contributed to this development.

The change in the amount of credit supply began to decrease and the real interest rates began to rise already in the late 1980's, and at the beginning of the 1990's there was a radical upsurge of real interest rates. The real aggregate demand growth stopped in 1990, and a fall in aggregate demand emerged in the subsequent years. These phenomena seemed to slow down the births of firms and also accelerate the deaths. The rise in real interest rates had obvious direct effects on entry and exit, but it also reduced the value of collateral, and caused a subsequent decline in the amount of credit supply through the balance sheet mechanism. It is less plausible to explain the effects of higher real interest rates by the reserve requirement mechanism in the absence of financial regulation.

During the last years of our data period, the real interest rates decreased but credit supply continued to fall. The fall in real interest rates and other reasons suggest, however, that the credit constraints had disappeared, and there was even an oversupply of credit. The positive upturn in the financial factors probably relieved the start-ups of new businesses and the survival of existing firms. On the other hand, the unemployment rate drastically rose at the beginning of the 1990's, and the supply of potential entrepreneurs grew up consequently. Unemployment has remained at a high level, although demand started to grow again from 1992.

3 The model and the variables

Based on the above arguments, entry is modelled using a formulation suggested by Orr (1974). It is assumed that entry is influenced by profitability and various other factors

$$EN_t = f(P_{t-1} - P_t^*, G_t, S_t, M_t)$$

where P_{t-1} is past profitability, P_t^* is the entry-forestalling level of profits, G_t denotes variables related to the growth and size of the market, S_t the supply of enterepreneurship, and M_t macroeconomic influences. If actual profits are above P_t^*, entry will occur. P_t^* depends on entry barrier variables BN:

$$P_t^* = g(BN_t)$$

Combining the equations and assuming that the f and g functions are linear, gives the entry equation

$$EN_t = a_0 + a_1 P_{t-1} + a_2' BN_t + a_3' G_t + a_4' S_t + a_5' M_t$$

To model exit, very similar variables can be used. Hence, the exit model is written as

$$EX_t = b_0 + b_1 P_t + b_2' BX_t + b_3' G_t + b_4' M_t + b_5 EN_{t-1}$$

where BX denotes exit barriers. Note that current rather than past profits should be in the exit equation, and the supply of entrepreneurship is not included. We also include past entry in the exit equation.

The data on entry and exit is based on the Register of Enterprises and Establishments of Statistics Finland. The register covers all firms which have annual sales above a certain minimum, have operated at least six months during a year and employ at least half a person. Although the coverage is good, the data content is fairly small. Basically only the total sales and the number of employees are available. The number of new firms and the number of discontinuing firms are separately calculated, but there is no information on their size. There are some classification problems in the data. First, multiproduct firms that operate in several industries are classified to the industry where their main activity is. Therefore the sales figures for the industries have some error, since they also include activity in some other industries. Second, the entry and exit figures may be overestimated, since a change of ownership or legal status is classified both as an exit and as an entry. It is difficult to judge how big the overestimation is. In any case, the overestimation is probably concentrated on smaller firms and it appears more often during booms when there is bigger turnover in the ownership of enterprises.

We use data on the three-digit level manufacturing industries. There are 70 such industries, but because of some missing data eight industries we left out. They were mainly industries which consist of only a few very large firms and have not experienced much entry or exit during the data period. The data period is 1988-1993 so that the data forms a balanced panel with 372 observations. Due to the use of some lagged variables, 310 observations were used in the estimations. In addition to the enterprise statistics, we used data on profitability from the Financial Statements Statistics and various macroeconomic data on general business conditions and financial market situation. The data sources and variables are explained in more detail in Appendix 1.

Figure 1 shows the total number of entering and exiting firms in the 62 included industries. The figure shows a clear cyclical fluctuation in the numbers, with a big drop in the start-ups in 1990 and 1991 and a slow revival from thereon. There is a big increase in firm exits in 1991, but already in the following year the number of exits begins to decline. This general cyclical variation, however, veils large differences between industries, with some industries experiencing a downward trend in the number of entrants and an increase in exits throughout the data period, whereas some industries have an increasing number of entries even during the general recession.

Figures 2 and 3 show the distribution of the entries and exits in the panel. It can be seen that there are many zero observations, i.e. cases, where in some year an industry has not had entries or exits. The typical cases are under 10 entries or exits, although some industries show very large numbers. Clearly, there are very big differences between industries.

The nature of the data shows that, first, we should use an estimation method that takes into account the discrete and non-negative nature of the entry and exit data. As explained in the next section, this is accomplished by using count data models. Second, we should be able to explain the cyclical variation in the data. This is taken into account be including macroeconomic variables in the model which is estimated using industry-level data. Third, we should take into account the big interindustry differences in entry and exit behavior. This can be handled either by using industry variables that have large variation across industries and relatively small variation over time, or by using a panel data estimation method with industry specific fixed effects.

