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Firm size in the Netherlands

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Executive Summary

Developments in firm size and its distribution have always been one of the main issues in economic research. Due to several trends in the economic structure some authors expected a shift from large to small firms (for example Audretsch and Thurik 2000). In the underlying thesis I will investigate whether this prediction has come true in the Netherlands in the period 1993-1998.

At first a theoretical framework on firm size and its determinants is provided. The following determinants are described: globalisation, technological development, deregulation, uncertainty, labour developments, knowledge and prosperity. These determinants do not have a value on their own; they should be explained from a theoretical framework, which is why the main theories on firm size are used as frameworks. The following theories are discussed: Transaction Costs Economics, Life Cycle Theory, Gibrat’s Law, Learning Theories and the Theory of Market Configurations. These are combined with the determinants. This leads to predictions on developments in average firm size.

An empirical analysis is carried out in order to provide more insight in changes in firm size distributions in 68 industries. From this it follows that especially manufacturing and construction industries are characterised by a decrease in average firm size, while the opposite is true for retail and hospitality industries.

So the hypothesis that trends lead to a general decrease in average firm size is not supported during the sample period.

The combination with the theoretical predictions does not lead to spectacular results. Globalisation, deregulation and prosperity have a significant explanatory value, but this depends on the theoretical framework chosen.
1 Introduction

In this chapter an introduction is given to the research project. In section 1.1 the research motivation will be explained. The research question is stated in section 1.2. The next section, 1.3 is about the research design. The relevance of the project is discussed in section 1.4 while the structure of this thesis is elaborated in section 1.5.

1.1 Motivation

One of the most discussed phenomena in contemporary economics is the concept of new economy. According to some writers, we are at the threshold of a new economic era. This shift is sometimes described as the shift from the managed to the entrepreneurial economy (Audretsch and Thurik, 2000)

This could have substantial effects on firm size, since firms will adapt themselves to new economic environments. This thesis investigates how these developments can be explained theoretically and how they are expressed in empirical data on firm size and its distribution.

1.2 Research question

The central research question can be stated as follows:

How does average firm size in the Netherlands in the period 1993-1998 evolve and how could this be explained theoretically?

This question can be divided into several sub questions:

- How does average firm size develop?
- How do several determinants influence firm size?
- What are theoretical explanations for firm size and growth?
- How does the combination of theories and determinants work out in firm size?
- Are there differences between and within sectors?
- How do the theoretical predictions fit with empirical data?

1.3 Research design

The research will start with a literature survey in order to obtain insight in the most important theoretical explanations for firm size distributions and its determinants. After this an
empirical analysis is carried out, making use of datasets constructed by EIM. We will apply frequency analysis in order to get insight in developments in firm size distributions. This empirical analysis will be used to answer the research questions posed above.

1.4 Relevance

Firm size distribution is an important tool to describe market structure within an industry. Recent policy trends are mainly concerned with market structure: governments attempt to stimulate entrepreneurship and small innovative firms while concentration and abuse of marketpower became the main obstacles to combat. The overall figures of firm sizes are important but do not give much insight into the developments within and between sectors and its determinants. This is the reason for this particular research approach to the subject.

1.5 Structure

The structure of this thesis is the following: section 2 gives an introduction to the subject, using some data as an illustration. Chapter 3 gives a broad theoretical overview of determinants of firm size, theories on firm size (distributions) and their combinations. In section 4 I will discuss and analyse the dataset using frequency analysis. Chapter 5 combines the empirical outcomes with the theoretical part of chapter 3. Finally the main conclusions are provided in chapter 6.
Motivation

Due to rising unemployment and declining economic growth the old paradigms of large-scaled production, efficiency and labour as the main production factor were replaced during the nineties by a greater emphasis on innovative entrepreneurship, flexibility and knowledge as the main input factor. Exogenous forces drove these developments; the most important of which are globalisation and the ICT revolution. These developments have had their influence on firm size: it is expected that small firms have more opportunities in a more dynamic economic environment.

Thus, the predicted expansion of small firms should take place in the nineties. This is why it is interesting to search for data on firm size and its distributions. EIM Business and Policy Research possesses a lot of detailed data on firms in the Netherlands. In this project I will use data for 1993 and 1998, so a comparison could be made between these years in order to provide more insight into firm size developments. Several techniques can be applied to these data. Frequency analysis shows the contribution each size class has in the average firm size figure. If we apply this to the private sector as a whole in the 1993 and 1998, we can show developments of the firm size distributions as in figure 2.1.

Figure 2.1: Firm size distribution characteristics of the Dutch private sector 1993-1998

\[ \text{Figure 2.1: Firm size distribution characteristics of the Dutch private sector 1993-1998} \]

\[ \text{Data are deducted from the EIM datasets “BlissRekeningen” and “BlissOndernemingen”. Both datasets are based on data provided by the Dutch Central Bureau of Statistics (CBS) and contain a size class dimension.} \]

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We see that the role of the largest size classes has declined, while small size classes show an increasing importance. However, due to the high aggregation level, this chart does not tell us everything. Many differences exist between sectors and not all determinants will work out in the same way in each sector. Therefore, a more detailed analysis is presented in the next chapters.

The expected rise in small entrepreneurial efforts should also translate itself into a higher business ownership rate, which is defined as the number of business owners divided by total labour force. Figure 2.2 demonstrates the historical development of the Dutch business ownership rate, as compared to the weighed average of the fifteen EU countries and the OECD countries (total, which is EU-15 added with US, Japan, Australia and New Zealand).

Figure 2.2: Business ownership rates between 1972 and 1998 (source: EIM)

We see that the Dutch figure is below average, but a sharp increase is seen from 1989 onwards. So following this line of reasoning a decrease in average firm size is expected here too. But again this figure is not all-telling. Entrepreneurial efforts will be concentrated in certain sectors, while in other industries it is not that much of an issue. We need a more sector specific analysis to explore this.

The following chapter gives a general theoretical framework that will be used in explaining the detailed empirical analyses.
3 Determinants of firm size in a theoretical framework

In this chapter several theories and determinants of firm size are discussed. Theories will be used as frameworks explaining the empirical evidence. Determinants are defined as external factors that affect the environment of firms in a structural way. Some determinants can also be characterized as trends. The influence of the determinants on firm size differs in each framework. This means that a combination of one determinant with two different theories could result in opposite predictions concerning firm size.

Economics has always been concerned with equilibrium thought. Firm size and firm growth were explained by neo-classical theories of the firm, in which firm size is dependent on the firm’s cost structure and firms will produce until they reach their minimum efficient scale. So cost structure defines firm size while firm growth is usually linked to developments in market size. However, many phenomena in market dynamics do not fit with these theories, for example the co-existence of large and small firms within one sector.

This chapter is structured as follows: in section 3.1 several determinants are discussed, in line with Bernardt and Muller (2000). Section 3.2 gives a broad overview of different theories on firm size and its distributions, the aim of this part is not to be exhaustive but to give useful frameworks for our discussion. The next section 3.3 combines the determinants with their theoretical frameworks in order to obtain predictions on average firm size developments. The final section 3.4 summarises the foregoing in two compact overviews, one on services and one on manufacturing.

3.1 Determinants

In this part an overview of determinants of firm size is given, these can be described as external factors. According to some writers, for example Audretsch and Thurik (2000), these determinants can be characterized as trends and they have played an important role in recent firm size distributions. The following determinants are discussed (Bernardt and Muller, 2000 and some supplementary trends). Where possible, a distinction is made between manufacturing and services, since the consequences of the trends does not work out in the same way in both sectors.

- Globalization
- Technological Development
- Deregulation and Liberalization
- Uncertainty
- Flexibility of Labour relationships
3.1.1 Globalisation

Globalization can be described as the shortening of distances; the world is becoming smaller. Due to institutional arrangements free trade of goods, labour and services is getting easier. Another important factor is the progress in communication technologies. The influence of these phenomena on firm size in a particular industry depends on several factors. First the openness of an industry. An industry that produces for external markets will face more severe competition. This needs a more efficient production structure, which favours scale increase. Second, labour intensive sectors face more competition from low wage countries, which will lead to firm size decline or exit in the higher wage countries. The development of new markets and a more diversified demand will probably lead to new firms and small-scaled entrance. Globalisation will have more influence in manufacturing, since manufacturing firms often play in international markets, while service firms are usually more locally oriented. The more severe competition in international markets will lead to more concentration in manufacturing firms; this will cause an increase in average firm size. The conclusion is that it is not easy to forecast the exact consequences of globalisation on firm size.