The entry variable EN is measured by the number of entering firms, and correspondingly the exit variable EX is measured by the number of exiting firms. Many entry studies use entry rate, i.e. entry divided by the pre-entry number of firms. Visual inspection of the data actually revealed a fairly linear relationship between industry size and entry with entry rate almost independent of size (see Ilmakunnas, 1996). Some studies use entry penetration, i.e. the market share of entering firms, but our data do not allow the calculation of this variable. In many cases, gross entry and exit are not available separately, in which case net entry has to be used. Here we can identify both separately. The data do not allow to identify separately domestic and foreign-based entry, so that they have to be treated symmetrically, although their determinants may be different (cf. Geroski, 1991).

Figure 1. **Entry and exit in Finnish manufacturing (62 industries) 1988–1993**

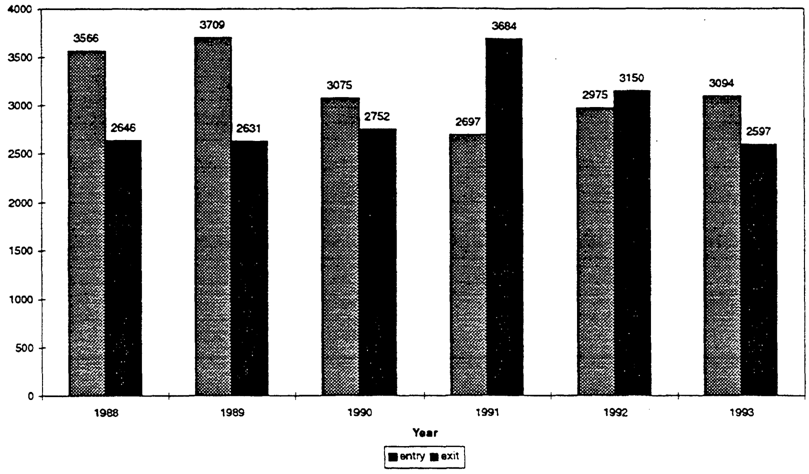


Figure 2. **Distribution of entry in Finnish manufacturing (62 industries) 1988–1993**

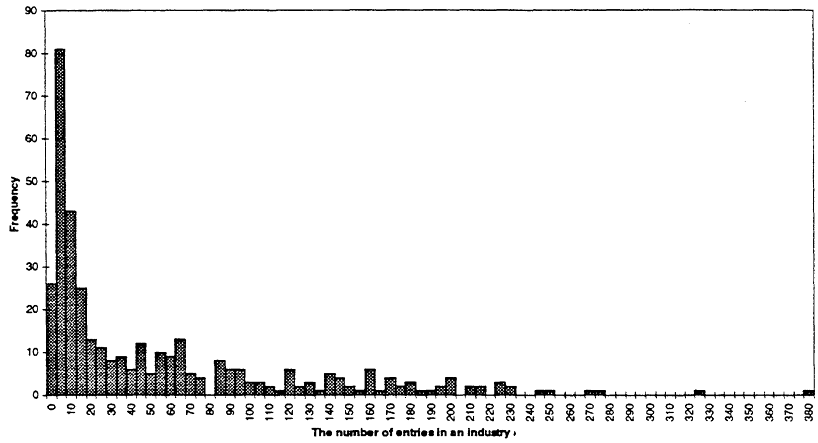
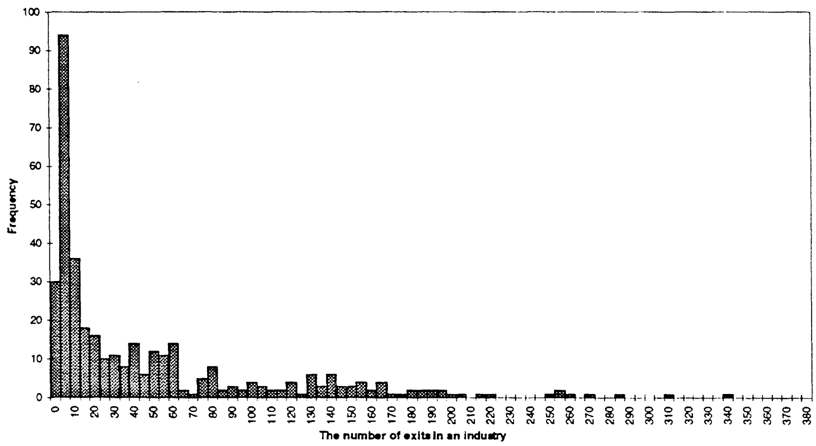


Figure 3. **Distribution of exit in Finnish manufacturing (62 industries) 1988–1993**



Profitability P is measured by the rate of return on capital. Due to data limitations this variable is available on a more aggregated level than the other variables. Variables BN describe barriers to entry. Due to data limitations, median firm size in relation to market size, med/sales, will be used as the only "natural" entry barrier variable. The median is assumed to measure minimum efficient scale, MES. Variables BN also include five-firm concentration ratio, c5, which accounts for strategic entry deterrence. In the exit equation, BX includes barriers to exit, which are also measured by med/sales and c5.

Industry size and growth variables include relative real change in the turnover of the industry, drsales. An alternative measure for industry growth is the change in the turnover normalized by MES, dsales/med, which takes into account how many efficient size firms can enter due to industry growth. Industry size is measured by the logarithm of the number of firms operating in the industry in the previous period, lnfirm_1. Similar variables are included in the exit equation.

The change in the unemployment rate, dunemploy, is used as a measure of the supply of entrepreneurship, S, and distinguished from other macroeconomic influences. This variable is included only in the entry equation, since the direction of causality would be controversial in the exit equation. The relative change in the real gross domestic product, drgdp, is one of the other macroeconomic variables and it is used for explaining both entry and exit. In the entry equation, dunemploy represents the "push" effect, and drgdp represents the "pull" effect.

The rest of the macro variables, M, include real interest rate, measured by three-month money market rate, rhelibor. It is used as a proxy for the direct effects of monetary policy on real activity. To observe the influence of credit supply, relative change in the total real bank lending, drcredit, is also included. Moreover, an interaction variable drcredit*rmed is created to capture how the entrants' access to capital market alters the influence of credit supply on entry and exit. drcredit*rmed is the product of drcredit and the median real firm size, which is used as a proxy for the degree of access to capital markets. Real exchange rate changes are measured by the logarithmic change in the official currency index deflated by the respective changes in consumer price indices in Finland and its trading partner countries, drexrate. A devaluation increases the value of drexrate, and a revaluation has an opposite effect.

All macroeconomic variables M are defined in real terms. Variables drgdp, rhelibor, drcredit, rmed and thereby also drcredit*rmed have been deflated by the change in the consumer price index. Variable drexrate is a measure of the real effective exchange rate.

Since our data cover only the years 1988–1993, there is a limit to the number of macro variables that can be included, since they have equivalent observations for each industry. As lagged variables are included, only four macro variables are allowed in a single equation.

4 Econometric specification

Since the explanatory variable in the entry (exit) equation is the number of firms entering (exiting), it should be taken into account in the estimation of the model that the dependent variable can take only nonnegative integer values. For this type of data Poisson models have been used (see Cameron and Trivedi, 1986, and Winkelmann and Zimmermann, 1995, for recent surveys of count data models in econometrics). There has been some earlier work on entry, where Poisson models have been used. Chappell et al. (1990) used a Poisson model for cross sectional net entry data. Mayer and Chappell (1992) modelled the implications of a bivariate Poisson model of entry and exit for net entry data. Bergman and Brännäs (1995) formulated a Poisson model for a case where regional panel data on the total number of firms, and hence on net entry, in each region and year is available. Poisson models have also been used by Baldwin (1995) for cross sectional data on gross entry, and Papke (1991) for regional panel data on gross entry. Poisson models have also been used in the organizational ecology literature (see Hannan and Freeman, 1989), but typically using time series data for individual industries.

Assuming that the probability that entry (exit) will occur in an industry in a small time interval is proportional to the length of the interval, that the probability of more than one occurences of entry (exit) is negligible, and that the number of entries (exits) in nonoverlapping time intervals is independent, the number of entering (exiting) firms follows the Poisson distribution. This can be generalized to the dependence of the occurence probability on different variables (covariates) and to dependence over time.

Let λ_{it} be the mean rate at which entry happens during year t. Note that following the statistical literature, the term "mean rate of entry" denotes the mean number of occurences, whereas in the industrial organization literature the term "entry rate" means entry divided by the number of firms. If EN_{it} denotes the number of firms entering industry i during year t,

$$\Pr(EN_{it} = N_{it}) = \frac{\exp(-\lambda_{it})\lambda_{it}^{N_{it}}}{N_{it}!}$$

The mean and variance of the Poisson distribution are both equal, $E(EN_{it}) = Var(EN_{it}) = \lambda_{it}$. Now let the mean rate of entry λ_{it} depend on the explanatory variables in the entry model, X_{it}, in the following way:

$$\ln\lambda_{i} = X_{it}\alpha$$

The log-linear form of the model guarantees that the mean rate of entry gets only non-negative values. This actually corresponds to the prevailing practice of modelling entry equations so that the dependent variable is in logarithmic form, but avoids the problem that actual entry N_{it} can be zero, in which case the logarithm cannot be taken.