3.1.2 Technological Development

Technological development is one of the most radical factors of change in the environment of firms. The most relevant development in these is the (r)evolution in information and communication technologies (ICT). This has various effects on firm size. Transaction costs of products, information and knowledge will be lower, which will lead to more opportunities for small firms. New technologies just like ICT will develop in a life cycle model, so in the beginning a lot of small entrants will occur, which has a negative effect on average firm size. The life-cycle theories predict that - in course of time - a lot of these small firms will exit during a shake out while others show internal growth, which will lead to an increase in average firm size. A further discussion of life cycles is provided in the section on theories. Innovation is a very important concept in ICT, so it is interesting to look for a relationship between firm size and technological development. Two causalities may exist: technological development can lead to more entrepreneurship and vice versa. We can think of small firms as the creators of new technological innovations, while on the other side large firms have more resources at their disposal to carry out new combinations. All this depends on comparative advantages and national policy. For example the creation of knowledge clusters and research parks (mostly done by governments) is expected to lead to more innovative entrepreneurship. The concept of innovation plays a more important role in manufacturing. Technological innovations will lead to new entrants, but this decrease in average firm size will be temporarily, since many small firms will fail in the end. Services will make use of the new applications created by technological development, for example cheaper communication: this will lead to a more long lasting decrease in average firm size. To conclude, ICT developments probably favour firm size decrease but one could wonder whether this would be long lasting, especially since recently many technology-based firms are in serious problems.
3.1.3 Deregulation and liberalisation

Another trend, which is particularly relevant in European countries, is deregulation and liberalisation of markets. Up to the 80’s policy has mainly been concerned with trying to reap the benefits of large scale. But the economic problems of the 90’s led to a reorientation on entrepreneurship. In "De ondernemende samenleving, meer kansen minder belemmeringen voor ondernemerschap", the Dutch Ministry of Economic affairs gives a broad overview of the role of entrepreneurship, the importance of smallness and policy measures to stimulate this. The aim is to create more dynamic and flexible markets by lowering the influence of government, stricter competition law and less superfluous regulation so that firms are less restricted in doing business. All of this will lead to intensified competition, lower entry barriers and more opportunities for entrepreneurship. The Dutch government aimed to reduce regulatory costs by 10 percent in the period 1994-1998; this would lead to a healthier climate for entrepreneurs and an improvement for the Dutch competitive environment. From the evaluation it followed that total regulatory costs were raised with 28% in the period 1993-1998, while without policy this would have been 35% (Boog, 1999). The target of 10 has not been reached, but the policy did work in the end. This reduction of regulatory costs was part of the broader approach “Competition, Deregulation and Legislation Quality (MDW), which was initiated by the first Kok Cabinet, aimed at lessening and simplifying government regulations. Another example of this policy related to firm size is the abolishment of the Establishment Act, which makes it much easier for new firms to enter the market. Especially small entrepreneurs often faced a threshold in entering a market due to several obligations, so after this new policy a rise in the number of small firms should be expected. The influences of a reduction in regulatory costs are strengthened by the trend of a (r)evolution in ICT developments. Due to the Internet and E-mail it is easier for firms to transfer information to the government, social partners and other firms, this will lead to less administrative costs and leaves room for a more flexible economic structure. The consequences for firm size are that flexibility and adaptability are increasingly important, which are characteristics of small firms. It is also easier to start a firm due to less regulation. Mergers that are expected to lead to (abuse of) market power are forbidden, which leads to smaller firms or less increase of firms. On the other hand, with more entry market transparency will decline, which will rise transaction costs and firm size. The concept of deregulation will not have much influence in manufacturing sectors, since most sectors are characterised by a high capital intensity, which makes it difficult for new entrants to enter. On the other hand entry into service sectors is easier due to less concentration and lower capital intensity, so a policy of deregulation is expected to lead to a decrease in average firm size, especially in the services sector.

3.1.4 Uncertainty

Uncertainty is a consequence of the increasing rate of competition and the fast technological change. Consumer wants change rapidly and product life cycles are shortened. Firms react to this in several ways. Due to more uncertainty transaction costs will be higher, which will lead to less market transactions and more internal transactions. This vertical integration leads to larger firm size. More merger activities are seen too, which will also increase firm si-
ze. Uncertainty will cause a less predictable future. Manufacturing and services react to this in different ways. In manufacturing, a safe strategy followed by many firms is a return to core competences, we can think of multinationals that sell factories. Services are less threatened since they can more easily change their strategy because of a lesser degree of capital intensity. Again it is not possible to give a straightforward expectation on the development in average firm size.

3.1.5 Flexibility of labour relationships and increasing education level

Recent developments in the Dutch labour market can be described from a labour demand and a labour supply aspect. Labour supply developments are characterized by a higher participation rate, more female workers, a greater demand for part-time work and a greater want of variety and own responsibility. Labour demand is characterised by a greater need for flexibility, emphasis on education and working experience. Education has become a keyword, training-on-the-job and work experience are becoming more and more important. The consequence of all this on firm size is not quite clear, large firms often offer more flexibility, more training and education opportunities and better wage and career prospectives. On the other hand small firms are often better at creating informal and flexible organisational structures, where workers have better incentives and higher motivation. This discussion can also be made with regard to manufacturing and services. Manufacturing firms are often large scaled and services have a tendency towards smallness. So flexibility of labour relationships does not work out in one way. Worker’s internal wants determine whether he will choose a large or small firm to work at.

3.1.6 Knowledge

Worldwide change in technology in accordance with the foregoing trends did destroy the traditional comparative advantage of industries in North America and Europe. Production costs are lower in other countries and communication is much easier. That is why countries like the Netherlands turned into a knowledge based economy, the most important production factor has changed from capital and labour to knowledge. This will lead to a decrease in average firm size, since scale-effects and minimum production levels are becoming less important. A distinction between manufacturing and service sectors will show that knowledge based activities will have a larger influence in service firms, since these are less capital intensive.

3.1.7 Level of Prosperity

Many of the foregoing trends are influenced by or depend on the level of prosperity. Economic welfare and a high income leaves room for investments, encourages consumer-wants and makes the trade-off between labour and spare-time, in other words labour flexibility, a debatable topic. In a world with increasing incomes, people will spend more on special products, niche markets will flourish and trade will be diversified. All this leaves room for smallness. The trends described above are all influenced by growth of prosperity, so will technological development depend on the amount of money spend on technological R&D. Labour
flexibility depends on wages and knowledge is easier created and transferred in a prosperous environment. Individualisation is another factor, since rich people are less dependent on others or governments. To conclude we can say that growth of prosperity causes more opportunities, so in times of high economic growth, just like our data-period, it is expected that more small firms will be able to exist.

### 3.2 Theoretical framework

This section describes several theories on firm size, firm growth and firm size distributions. The aim of this is to provide frameworks that are used in the explanation of the determinants. The following theories are discussed:

- **Transaction Costs Theory**
- **Life-cycle Theory**
- **Gibrat’s Law**
- **Learning models**
- **The theory of market configurations**

#### 3.2.1 Transaction Costs Theory and Firm Size

One of the oldest theories on firm size is the transaction costs theory. Coase (1937) examined whether transactions (of goods or information) should take place in a firm (vertical integration) or in the market. A higher degree of market transactions leads to smaller firm sizes, while the opposite is true for a high degree of vertical integration. Whether a particular transaction is allocated to the market or to an organization is a matter of cost minimization. Transaction cost economics is based on two assumptions with respect to human behaviour (Williamson, 1975) (1) human beings are characterised by bounded rationality and (2) human beings are opportunistic. The choice between markets and organisations depends on three critical dimensions of transactions: asset specificity, uncertainty/complexity and frequency. For example, a higher frequency of transactions will make it more efficient to coordinate this action into a firm. Asset specificity means an asset is transaction specific and cannot be redeployed to an alternative use without a significant reduction in the value of the asset (Douma and Schreuder, 1998). A high level of asset specificity means that the asset is difficult to transfer within the market and internal co-ordination will occur, which could lead to larger firm size. So in a transaction costs view, firm size is dependent on human characteristics and transaction characteristics. These characteristics will show a continuous change due to economic or institutional developments. For example, a higher degree of educational activities leads to a lesser degree of bounded rationality. The discussed determinants will influence all the dimensions of transactions, so firm size will change too, dependent upon which determinant works out in the strongest way.