The Poisson model assumes equal mean and variance, which is unlikely to hold in practice. This leads to the problem of overdispersion. One way to account for this is to assume that the mean rate of entry has some randomness, so that

$$\ln\lambda_{it} = X_{it}\alpha + \varepsilon_{it}$$

Assuming ε_{it} to have gamma distribution with parameters ϕ_{it} and v_{it} leads to a compound Poisson distribution which is in this case the negative binomial distribution

$$\Pr(EN_{it} = N_{it}) = \frac{\Gamma(N_{it} + v_{it})}{\Gamma(N_{it} + 1)\Gamma(v_{it})}\left(\frac{v_{it}}{v_{it} + \phi_{it}}\right)^{v_{it}}\left(\frac{\phi_{it}}{v_{it} + \phi_{it}}\right)^{N_{it}}$$

where Γ is the gamma function. The negative binomial distribution has mean $E(EN_{it}) = \phi_{it}$ variance $Var(EN_{it}) = \phi_{it} + \phi_{it}^2/v_{it}$. The mean is usually parameterized as $\phi_{it} = \exp(X_{it}\alpha)$ and the parameter v_{it} in the variance as $(1/\gamma)(\exp(X_{it}\alpha))^k$. Two popular choices for k are $k = 1$, which leads to $Var(EN_{it}) = (1 + \gamma)E(EN_{it})$ and $k = 0$, which gives $Var(EN_{it}) = E(EN_{it})(1 + \gamma E(EN_{it}))$. Cameron and Trivedi (1986) call them Negbin I and Negbin II, respectively. The former gives a constant variance-mean ratio and the latter has the variance-mean ratio linear in the mean. We use the Negbin II model in our estimations.

The Poisson model and the negative binomial model can be estimated using maximum likelihood. The log likelihood function of the Poisson model is, assuming full pooling of the panel data,

$$\ln L = \Sigma_t\Sigma_i[N_{it}! - \exp(X_{it}\alpha) + N_{it}X_{it}\alpha]$$

and the log-likelihood of the negative binomial model with full pooling is

$$\ln L = \Sigma_t\Sigma_i\left[\ln\Gamma(N_{it} + v_{it}) - \ln\Gamma(N_{it} + 1) - \ln\Gamma(v_{it}) + v_{it}\ln\left(\frac{v_{it}}{v_{it} + \phi_{it}}\right) + N_{it}\ln\left(\frac{\phi_{it}}{v_{it} + \phi_{it}}\right)\right]$$

where $\phi_{it} = \exp(X_{it}\alpha)$ and $v_{it} = 1/\gamma$.

The results may be sensitive to the distributional assumption. For example the Poisson model gives a consistent estimate of the mean even under misspecification, but the standard errors of the parameters are not consistent. One solution to this problem would be to use pseudo maximum likelihood (see Cameron and Trivedi, 1986). We investigate this in future work.

Since panel data is used in this paper, fixed industry effects should be taken into account. This can partly be handled in the pooled models by having explanatory variables, like c5 and dsales/med, which have a big interindustry variation, but do not vary as much over time. Hausman, Hall and Griliches (1984) have derived a fixed effect Poisson estimator. The estimation is conditional on the total number of entries (exits) in an industry in the sample. The log-likelihood of the fixed effect Poisson model is

$$\ln L = \Sigma_t \Sigma_i [\Gamma(N_{it} + 1) - N_{it} \ln \Sigma_s \exp(-(X_{it} - X_{is})\alpha)]$$

In this case the model explains how big is the share of year t entry in an industry of the industry's total entry over the sample.

As alternatives to these estimation methods, we also experimented with hurdle Poisson estimation. In this model the determinants of zero (no entry or no exit) observations may differ from those of positive entry observations (see Mullahy, 1986).

All the described estimation methods can be used also for exits. Let μ_{it} denote the mean rate of exit. If EX_{it} denotes the number of firms exiting industry i during a year, the Poisson model for exits is

$$\Pr(EX_{it} = N_{it}) = \frac{\exp(-\mu_{it})\mu_{it}^{N_{it}}}{N_{it}!}$$

Again, $E(EX_{it}) = Var(EX_{it}) = \mu_{it}$, and the mean rate of exit is parameterized as

$$\ln\mu_{it} = Z_{it}\beta$$

where Z_{it} are the explanatory variables in the exit model. The negative binomial and fixed effect Poisson models for exists are formed in an analogous manner.

5 Estimation results

Tabels 1 and 2 give the Poisson, negative binomial and fixed effects Poisson estimation results for entry, and Tables 3 and 4 include the estimation results for exit. In general, the results give support to the negative binominal model, since the γ parameter is significantly different from zero.

As microeconomic influences are concerned, we use scale economies, concentration, industry growth and industry size as the determinants of entry. The basic model outlined above includes also past profitability as a determinant of entry. We tried profits as an exogenous variable in preliminary estimations but its coefficient was clearly insignificant. Microeconomic influences on entry are largely in accordance with our expectations. Entry has a clear positive connection to the industry size measured by the lagged number of firms, and the elasticity of entry with respect to industry size seems to be quite near unity. This result also supports the use of entry rate as a dependent variable. The scale economies variable has a negative connection to entry, and this influence is also statistically significant. As a measure of industry growth, the relative change in total real sales, drsales, proved to be more significant in the entry model than the ratio of the change in nominal total sales normalized by the median firm size, dsales/med. This may suggest that the entry size of the new enterprises is generally below MES. In both cases, entry is positively related to industry growth. Finally, the evidence on the connection of entry to concentration is as expected. The coefficient of the concentration ratio is negative in the Poisson regressions at the 5 % significance level, although insignificant in the negative binomial models.

Since our data period is only five years (as lagged variables are used), we are not able to estimate the influences of all the macro variables on entry simultaneously. We therefore begin by including only the financial variables in the model, and then complete it by adding the business cycle and the exchange rate variables in turn. The macroeconomic influences on entry are also quite expected. Entry seems to be negatively related to the real interest rate, although the significance of this connection remains low in the negative binomial models and in the model that includes business cycle variables. The coefficient of the change in the real credit supply is positive and significant except for the model with the business cycle variables. This may be due to the correlatedness of the macro variables. Our estimation results also support the hypothesis that the influence of credit constraints on entry varies with the average firm size. The coefficient of drcredit*rmed is negative and significant in all our estimations. In accordance with our hypothesis, entry is positively connected both to the GDP growth and to the change in the unemployment rate. The coefficient of the change in the unemployment rate is not very significant, however. This result suggests that unemployment and GDP developments have different roles in the analysis of new firm formation. The coefficient of the change in the real exchange rate is positive and significant both in the Poisson and the negative binomial models, which implies that the influence of exchange rates on entry works through foreign trade prospects.

We illustrate the entry-exit process in the model of exit by introducing lagged entry as a determinant of exit. In the model of exit, we also use the average profitability of the industry as an exogenous variable since it performs quite well. The coefficient of profitability is negative and significant in all our exit models. The other microeconomic influences behave also in an expected way. Exit has a significant connection to industry size in the same manner as entry. So, the exit rate could also be an appropriate dependent variable. Scale economies have again a negative influence, but the coefficient is not significant in the negative binomial model. Two alternative measures of industry growth were tried again. In the exit models, dsales/med performs better, although both of the measures had a negative coefficient, as expected. The coefficient of the concentration rate consistently has a negative sign in all estimations, but its significance is poor especially in the negative binomial models.

As mentioned above, the change in the unemployment rate may rather be a consequence of firm deaths than a cause for them. Therefore, we do not use the unemployment variable in the models of exit. Our evidence about the other macroeconomic influences is not as encouraging as in the models of entry.

Exit is positively connected to the real interest rate as expected, but the significance of the results is generally poor. The coefficient of the relative change in the real credit supply is negative, but not significant. The sign of the coefficient becomes positive in the models where GDP growth or real exchange rate change is included. The coefficient of the interaction variable drcredit*rmed has a negative sign in all estimations, but not significant in the negative binomial model. Part of the impact of the financial variables on exit seems to come indirectly, since they have a positive impact on entry which in turn increases exit.

Exit is negatively connected to the relative change in the real GDP as expected. The coefficient of the change in the real exchange rate is positive but not significant. This result suggests that the influence of a real devaluation on the amount of foreign debt and interest expenditure and its positive influence on export demand to a large extent outweigh each other.

Tables 1 to 4 also show the results from the fixed effects Poisson estimation. This model explains the number of entries or exits in an industry in a certain year, conditionally on the total number of entries or exits in the industry over the data period. Therefore the values of the coefficients are not directly comparable to those in the other estimations.

In the entry models the fixed effects estimation lowers the explanatory power of the industry variables, which is understandable since they may have more variation between industries than across time. An exception is the concentration rate variable, which gains significance. The impact of the macroeconomic variables on entry is similar to that obtained in the other estimations. In the exit models the fixed effects results are mainly the same as in the estimations with pooling. Among the macroeconomic explanatory variables, GDP growth gains more significance. However, the influence of past entry on exits seems to vanish.

In addition to the estimations shown in the tables, we also experimented with models for entry and exit rates. Since the coefficient of the lagged number of firms is close to one both in the entry and in the exit models, we re-estimated the models by restricting the coefficient to one. This implies that we are in fact explaining entry and exit rates. The results were otherwise very close to those presented, except that the coefficient of the concentration rate was positive, although not significant. Another way of estimating a model for the entry or exit rate is to use Tobit estimation. The entry rate is a nonnegative, continuous variable, which is not bounded from above since in principle entry can exceed the number of firms. The exit rate, on the other hand, is in the interval [0,1], since exit cannot exceed the number of firms. However, there are no cases in the data where exit is so large that the exit rate would be close to the upper bound. Tobit estimation gave again fairly similar results to those presented, except that the coefficient of concentration was not significant.