#### 3.2.2 Life Cycle Theory and Firm Size
The whole idea of a life cycle of firms resembles that of a product life cycle, which states that the number and versions of a certain product will evolve over time. Many different versions emerge after a basic innovation, followed by a general decline in this number due to refinements and scale economies. In the end a dominant design emerges, which will serve the largest part of the market.

**Dominant Design**

Mueller and Tilton (1969) give a general introduction to the concept of life cycles in firms. The evolution of an industry can be divided into four stages: an innovation stage, an imitation stage, a technological competition stage and finally a standardisation stage. In the innovation stage a basic invention and its development take place. Many small firms compete in this phase, there still are no scale effects or technical barriers so high entry rates are seen. In the imitation stage many followers appear, who are all trying to imitate the original inventor, entry barriers are still low. As the number of firms rises, technology and R&D become more complex, the industry reaches its maturity: they call this the technological competition phase. Scale and R&D costs are rising, which leads eventually to a shakeout of industries, the entry rate decreases. Here the standardisation stage appears, technological progress declines and price competition becomes very important. Only mature, big scale firms can stand this phase.

Utterback and Suarez (1993) describe the relationship between innovation, competition and industry structure. In an earlier publication they composed the dominant design theory, which states that an emerging market is characterised by many small entrants who are all innovating. After some time a dominant design appears, which leads to a shakeout, followed by a stability phase. Sometimes a new round of innovations breaks through. It is important to make a distinction between process-innovations and product-innovations, in the beginning of a new life cycle the emphasis will be on product innovations while in latter phases process innovations will play a more important role, in order to improve efficiency. An important difference with the above-mentioned study by Mueller and Tilton is the fact that innovation does not stop after the dominant design. It is possible for new dominant designs to appear. After a dominant design a market is characterised by technical entry barriers and a higher level of vertical integration.

**Refinement**

In the same line of thought Jovanovic and MacDonald (1994) built a model to show empirically the shakeout theory. They use data on the American tire industry, because a lot of data is available on this industry. Innovation plays a central role in their theory. A market starts with a small number of low-tech firms, and then a basic invention is being developed, which attracts new low-tech firms while the incumbents become high-tech. A refinement to the basic invention leads to higher production levels and lower prices, which leads to a shakeout in low-tech firms and a strong decline in the entry rate. After this theoretical explanation a model is build to test the theory. The technological explanation works well, a dramatic scale increase in tire-production leads to a considerable shakeout. Carree and Thurik (1999) wrote an article in reply to this model. In their view the model is too limited, many markets are characterised by more than one refinement invention. Instead of this a continuous refinement is mostly observed. They state that declining unit costs, declining profits and learning by doing cause the shakeout. An evolutionary model is build to test their ideas. From
the data it follows that output has steadily increased, while prices declined in a sharp way. A shakeout is seen, which is caused by severe price competition and not by a dominant innovation.

**Increasing Returns to R&D**

Klepper (1996) provides another contribution to life cycle theories. He thinks size is an important factor causing big firms to survive: “large getting larger”. Due to increasing returns in R&D large gets larger, especially in process-innovations. Product innovations leave room for smallness. Klepper also proposes a more continuous decline in the number of firms, contrary to the foregoing theories, where a stable end population is assumed.

Klepper and Simons (1997) present an evaluation article in which they test the different life-cycle models using empirical evidence (automobiles, tyres, televisions and penicillin). They consider three theories: Jovanovic’s theory of a refinement innovation, Utterback’s theory of a dominant design and Klepper’s theory of increasing returns to R&D. In all theories product and process innovations play an important role, that’s why they receive much attention in the case-studies discussed by Klepper and Simons. If we take for example the car market, a steady decline in the number of firms exist. A continuous pattern of innovations in which large firms play an important role is to be seen while no real dominant design or refinement exists. Large firms carry out almost all innovations. Regarding this, Klepper’s theory is the most appropriate to describe the car industry. In the evaluation the authors conclude that the Dominant Design and Refinement Theories often do not fit the data. The increasing returns to R&D approach does not always fit the data either, but in most cases it is the best approach.

### 3.2.3 Gibrat’s Law and Firm Size

In trying to explain differences in firm size, an important part of literature is dedicated to growth. For a long time different scholars have tried to explain firm growth by Gibrat’s Law (Gibrat, 1931). This “law” states that it is expected for firms to increase their size proportional to their current size, in other words, growth is expected to be independent of firm size. Different authors doubt whether Gibrat’s Law is able to explain growth patterns in daily practice.

Mansfield (1962, pp. 1023-51) tries to test empirically Gibrat’s Law. He tests different versions of this model. First a model in which the law is appropriate to all firms, inclusive firms that leave the industry during the sample period. This model doesn’t work: small firms are more likely to exit. Second a model in which the law is appropriate to all firms, exclusive of firms that leave the industry during the sample period. No evidence is found to fit this model either: small firms exhibit higher growth rates. At last a model in which the law is appropriate only for large-scale firms, with production levels above the minimum efficient scale. This model works in some cases. Mansfield concludes that Gibrat’s Law is not suited to explain differences in firm growth. He thinks it important to explain growth patterns by innovation intensity, since small, innovative firms exhibit the highest growth rates.

A drawback of most studies testing Gibrat’s Law is the solely use of manufacturing data, for which Gibrat’s Law appears to have a low explaining value. A possible explanation could be the fact that growth in manufacturing industries depends on sunk costs, scale economies and capital requirements instead of a stochastic growth process. One could wonder whether Gibrat’s Law also fails to hold in sectors with less sunk costs, a lesser dependence
on scale economies and less capital requirements. This is exactly what is done in Klomp and Thurik (1993) and a similar exercise in Audretsch, Klomp and Thurik (1997). Because of the foregoing they expect to find more validation for Gibrat’s Law in the services sector. Data from the Dutch hospitality sector is used. First firms are classified according to their size and second a division on growth rates is made. A chi-square test is used to see if size and growth are correlated. To easily compare the results, Mansfield’s versions of Gibrat’s Law are used in these tests too. Only the third version seems to hold. Three conclusions are drawn from this static test:

• small firms face the highest exit rates
• for surviving firms there is hardly any relationship between growth and size
• Gibrat’s Law is accepted for firms that operate above the Minimum Efficient Scale

A different form of Gibrat’s Law is tested too. In this regression model the persistence of growth rates is tested, in other words; growth rates in period T are compared to the same rate in period T-1. Three main results from this dynamic analysis are:

• Gibrat’s Law is accepted in 11 of 15 cases
• The results differ across the years and business groups

The main conclusion for the Dutch hospitality sectors for the period 1987-1991 is that Gibrat’s Law is accepted in most cases. This is explained by the absence of scale economies. The question whether Gibrat’s Law works or not is dependent on the firm’s scale and on the sectoral characteristics, services are expected to show a more randomly growth process while manufacturing firms have opportunities to influence their growth process.

3.2.4 Learning Models and Firm Size

Firm dynamics and growth can also be explained by theories based on the concept of learning. The main idea behind this is that firms learn from their past behaviour, a successful path will be followed, while mistakes will not be made in the future. Pakes and Ericson (1998) consider the empirical implications of two models of the dynamics of firm behaviour. These models allow for firm specific differences and take account of liquidations and entry. A short description of the models is given first.

1. Model with passive learning. In this model an unknown “value of profitability parameter $\theta$" exists, which is a measure of future profits. Firms do not know their own $\theta$, they form expectations according to current profitability. Passive means that this information is a by-product of operating. The main implications from this model are:
   • a higher age will lead to a higher $\theta$ distribution
   • firms with higher current sales will have a better posterior for $\theta$
   • the size distribution of surviving firms is stochastically increasing in age

2. Model with active exploration. In this model the firms know their profitability parameter $\omega$ and also the value of this parameter for their competitors. Firms can invest to improve their distribution of profits. Implications:
   • Size distribution of surviving firms converges to invariant distribution

$^1$ The observed firm sizes are divided into several size classes and are then tested whether firm growth rates are equally distributed across these classes.
• Over time $\omega$ evolves, i.e. dependence between the later and earlier values of $\omega$ dies out. The same holds for sales, they are expected to be independent from earlier sales, this in contrary to the passive learning model.

In the empirical part two hypotheses are tested:
1. The size distribution of surviving firms is stochastically increasing in age.
2. Sales depend on sales in the past period.

To test these hypotheses, Wisconsin Data are used on manufacturing and retail firms for the period 1978-1986. Size is measured as the number of employees. Size distributions are given according to age. It follows that the proportion of surviving firms increases with age, especially in retail. Size distribution is stochastically increasing in age in both sectors, but it is increasing at a much more rapid rate in manufacturing, so manufacturing firms grow at a faster rate. Data from retail supports the passive learning model, while the data from manufacturing does not support this model. A more formal check is provided by an analysis of regression for size, whereby size is explained by size in previous years. This leads to the remark that both the retail and manufacturing data are consistent with the hypothesis that the regression function is nondecreasing in sales. However important differences between the sectors emerge too. For example in retail initial year sales has an effect conditional on size at any traditional significance level, while in manufacturing initial year sales has little effect on the expected size at the end of the period. This all leads to the conclusion that manufacturing data is consistent with the implications of the active learning model, but is inconsistent with passive learning, while the reverse hold for the retail sector. So in other words, retail firms can only learn afterwards, the success of their strategy will translate itself in sales. Growth strategies will be made dependent upon sales in past periods since this is the only information they have. Their profitability parameter is unknown. On the other hand, growth of industrial firms is more dependent upon investments: growth can be influenced by investments in more efficient production facilities. The most efficient firms will be successful in manufacturing. Growth in retail is not to be directed by investments, but is much more dependent upon customer loyalty, marketing strategies and creativity instead of efficiency.

### 3.2.5 Market Configurations and Firm size

The co-existence of large and small firms within one market remains a puzzle, Gans and Quiggin (2000) think most stochastic and dynamic models do not give a sufficient explanation. That’s why a new model is being built, using technology and economics of organisation in order to derive a static equilibrium situation. Firms are divided into two main groups:

- Managerial firms, the importance of scale effects and labour management are the main characteristics, this node substitutes away from entrepreneurial input towards delegated managerial decision making.
- Entrepreneurial firms, commonly led by one entrepreneur, no scale effects and an increasing supply curve are some main characteristics.

One of the main differences between these two groups are their production technologies. Entrepreneurial firms are expected to show constant returns to scale and make heavily use of entrepreneurial effort as input. On the contrary, managerial firms show increasing returns to scale and use only labour as main input. In the analysis marginal costs of labour are expected to depend on the level of output.

From the assumptions it follows that from a certain level of output $Q$, average costs of production for the managerial firms will be positioned below the average costs curve for the
entrepreneurial firm. So it follows that for small levels of output, entrepreneurial firms are more efficient.

In the analysis it is shown that different sustainable industry configurations can exist:

- A natural monopoly, this case can arise if the market price stays too low for entrepreneurs.
- Only entrepreneurial firms, if the residual demand curve lies under average costs for the managerial firm (which is probably faced with higher fixed costs).
- Mixed, a limited supply of quality entrepreneurs.

Then the authors look whether different industry configurations are efficient. The survival principle states that firms who survive are efficient, no matter if they are large or small. A natural monopoly can be efficient, if the price of the monopolist lies beneath the price of the entrepreneur and if he breaks even. Only entrepreneurial fringe can be efficient too, if they drive out the managerial firm by lowering prices. A mixture of both types is assumed to be inefficient since managerial firms are characterized by falling average costs, more entrepreneurial firms mean more competition and lower prices too.

In the article the evolution of market structure is studied. From the model it follows that as the market grows, more concentration will arise, with a dominant firm emerging. This firm can lower prices, which will force entrepreneurial firms to exit.

### 3.3 Determinants in a theoretical framework

This chapter so far has given tools usable in the explanations of observed firm size distributions. The discussed determinants and theories can be combined in order to predict the consequences of these on firm size, whereby a distinction could be made between manufacturing and services. This section explores these combinations. The aim is to combine each theory with the seven determinants, so in the end we have a 35 cells matrix wherein each cell gives the expected influence on firm size.

#### 3.3.1 Determinants from a transaction costs viewpoint

Transaction costs are influenced by all trends mentioned in the foregoing. Globalisation will lead to shortening of transmission channels, in a global economy transaction partners are easier found and risk will be reduced due to a greater spectrum of contract partners. This lowering of transaction costs leaves more room for small firms, especially in services. On the other hand larger markets and more severe competition will make it more attractive for firms to co-operate or will lead to mergers, which increases average firm size. This can be seen especially in manufacturing. Technological development leads to less transaction costs due to lower communication costs. Contract partners are easier found. This leads to more market transactions and a decrease in average firm size, especially in services since entry in services sectors is easier. Deregulation could have different impacts on transaction costs. On the one hand, less regulation and lower entry thresholds will lower the transaction costs of market operations. On the other hand less formal control of markets may lead to less trans-
parency, which could lead to a rise in contract costs. So the expected influence on average firm size is not quite sure. A rise in uncertainty will lead to higher transaction costs, so organisation into the firm will occur, which leads to a larger average firm size. But in manufacturing we see also a return to core competencies, which means a decrease in average firm size. A more flexible labour market makes the transaction of labour cheaper. Due to a rise in part-time work it is no longer necessary to have superfluous personnel, which could lead to a smaller average firm size. The emergence of a knowledge-based economy can raise transaction costs, since knowledge (and especially tacit knowledge) is difficult to transfer. This holds especially in knowledge intensive manufacturing and related services. This difficulty can make it more efficient to organise knowledge based activities into a (larger) firm. The link of a rise in prosperity with transaction costs is not easy to make, so in general no significant influence of an increasing prosperity-level on firm size is expected.

Summarising, we can state that transaction costs change due to several trends in the economic structure. The influence on average firm size is not easy to forecast. This depends on the theoretical framework chosen.

3.3.2 Determinants from a life cycle viewpoint

Globalisation will lead to a shortening of life cycles. Less efficient firms or industries will be replaced by foreign competitors. The more severe competition in the environment of firms will lead to more innovation too, which leaves room for more small firms. This shortening of life cycles will cause less large firms, since the mature phase is shortened. On the other hand the scale increase due to larger markets could lead to longer life cycles because of a more international context. The expected influence on firm size will be negative, especially in manufacturing, since manufacturing firms are usually more internationally oriented. Rapid technological change will cause short life cycles and high entry and exit rates. Continuous opportunities for new innovations exist, which attracts new entrants. This leads to a decrease in average firm size. Due to deregulation, the beginning of a new life cycle could attract more entrants, since fewer formalities are needed to enter a new market. More rules concerning mergers could also lead to a smaller average firm size, since co-operation in latter phases of the life cycle is less easy. Uncertainty could have several effects on life cycles. Since consumer wants change rapidly, life cycles are shortened, which decreases average firm size. On the other hand uncertainty could lead to more risky innovations and investments, which makes co-operation in innovation more attractive. A larger firm size is the consequence. This could be the case especially in manufacturing, since growth is more dependent upon innovations. More labour flexibility will have no significant influence on firm size in this context. Maybe a larger share of Self-employed without personnel could lead to more small innovative firms in the beginning of a new life cycle. But one could wonder whether this has a significant influence on firm size. More knowledge-based activities will make shake-outs less possible, since scale effects and efficiency are less important in knowledge based innovations. This will make it possible for small firms to hold their place in the market, especially in services. Increasing prosperity leads to rapidly changing consumer preferences, this will lead to shorter life cycles and more opportunities for small firms to bring a new innovation into the market and start a new life cycle.