Finally, we experimented with hurdle Poisson estimation, but the determinants of the incidence of entry and the amount of entry seemed to be more or less identical. Therefore the model collapsed to the standard Poisson model.

6 Conclusions

We have examined empirically the entry-exit process in the Finnish manufacturing industry. Following recent work in industrial organization, we used a model where entry is influenced by past profits, industry growth and size, entry barriers (proxied by scale economies) and concentration. Exit, on the other hand, is influenced by exit barriers (scale economies), concentration, industry growth and size, and current profitability. Also past entry influences exit through the replacement of old firms by new ones. However, it is likely that the microeconomic factors are not sufficient in explaining entry and exit over time. We therefore added macroeconomic explanations in the model. The theory of monetary transmission mechanism suggests that both interest rates and credit supply might influence investments. Since entry can be considered as an investment, and exit as a disinvestment, we tested the hypothesis that entry and exit are influenced by financial variables. Also the general economic climate may affect entry and exit, e.g. the theories of entrepreneurship emphasize the role of unemployment in explaining business starts. In addition to the role of both microeconomic and macroeconomic explanations, we also emphasized the use of econometric techniques that can deal with non-negative integer valued observations on entry and exit.

The results were in general consistent with our expectations. Past profits did not explain entry, but scale economies had a strong negative influence on entry. The role of the concentration ratio, which proxies possibilities for collusive entry deterrence, was more vague. This is understandable, since oligopoly theory has in any case no clear predictions about the connection of concentration and conduct. Exit seemed more difficult to model using the microeconomic factors. Entry barriers did not seem to act as exit barriers, at least not very strongly. Industry growth and profitability had a much stronger negative impact on exit than what their positive impact on entry was. Lagged entry had a significant influence on exit, which shows that either new firms replace old ones or new firms have short life expectancy. The lagged number of firms had a strong influence on both entry and exit, and the coefficient of the variable was close to one. This implies that entry rate and exit rate are almost independent of the size of the industry.

The macroeconomic factors explained entry fairly well, but exits much less. Both real interest rate and change in credit supply worked as expected in the entry models, and there was also some evidence of more credit constraints in industries where firms are small. The influence of the financial variables on exit may partly come through their impact on entry. GDP growth and real exchange rate changes had more influence on entry than on exit. Unemployment had a slight positive influence on entry as the theories of entrepreneurship predict.

In comparison to some other Finnish studies, we can conclude that the impact of unemployment of business starts was less clear than in the study of Tervo and Niittykangas (1995). However, since they used regional data which has more variation in unemployment rates, and data on the whole business sector, which includes more opportunities for self employment, the result is understandable. The role of the macroeconomic variables in the determination of exits was somewhat less clear than the in the study of Takala and Virén (1995). They concluded that indebtedness and real interest rate had a positive and GDP growth a negative impact on bankruptcies. The stronger impact of the macro variables is probably partly due to their use of a long time series data with more cycles included than in our data. Bankruptcies are also more sensitive to financial factors than exits, which also include voluntary liquidations and changes of ownership.

The traditional exit model in industrial organization is based on the idea of voluntary exit. The macroeconomic theories of monetary transmission, on the other hand, are more concerned of forced exit in the form of bankruptcy. Both approaches treat entries as voluntary investments. This may explain why the financial factors worked well in the entry models, but did not seem to explain exits.

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Appendix 1

Data

The data were collected from three primary sources. Firm and industry level data have been gathered from the Register of Enterprises and Establishments of Statistics Finland (SFREE) except for profitability which is from the Financial Statements Statistics of Statistics Finland (SFFSS). Macro data have been obtained from the database of Bank of Finland (BOFDB). The definitions of the variables and the respective data sources are the following:

entry	the number of entries in the industry (SFREE)
exit	the number of exits in the industry (SFREE)
c5	concentration ratio, turnover of five largest firms in the industry / total turnover of the industry (includes plants of firms classified in other industries) (SFREE)
med/sales	median firm turnover in the industry / total turnover of the industry (SFREE)
drsales	relative change in total real turnover of the industry from previous period (SFREE)
dsales/med	(change in total turnover of the industry from previous period) / (median firm turnover in the industry) (SFREE)
drcredit	relative change in total real credit supplied by the banking sector from previous period (BOFDB)
drcredit*rmed	drcredit * median real firm turnover in the industry (BOFDB / SFREE)
rhelibor	average real three-month helibor interest rate (Helsinki interbank offered rate) (BOFDB)
lnfirm_1	natural logarithm of the number of firms in the previous period (SFREE)
dunemploy	change in the ratio of unemployed to total work force from previous period (BOFDB)
drgdp	relative change in real gross domestic product from previous period (BOFDB)
drexrate	relative change in official real exchange rate index value from previous period (BOFDB)

profitability return on investment, (profit/loss after financing costs + interest expense + other expenses on liabilities) / (liabilities subject to interest + shareholders' equity + reserves + valuation items) (SFFSS)

The consumer price index is used for deflating the nominal values of certain variables (BOFDB).