Summarising we can state that the rise and fall of life cycles is influenced by all determinants discussed so far. In general a decrease in average firm size is expected. The start of a new life cycle, with a corresponding number of small entrants, has become easier.
3.3.3 Determinants and stochastical growth

As we did see in the theoretical part, the validity of the Law of independent growth depends on scale economies and on sectoral characteristics. Globalisation could lead to scale increase in some sectors. This will rise the minimum efficient scale, so Gibrat’s Law will hold in more cases, growth will be more random. Technological Development will decrease the minimum efficient scale in many cases. This could lead to a decrease in average firm size since small firms face the highest exit rates as we did see in the theoretical part. Deregulation is aimed at stimulating entrepreneurial effort and a corresponding emphasis on small-scaled business. This will lower the explanatory power of Gibrat’s Law since this value is scale dependent as we did see in the theoretical part. Due to the emergence of a knowledge-based economy, with emphasis on uncertainty and turbulence, growth is less dependent on scale economies and efficiency but more on creative innovation and sometimes pure chance. So in line with Klomp and Thurik (1993) we can state that due to fundamental changes in the economic environment, Gibrat’s Law can provide more insight in the growth process of business firms. A random growth process will not move into a predicted direction, so average firm size will not be influenced. An increasing education level and growing prosperity will give more opportunities for entrepreneurial behaviour, where scale economies and sunk costs are less important. Summarising we can state that the discussed determinants will influence firm size in many ways, but a direct link with the working of Gibrat’s Law is not easy to find. In the following scheme this is translated into a zero-value in each cell concerned with Gibrat’s Law.

3.3.4 Determinants and learning theories

Globalisation will make growth and efficiency necessary to survive in a more dynamic environment. Active exploration, whereby firms can invest to improve their position relative to competitors, will favour large firms since they have more resources to invest. This is necessary in order to stay in the market, so firm size will increase. This holds especially in manufacturing, where firms can invest in order to improve their market position. Technological development makes information sharing and communication easier. Firms can monitor their own position, so investments can be more adequately carried out and fewer resources are needed. This makes a higher growth rate possible (which of course favours average firm size). Deregulation changes the environment of firms. Less transparency will make learning from past behaviour more difficult, which can be an obstacle in passive and active learning. On the other hand the stimulation of clusters and networks will make the interchange of information easier, so firms can more actively invest in order to improve their position. This will cause a higher growth rate. Uncertainty will make it more difficult to rely on past or present information in the determination of future investments. Growth in this aspect can also be explained by pure chance, so learning theories will have a lower prediction value in explaining firm size developments. Like we discussed in the part on learning theories this holds especially for retail firms, whereby firms do not know their profitability parameter. Labour developments will not have a significant influence in the determination of learning theories, so a combination of these views does not give clear predictions. The emergence of a knowledge-based economy does have different influences on learning environments. Low capital requirements will make it easier for small firms to invest and display growth. On the other
hand, the often tacit character of knowledge will make it more difficult to use active exploration, so growth in this manner will be limited. Growth in prosperity in itself does not influence learning theories in a direct way, but in an indirect manner, all determinants are influenced.

Summarising, several trends in our economic system make learning from past or present behaviour easier. This creates opportunities for firms to invest in successful strategies, which yields a higher growth rate.

3.3.5 Determinants from a market configuration's viewpoint

Globalisation will raise opportunities for entrepreneurial fringe because of new markets, but the scale effects will need managerial qualities and growth in order to survive, so in general an increase in average firm size is expected, especially in manufacturing firms. Technological Development raises more opportunities for small entrepreneurial effort while scale is not important in innovative stages: so entrepreneurial firms will become more important. Another consequence of technological development is a decrease in average costs: this will favour large scaled firms, since entrepreneurial firms usually have a higher level of average costs. Deregulation and public policy stimulate entrepreneurial fringe while concentration is made more difficult, so a decrease in average firm size is expected. Uncertainty makes flexibility and adaptability more important, which are main characteristics of small entrepreneurial firms. This leads to a decrease in average firm size too. Labour developments could have positive as well as negative effects on firm size. On the one hand we see a large share of especially high potentials who prefer to work in large firms because of the better career perspectives they offer. On the other hand a rise in entrepreneurial activities is seen because of the flexibility, informality and emphasis on skills demanded by small firms. Knowledge makes scale aspects and efficiency (which are characteristics of managerial firms) less important, so entrepreneurial firms will have more opportunities. Growth in prosperity creates opportunities for niche markets, where small entrepreneurial effort can flourish. Summarising, the changing environment leaves more room for entrepreneurial effort, but the advantages of large scale are still on stage.

3.4 Evaluation

This chapter started with an assessment of the most important determinants influencing firm size and its distribution. We respectively discussed the influences of globalization, technological development, deregulation and liberalization, uncertainty, flexibility of labour relationships, knowledge and prosperity. These determinants play different roles in the frameworks of several accepted firm size theories. Many authors attempted to explain the coexistence of large and small firms within a single industry with a theoretical justification. In this, the following main strands of thought appeared.

Transaction cost economics stresses that optimal firm size is determined by the marginal costs of internalizing a transaction. In the transaction costs view, firm size is dependent on human characteristics and transaction characteristics. These characteristics will show a continuous change due to economic or institutional developments. The discussed determinants
will influence all dimensions of transactions. This implies that average firm size will change too, its direction being dependent upon which determinant works out in the strongest way. Life cycle theories try to explain firm size developments by examining the evolution of a market from the early entrants with basic innovations until the exit from the market by the latest producer. During the life-cycle large and small firms alternate - dependent on innovativeness, scale effects and consumer demands. Size distributions will change in time following a predefined pattern of a start with small, innovative firms. Some of these will succeed and grow, while others fail and disappear. The successful firms become large scaled and entry barriers appear. The market becomes more stable, which lasts until a new innovation is carried into the market or until the existent product is driven out of the market.

Two other alternative theories, maximizing theories and stochastic theories focus at firm growth. Both theories seem to have explanatory power, depending on size, age and sector. Learning models give another explanation for firm growth: learning from past behaviour. The theory of market configurations considers entrepreneurial effort and managerial qualities as alternative inputs in firms. Small entrepreneurial firms will characterize a market where innovation is important and flexibility is needed while a market based on efficiency and scale effects will be dominated by large, managerial firms. Mixtures of both types are seen too, however it is questionable whether these are efficient.

Outside the above-mentioned theories, the institutional context (for instance the judicial or governmental environment) is an important factor in market forces. This factor will be especially important in explaining differences in firm size across countries, which is not the scope of this paper.

It appeared that the direction and size of the effect of these determinants is dependent on the theoretical context. Therefore determinants should be connected to the theoretical context in order to predict developments in firm size. Moreover, the outcomes will not be the same in each sector. A distinction is made between manufacturing and services, since these sectors show important differences (for example in openness). Therefore, two distinct schemes on services and manufacturing are constructed in tables 1 and 2. The schemes give, for each combination of determinant and theoretical context, the predicted relation with firm size. In the scheme on services (table 2), only the combinations that are different from the scheme on manufacturing are mentioned. From these schemes several hypotheses can be derived. For instance, in manufacturing, most determinants are related to firm size decrease in the context of the life cycle theory, while the other theories see globalization to induce an increase in average firm size in manufacturing. Deregulation is expected to invoke a decrease in average firm size, especially in services. In the next two chapters, we confront the schemes with the observed firm size developments. This leads to a first inkling as regards the validity of the predictive schemes through empirical analyses.
Table 1 Manufacturing: predicted influences on firm size