Appendix 2

Estimation results

Table 1. **Entry in Finnish Manufacturing**

Variable	Poisson	NEGBIN	Fixed effect Poisson	Poisson	NEGBIN	Fixed effects Poisson
constant	-0.764***	-1.403***		-0.775***	-1.386***	
	(-5.581)	(-4.526)		(-5.650)	(-4.453)	
c5	-0.384***	-0.144	-0.355*	-0.342***	-0.145	-0.524**
	(-4.285)	(-0.732)	(-1.904)	(-3.805)	(-0.733)	(-2.518)
med/sales	-0.016***	-0.009**	-0.005	-0.017***	-0.009**	-.006
	(-3.622)	(-2.483)	(-0.617)	(-3.745)	(-2.556)	(-0.729)
drsales	0.142***	0.066	0.049**			
	(5.785)	(1.292)	(2.010)			
dsales/med				0.121**	0.153	0.262***
				(2.317)	(0.850)	(7.002)
drcredit	0.673***	0.831***	0.602***	0.708***	0.835***	0.547***
	(6.706)	(2.668)	(7.432)	(7.034)	(2.676)	(6.306)
drcredit*rmed	-0.201***	-0.139***	-0.192***	-0.209***	-0.141***	-0.193***
	(-5.274)	(-2.964)	(-3.144)	(-5.423)	(-2.992)	(-3.252)
rhelibor	-0.036***	-0.026*	-0.021***	-0.036***	-0.025*	-0.017***
	(-7.880)	(-1.873)	(-4.871)	(-7.785)	(-1.765)	(-3.742)
lnfirm_1	0.872***	0.946***	-0.292***	0.872***	0.941***	-0.302***
	(55.312)	(27.197)	(-6.921)	(55.089)	(26.892)	(-5.314)
γ		0.104***			0.105***	
		(9.429)			(9.715)	
Log-L	-1615.410	-1086.232	-791.361	-1626.900	-1086.732	-748.658

Restricted Log-L = -11500.99

Note: * denotes coefficient significant at 10 % level, ** at 5 % level,and *** at 1 % level, respectively (t-statistics in parentheses)

Table 2. **Entry in Finnish Manufacturing**

Variable	Poisson	NEGBIN	Fixed effects Poisson	Poisson	NEGBIN	Fixed effects Poisson
constant	-1.003***	-1.637***		-0.964***	-1.574***	
	(-7.108)	(-5.067)		(-6.949)	(-5.053)	
c5	-0.394***	-0.171	-0.648***	-0.396***	-0.172	-0.643***
	(-4.380)	(-0.908)	(-3.070)	(-4.406)	(-0.908)	(-3.035)
med/sales	-0.016***	-0.009***	-0.006	-0.016***	-0.009***	-0.005
	(-3.692)	(-2.580)	(-0.773)	(-3.681)	(-2.578)	(-0.741)
drsales	0.103***	0.055	0.002	0.112***	0.056	0.011
	(3.849)	(1.057)	(0.048)	(4.310)	(1.090)	(0.357)
drcredit	0.638**	1.344	0.714***	3.278***	3.455***	2.763***
	(1.909)	(1.476)	(2.635)	(10.110)	(3.646)	(8.777)
drcredit*rmed	-0.203***	-0.140***	-0.198***	-0.202***	-0.140***	-0.198***
	(-5.353)	(-3.131)	(-3.252)	(-5.339)	(-3.132)	(-3.254)
rhelibor	-0.009	-0.005	-0.003	-0.038***	-0.030**	-0.026***
	(-1.550)	(-0.310)	(-0.627)	(-8.519)	(-2.207)	(-5.579)
lnfirm_1	0.870***	0.941***	-0.220***	0.869***	0.941***	-0.232***
	(55.105)	(28.021)	(-5.632)	(55.112)	(28.036)	(-5.722)
dunemploy	3.117**	4.971	3.226***			
	(2.494)	(1.551)	(2.912)			
drgdp	3.362***	3.134***	2.782***			
	(8.724)	(2.687)	(7.244)			
drexrate				3.015***	3.026***	2.537***
				(8.437)	(2.933)	(6.957)
γ		0.099***			0.099***	
		(9.233)			(9.240)	
Log-L	-1576.645	-1082.151	-766.724	-1579.725	-1081.815	-767.901

Restricted Log-L = -11500.99

Note: * denotes coefficient significant at 10 % level, ** at 5 % level, and *** at 1 % level, respectively (t-statistics in parentheses)