<table>
<thead>
<tr>
<th>Translation Costs</th>
<th>Life-Cycle</th>
<th>Gibrat's Law</th>
<th>Learning Theories</th>
<th>Market Configurations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globalisation</td>
<td>+/+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Technological Development</td>
<td>-</td>
<td>0/-</td>
<td>+/-</td>
<td>0/+</td>
</tr>
<tr>
<td>Deregulation</td>
<td>0/-</td>
<td>+/-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>+/0</td>
<td>0/-</td>
<td>0</td>
<td>0/0</td>
</tr>
<tr>
<td>Labour Developments</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Knowledge</td>
<td>+/0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Prosperity</td>
<td>0/0</td>
<td>0/-</td>
<td>-</td>
<td>0/-</td>
</tr>
</tbody>
</table>

Table 2 Services: predicted influences on firm size (empty cells have the same sign as their corresponding cells for manufacturing in table 1)

<table>
<thead>
<tr>
<th>Translation Costs</th>
<th>Life-Cycle</th>
<th>Gibrat's Law</th>
<th>Learning Theories</th>
<th>Market Configurations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globalisation</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Technological Development</td>
<td>-</td>
<td></td>
<td>+</td>
<td>0/-</td>
</tr>
<tr>
<td>Deregulation</td>
<td></td>
<td>+</td>
<td>0/-</td>
<td>-</td>
</tr>
<tr>
<td>Uncertainty</td>
<td></td>
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<td>-</td>
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<tr>
<td>Labour Developments</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td>+/0</td>
<td>-</td>
</tr>
<tr>
<td>Prosperity</td>
<td></td>
<td></td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>


4 Empirical investigation.

The previous chapter discussed the main theories and determinants on firm size. Linking the exogenous determinants to the main theories led to predictions on the development of average firm size, whereby the distinction between manufacturing and services was made. In the introduction the question about differences in firm size developments in different sectors was posed. For the private sector as a whole a slight decrease in average firm size is observed. The aim of the underlying chapter is to investigate developments between and within sectors and to explore differences and similarities between the sectors. In the next chapter these empirical findings are confronted with the theories discussed in the previous chapter. We shall see that some particular structures emerge.

4.1 Frequency analysis

For exploring the industrial firm size distributions in the Netherlands, we have an extensive dataset at our disposal, identifying the number of firms in 68 industries and 9 size classes over the period 1993-1998. We also have, on a more aggregate level, the number of employees per size class. With these data, several analyses can be carried out. We can display the number of firms per size class, the number of employees per size class and the contribution of each size class for the average firm size (over the size classes). To this end, we require the number of employees in each size class. These numbers are only available on a more aggregate level (i.e. three size classes).

An appropriate interpolation method is used to estimate the number of employees for all nine size classes. To picture the firm size developments in each size class, we constructed three charts; together these explain the changes in the average firm size number.

The garages industry will be used as an example.

Figure 4.1 displays the contribution of each size class for the average firm size. Figure 4.2 displays the number of employees per size class. Figure 4.3 displays the number of firms per size class.

\[1\] The original database consisted of 80 industries, but due to data inconsistencies 12 industries had to be scrapped.
Figure 4.1: Contribution of each size class for the average firm size

Figure 4.2: Number of employees per size class

Figure 4.3: Number of firms per size class
We see that for garages the contribution of small firms and large firms has increased, while the contribution of the middle-sized firms decreased. These effects can cancel each other if we look at the average firm size over all size classes. The firm size per size class declines with 5%, the number of employees increases with 4% while the number of firms grows with 10%. This exercise is done for all 68 industries. An overview of the results will be given in appendix I, while in a separate publication the charts for all industries are offered. In the next part of this section the main results are discussed.

Services
The services industries show a mixed pattern. Some industries (for example temporal employment agencies) exhibit a sharp decrease in average firm size, while other industries are characterised by an increase in average firm size (for example financial companies). The main reason for decrease in the services sector seems to be high entry rates, while concentration (for example by mergers) or internal growth in the higher size classes will account for the observed increase in average firm size.

Car and Repair
Three out of six car and repair industries show a decrease in average firm size, while the other part is characterised by an increase in average firm size. The increase in average firm size can particularly be explained by a decrease in the number of one-man business firms, while the decrease is caused by a relatively higher growth rate of small firms compared to large firms.

Transport
Again the same pattern is noticed. Half of the transport industries are characterised by an increase in average firm size, while the other half shows an opposite tendency. The increase in average firm size is mainly caused by a decrease in the number of one-man business (internal growth to two or more employees). While the observed decrease in average firm size can be attributed to a higher relative growth rate of small firms compared to large firms, probably partly caused by a positive net entry rate.

Hospitality
Except for catering, the hospitality sector is characterised by an increase in average firm size. This is especially caused by a decrease in the number of one-man business while all the other size classes have shown an impressive growth rate. The observed decrease in average firm size in the catering industry is caused by a high entry rate in this industry.

Wholesale trade
Only minor changes are observed in wholesale trade: some industries show a slight increase in average firm size, while other industries show a slight decrease in average firm size. Increases in average firm size are mainly caused by a decrease in one-man business, while a decrease in average firm size could be attributed to a larger relative growth rate of small firms compared to large firms.

Construction
Almost the entire construction sector (except for electromechanical construction) is characterised by a decrease in average firm size. This decrease can be explained by an impressive growth in the number of small firms.

Retailing
Dutch retailing is in the period 1993-1998 characterised by an increase in average firm size per size class. This can be explained by a decrease in the number of one-man business, while the higher size classes show a relative high growth rate.

Manufacturing
Except for transport devices all manufacturing industries are characterised by a decrease in average firm size. This can be explained by a larger growth rate of small firms compared to large firms.

4.2 Exploration
In the previous section we observed mixed patterns within the aggregate sectors. Therefore we classify the 68 industries according to the patterns observed.

A discussion could be hold from different viewpoints. One could discuss several industries separately or another possibility is to divide the industries into groups that show more or less the same pattern of growth or decrease in average firm size. If the latter approach is taken, one could search for explanations which show light on a typical pattern. Of course the explanations will often be industry specific but some general tendencies may appear, which can be compared with the predictions made in the theoretical part. In the following I will distinct 4 patterns of growth and decrease, based on some rough indicators. Each group is discussed, with sometimes sector specific information.
4.2.1 Main patterns

I A decrease in average firm size mainly caused by a high entry rate.

A rise in the number of firms is a sign of a high entry rate. The group of firms that is characterised by a decrease in average firm size shows an average growth in the number of firms of 40%. However, when temporal employment agencies are excluded because of the extraordinarily high entry rate a figure of about 35% is obtained. If a high entry rate is defined by a change in the number of firms of more than 35%, the following industries remain:

Services related
Temporal employment agencies - insurance sector - company car imports - telecommunications - travelling agencies - catering
Manufacturing related
Construction sector: civil and utility- road building- restcategory installation- plaster- rental of machinery- manufacturing sector: chemical (basic)- metals (basic)- paper and printing- shipbuilding and construction materials.

II A decrease in average firm size that is not caused by a high entry rate but more by a growing relative importance of small firms compared to large firms, often caused by a declining influence of large firms.

These are the industries demonstrating a smaller increase in the total number of firms. Industries in this category are:

Services related
Cleaning services - car imports - garages - expeditors - load/unload - wholesale in intermediary goods, food products and construction materials
Manufacturing related

III An increase in average firm size mainly caused by a decrease in the number of especially small firms, probably caused by concentration or liquidation of small firms.

This group is measured by a decline in the number of firms. The following industries belong to this category:

Financial companies - petrol-service-stations - transport by air or water - cafes - retail in food specialties and textile.

IV An increase in average firm size not especially caused by a decline in the number of small firms, but more by a larger growth rate of large firms compared to small firms.

This group consists of the following industries:

The above mentioned groups do not explicitly mention medium sized firms. This is because medium sized firms usually do not show developments on their own. They are influenced from both small firms and large firms. Small firms can grow and become medium sized, while split-ups or efficiency reasons can lead to large firms getting smaller. In order to get more insight into developments in medium sized firms one should study in detail each industry, but this is beyond the scope of this thesis.

4.3 Elaborations on main groups

The previous section discussed four main groups. Before confronting these with our theoretical framework, it is useful to take a closer look at within-the-industry developments in order to provide insight into what really happened during the sample period. After this survey I will look whether the different tendencies can be explained by the combination of theories and determinants.

4.3.1 Industries with high entry rates

What is most striking in the group characterised by high entry rates is the large share of construction firms. A major explanation for this is the recent rise in the number of Self-Employed Without Personnel, see box I

Box I

Self-employed without personnel (SWP) can be characterized as working people operating in the border area between entrepreneur and (temporary) employee status. The industries in which SWP mostly operate are characterized by a high labour-intensity, a large demand for labour, low entry thresholds and a high need for flexibility. A possible explanation could be the recent trends in labour relationships; greater flexibility and individualization are key words. But more general forces just as a fair economic wind,

1 I would like to thank Ro Braaksma, Lex van Eck van der Sluijs and Maarten Overweel for the information on this part.

2 Self-employed without personnel, Entrepreneur or employed? EIM, ING and RZO, 1999
government policy and a favourable business climate also play a role\(^1\). It are probably these reasons that played the largest role in the period 1993-1998.

This is due to policy reasons; the Dutch government tries to stimulate entrepreneurship. Other factors which caused an increase in the number of SWP are tax policy and a shortage of personnel in the construction sector, which makes it attractive for employees to start their own business since they will have good earnings-perspectives. Another characteristic, which stimulates SWP in the construction sector, is the low capital intensity needed. We also see a tendency of larger firms contracting out tasks like digging: entrepreneurs buy an excavator and perform these tasks.

Another industry worth mentioning is temporal employment agencies. Due to an impressive rise in part-time working and a higher participation rate, a lot of new firms arranging all this kind of labour arise. In the insurance industry large firms stimulated employees to become insurance agents, which was translated in a rise in the number of small firms. Phone companies showed a high entry rate due to the emergence of mobile phones and new communication technologies. This led to the entry of new innovative entrepreneurs, who are all trying to reap the benefits of these technologies.

A large demand for party-catering and in-firm restaurants led to a rise in catering based activities during the sample period. These firms offer not only food, but also a whole range of services. A period of relative prosperity always leads to a rise in demand for luxury articles and niche products, such as special foreign trips and arrangements. Indeed we see a rise in the number of small travelling companies during the sample period.

Another industry in this group is paper manufacturing and the printing industry. The rise of new technologies in this industry and the increasing promotional activities of firms makes it possible for small firms to enter this market.

Summarising, we can say that several factors played an important role in this high entry group. First the role of SWP, second technological developments, third regulatory reforms and last but not least a rising demand with great purchasing power for all sorts of products and services.

4.3.2 Decrease without extraordinarily high entry rates

Industries in this category are not characterised by a high entry rate. The decrease in average firm size is caused by other reasons, such as a declining importance of large firms or growth in the number of firms in all small firm size classes. In these industries usually several forces are at play. If we take, for example, cleaning services, on the one hand there is a tendency towards concentration in large and medium sized firms: firms want to offer a full line of services, whereby partners are needed. On the other hand the increased demand for cleaning and other firm-related services led to a rise in the number of small firms.

The wholesale sector is characterised by more or less the same developments. We see the need to offer a broader line of services to customers in response to a growing concentration of customers. Another trend is outsourcing, because of capacity and efficiency reasons, wholesale firms contract out tasks outside their core business. This leads to a decrease in

\(^1\) Ibid
average firm size. Due to regulatory and administrative reasons it has become easier to start a business in wholesale trade which leads to more entrants and small business activities. Similar developments are seen in construction. A good example is the isolation industry. Here we see an increase in the number of firms in the size class 251-500 employees due to concentration. On the other hand however we see a rise in the number of small firms, especially in the size classes of 2 and more employees. This twofold movement is seen in more construction industries. Concentration by large, national firms in order to compete on European markets and at the same time a lot of new activities, a great part of which is explained by SWP.

Manufacturing industries are also heavily represented in this group. They show most of the turbulence at the head and tail of their size distributions. On the one hand we see a group of large, internationally oriented firms trying to improve their international positions by merging (which lead to an increase in average firm size) or outsourcing (which lead to a decrease in average firm size). On the other hand we see a rising share of small, often locally oriented producers who serve niche markets. If we take for example the textile, leather and clothing industries, we see that during our sample period a lot of large firms disappeared. Probably they moved their activities towards low-wage countries. This decline in large firms was accompanied by a rise in the share of small firms, often caused by foreign entrepreneurship that serves local niche markets.

Manufacturing in chemical products is characterised by a change away from bulk goods to specialties. These specialties mostly require an innovative environment, which is often provided by small entrepreneurial firms. In machinery, we see a division of tasks between small and large firms. Due to technological developments and computer-related parts of production, a growing group of small specialised firms emerged, which each serve a small part of a more complex production process.

Summarising we see a group of industries in which a decreasing firm size is not characterised by one superior movement. Several forces are interrelated. A declining share of large firms can very well be accompanied with a rise in the number of small firms for serving the niche markets that are not reached by large firms.

### 4.3.3 Increasing firm size and a decreasing number of small firms

This group is the smallest of the four. It is characterised by a decrease in the number of firms. This shake-out of firms is especially seen with small firms. Due to severe competition or other market developments, small firms are forced to exit the market. They may also try to reinforce their position by joining forces with other small firms.

If we look at the financial industry, we see this typical tendency towards concentration, especially in the largest size class. These are internationally oriented banks that try to improve their position at the European market. Mergers and take-overs lead to larger scale, which is favourable from an efficiency viewpoint. A contrary trend is caused by the rise of ICT in financial markets, leading to a decrease in average firm size, since fewer employees are needed to do the same jobs.

Another industry where scale increase is necessary to stay into the market is transport by air or by water. This capital-intensive industry faces severe competition from large foreign companies, which sometimes leads to a take-over or closure of Dutch firms. Moreover large firms often go abroad because of tax- or regulatory reasons.
A special case is the cafe-industry: here we see a dramatic decrease in the number of one-man business and an impressive increase in the number of 2-5 employees firms. One could think that this is caused by closure of small, local establishments or by internal growth. This may be true, however another explanation are intensive controls on moonlighters. Owners were forced to sign-up their personnel, which led to an artificial rise in average firm size in this sector.

Another sector where the increase in average firm size coincides with a decrease in the number of firms is the retail sector. A good example is the textile and leather retail shops. Here we observe an increase in the share of large firms, while the one-man business showed a decrease in the number of firms. Retail is currently in the mature phase of its life cycle and severe competition goes hand in hand with scale increases. As consumers like to do their daily shopping as fast as possible, megastores and supermarkets respond by offering a diversified supply. This is unfavourable for small, local shops. On the other side smallness is still possible in niche markets, where exclusive and expensive products are sold.

So this group faces several developments. Globalisation and efficiency reasons force small firms to co-operate or leave the market. These developments make it difficult for new firms to enter the market, and only niche markets will offer new opportunities.

### 4.3.4 Increasing average firm size without loss of firms

This final group consists of industries with an increasing average firm size and an increasing number of firms. In these industries the relative share of larger firms has grown compared to the relative share of small firms. Usually these are high-growth industries whereby a high internal growth rate causes an increase in average firm size, which is not cut-off by entry of small firms.

Computerservices is an industry in which a rapidly growing market demand during the sample period led to high internal growth rates and concentration tendencies, especially in the largest size classes. On the other hand, a sharp increase in the number of small firms is seen. However this is not enough to offset the growing importance of large firms. Small firms in this industry usually serve the consumer market, while larger firms take care of business applications, often internationally oriented. The accountants industry shows more or less the same pattern, but the increase in average firm size is much smaller than with computerservices. Due to a growing demand for accountants’ services, internal growth has occurred, which has been especially favourable for small and medium sized firms. Internationalisation caused partnerships and fusion on European markets, especially within large firms. This leads to larger firm sizes, which is seen in the size class of 500 and more employees. Leasing is another industry in which scale increase is seen; especially the car-lease market showed an impressive growth during the sample period. European ambitions led to concentration, especially in the size class of 250-500 employees.