Table 3. **Exit in Finnish Manufacturing**

Variable	Poisson	NEGBIN	Fixed effects Poisson	Poisson	NEGBIN	Fixed effects Poisson
constant	-0.998***	-1.471***		-1.084***	-1.515***	
	(-6.364)	(-6.331)		(-6.883)	(-6.642)	
c5	-0.271***	-0.229	-1.242***	-0.264***	-0.222	-1.063***
	(-2.828)	(-1.626)	(-5.200)	(-2.778)	(-1.637)	(-4.006)
med/sales	-0.017**	-0.010	-0.014	-0.017**	-0.010	-0.012
	(-2.445)	(-1.476)	(-1.290)	(-2.427)	(-1.483)	(-1.239)
drsales	-0.127***	-0.048	-0.035			
	(-3.204)	(-1.077)	(-0.937)			
dsales/med				-0.359***	-0.248**	-0.274***
				(-6.064)	(-2.315)	(-4.124)
profitability	-3.131***	-2.942***	-2.297***	-2.610***	-2.681***	-1.774***
	(-10.371)	(-5.711)	(-5.437)	(-8.213)	(-5.264)	(-3.740)
drcredit	-0.157	-0.078	-0.167	-0.104	-0.046	-0.152
	(-1.351)	(-0.379)	(-1.518)	(-0.885)	(-0.222)	(-1.325)
drcredit*rmed	-0.084**	-0.054	-0.103	-0.086**	-0.056	-0.098
	(-2.113)	(-0.679)	(-1.466)	(-2.176)	(-0.707)	(-1.351)
rhelibor	0.015***	0.017*	0.013***	0.012**	0.015	0.011**
	(3.140)	(1.781)	(2.740)	(2.353)	(1.578)	(2.309)
lnfirm_1	0.833***	0.911***	0.863***	0.849***	0.919***	0.853***
	(40.751)	(26.407)	(8.810)	(41.306)	(26.898)	(8.071)
entry_1	0.180***	0.124***	0.022	0.149***	0.108***	0.037
	(10.722)	(3.187)	(0.754)	(8.629)	(2.679)	(1.174)
γ		0.033***			0.031***	
		(6.124)			(6.038)	
Log-L	-1057.821	-959.789	-702.738	-1044.985	-958.024	-692.452

Restricted Log-L = -11637.53

Note: * denotes coefficient significant at 10 % level, ** at 5 % level, and *** at 1 % level, respectively (t-statistics in parentheses)

Table 4. **Exit in Finnish Manufacturing**

Variable	Poisson	NEGBIN	Fixed effects Poisson	Poisson	NEGBIN	Fixed effects Poisson
constant	-1.062***	-1.477***		-1.097***	-1.520***	
	(-6.723)	(-6.440)		(-6.947)	(-6.575)	
c5	-0.268***	-0.230*	-1.033***	-0.264***	-0.221	-1.064***
	(-2.822)	(-1.685)	(-3.573)	(-2.777)	(-1.635)	(-3.779)
med/sales	-0.017**	-0.010	-0.012	-0.017**	-0.010	-0.012
	(-2.432)	(-1.465)	(-1.237)	(-2.427)	(-1.481)	(-1.243)
dsales/med	-0.327***	-0.207*	-0.162**	-0.369***	-0.251**	-0.262***
	(-5.334)	(-1.866)	(-2.269)	(-6.152)	(-2.361)	(-3.827)
profitability	-2.339***	-2.359***	-0.901	-2.716***	-2.711***	-1.676***
	(-6.755)	(-4.427)	(-1.502)	(-8.156)	(-5.179)	(-3.127)
drcredit	0.061	0.225	0.258*	0.264	0.081	-0.405
	(0.420)	(0.774)	(1.824)	(0.731)	(0.128)	(-1.593)
drcredit*rmed	-0.084**	-0.054	-0.091	-0.086**	-0.056	-0.983
	(-2.120)	(-0.673)	(-1.222)	(-2.193)	(-0.709)	(-1.349)
rhelibor	0.006	0.006	-0.000	0.010**	0.014	0.012**
	(1.093)	(0.502)	(-0.011)	(2.043)	(1.535)	(2.419)
lnfirm_1	0.846***	0.917***	0.776***	0.849***	0.919***	0.847***
	(41.097)	(26.889)	(7.307)	(41.295)	(26.901)	(7.873)
entry_1	0.155***	0.112***	0.040	0.149***	0.108***	0.033
	(8.825)	(2.830)	(1.280)	(8.590)	(2.656)	(1.063)
drgdp	-0.786*	-1.166	-1.943***			
	(-1.959)	(-1.542)	(-6.112)			
drexrate				0.407	0.144	-1.286
				(1.077)	(0.200)	(-0.942)
γ		0.031***			0.031***	
		(5.984)			(6.007)	
Log-L	-1043.071	-956.844	-687.296	-1044.405	-958.004	-696.207

Restricted Log-L = -11637.53

Note: * denotes coefficient significant at 10 % level, ** at 5 % level, and *** at 1 % level, respectively (t-statistics in parentheses)

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