Transport by taxi is also classified in this group. Increasing costs and efficiency reasons mergers and partnerships caused an increase in average firms’ size, while entry into this industry is difficult due to high capital costs and regulatory reasons.\(^1\)

Hotels, camping-sites and restaurants show more or less the same pattern. Scale increase is accompanied with a declining number of one-man businesses. In hotelling a movement to-

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\(^1\) Recently new legislation has been enacted, which should lead to easier access into this sector.
wards high quality service is seen and new estate with scale effects led to scale increases. Camping-sites were confronted with an increasing demand. The emphasis on environmental aspects and requirements on sanitary facilities made scale increases necessary and entry less easy. Restaurants exhibited internal growth; especially foreign food specialties were successful.

The wholesale trade in agricultural products and machinery are in the mature phase of their life cycle. Strong international competition forces firms to co-operate or increase their scale. Entry or small-scale existence is possible in niche markets, that is why these industries are more or less stable over the 1993-1998 period. Industries with an increasing average firm size without loss of firms are characterised by a high internal growth rate, usually caused by a fast growing market demand. If industries reach maturity, small-scaled entrance is still possible, especially in niche markets. This is the main reason that the observed increase in average firm size is not accompanied by a decline in the number of firms.
5 Synthesis

In the first chapter several research questions were posed. Chapter two showed how average firm size developed during the period 1993-1998. Chapter three explored the working of determinants on firm size and how this depends on the theories chosen. Using the combination of determinants and theories predictions on the development of average firm size were given, whereby a distinction was made between manufacturing and services. Chapter four provided the empirical data on firm size for the period 1993-1998. The observed developments were described and explanations were given.

At this point one thing rests to do and that is the combination of our empirical and theoretical parts. This could be done in several ways, but since the distinction between manufacturing and services was made, an exploration per industry is the most useful. An exploration per pattern of growth will cause problems, since each sector has its own characteristics. I confront the empirical facts with the expectations that follow from the theoretical part. The outcomes will show whether the predictions are correct or if other factors are more relevant.

5.1 Manufacturing related sectors

5.1.1 Manufacturing

We saw that almost the whole manufacturing sector belongs to the groups with a decreasing average firm size. This is due to a high entry rate, exit of large firms or a combination. If we look at globalisation, this will lead to a scale increase within most theories. This prediction only holds in a few cases, where firms co-operate in order to withstand international competition. On the other hand we see a departure of firms to low-wage countries or outsourcing, which both lead to a decrease in average firm size.

Technological development is a useful determinant in combination with the theory of transaction costs and life cycle theory. Technological development lowers transaction costs, which creates opportunities for new entrants. New technologies could start new life cycles with a corresponding number of new, often small, firms. This was the case in for example the paper and printing industries.

Deregulation is an important determinant too: it predicts a decrease in average firm size within almost all theories. The framework of market configurations gives useful insights: deregulation enables entrepreneurial efforts while at the same time large managerial firms exist which often serve international markets. Transaction costs will be lowered by deregulation too. Fewer formalities are needed to enter a market. This makes small-scaled entry in niche markets easier, which is observed in many manufacturing sectors.

Growth of prosperity together with life cycle theory predicts a decrease in average firm size too. This is a good explanation for the observed developments in many manufacturing sectors: a growing demand for special products creates opportunities for new firms.

Summarising, especially technological development, deregulation and prosperity seem to have explanatory power in manufacturing industries. The combination with life cycle theory
and the theory of market configuration makes sense but of course not all industries will react in the same way.

5.1.2 Construction

The construction sector resembles the manufacturing sector in the production of tangible goods. That is why the scheme on manufacturing is used with this sector too. The previous chapter showed that this sector is characterised by sometimes-sharp decreases in average firm size accompanied by impressive growth rates in the number of firms. The scheme on manufacturing does not show determinants that predict a decrease in average firm size in every framework. Globalisation and technological development are not influential in many construction sectors. Most of the firms are locally oriented with an emphasis on labour as the main production factor. Deregulation is an important determinant, especially from a life cycle or market configurations viewpoint. Deregulation enables the rise in the number of SWP. This entrepreneurial effort can be characterised as the start of a new life cycle with a corresponding decrease in average firm size. Labour developments (an increasing demand for flexibility, a higher education level, a greater need for own responsibility and a shortage of craftsmen) will stimulate small entrepreneurial activity too. The starting of an own firm became an attractive opportunity. In the previous chapter a general decrease in average firm size in construction industries was shown, but this is not the whole story. A small number of large firms exist too. They often grew during the sample period. Globalisation is the most appropriate determinant in this case. In order to withstand competition in international markets large firms try to lower transaction costs by co-operation with other firms. Summarising, the decrease in average firm size in many construction firms is best explained by deregulation, labour developments and growth of prosperity from a life cycle or market configurations viewpoint. The increase in average firm size in large firms follows from globalisation tendencies, which led to attempts to reduce transaction costs.

5.1.3 Conclusion

The combination of empirical explanations with theoretical predictions does not always lead to the same conclusions. Technological development, deregulation and labour developments seem to fit best, but this is dependent upon the theories chosen. It is also wrong to describe the manufacturing or construction sectors as entities since several industries will show different characteristics or economic environments.

5.2 Services related sectors
5.2.1 Services

Industries that belong to the services sector are not characterised by a uniform tendency in average firm size developments. So it is not easy to choose a dominant determinant or framework.

Globalisation explains the developments in the financial and advisory sectors. From a transaction costs viewpoint (inter)national co-operation leads to more efficient structures, which lowers transaction costs.

Labour developments (a greater need for flexibility) of course fit best the developments in the temporal employment agencies. In combination with life cycle theory the rise in the number of small firms can be explained since the relatively new concept of temporal employment led to a growing number of small firms that try to make profits in this sector. De-regulation and prosperity also predict a general decrease in average firm size, but in the industries that were analysed they do not seem to have a significant influence. Due to the low number of industries, it is not possible to draw conclusions in this mixed sector.

5.2.2 Retail

In the previous chapter the retail sector belonged to the groups with an increasing average firm size. The scheme discussed does not give determinants that predict a continuous increase in average firm size. Globalisation does in some cases predict an increase in average firm size, but this will not hold in retail since firms in this sector are mostly locally oriented. Uncertainty is a useful explanation. The consumer market is rapidly changing and firms try to insure themselves by co-operation in mostly mature markets, so a transaction costs motive is at work here. The other determinants do not seem to have considerable influence here.

We conclude that only uncertainty is useful to explain the main developments in the retail sector.

5.2.3 Wholesale

The wholesale industries belong to different groups as we observed in the previous chapter. Again no uniform movement in average firm size is seen. Several determinants are at work here. Globalisation will cause a scale increase since large firms want to improve their position at the European market, which requires a lowering of transaction costs. Technological development could lead to more efficient, easier and faster wholesale activities, which makes it possible for small firms to enter. Especially from a transaction costs viewpoint or life cycle theory the decrease in average firm size is explained. Deregulation makes entry easier too; this is the case with the abolishment of the establishment act. Again the transaction costs and life cycle theories can be used, just like in the retail sector. But the theory of market configurations is useful too, since large, managerial wholesale firms serve the large retail firms and small wholesale firms often serve the niche markets. Uncertainty could explain both the decrease and increase in average firm size. From a transaction costs viewpoint, a rise in average firm size is expected since wholesale firms try to reduce transaction costs by co-operation, which leads to an increase in average firm size. Another way to avoid uncertainty is specialisation into niche markets. This causes a decrease in average firm size. In terms of
the theory of market configurations, more entrepreneurial effort will develop besides managerial firms.
In short, no dominant determinant is discerned. Several explanations for the developments in wholesale firms exist dependent upon which theoretical framework is chosen.

5.2.4 Hospitality

Except for catering, which is a special case, the Dutch hospitality sector belongs to the group with an increasing average firm size. The scheme on services does not provide determinants that predict a continuous increase in average firm size. Globalisation, deregulation, knowledge or technological developments do not seem to be important determinants in this case since hospitality is often a local business, where labour is an important production factor. The hospitality sector is traditionally characterised by a large amount of part-time and female workers, so recent labour developments (a higher participation rate and an increasing demand for flexibility) do not seem to have much influence either. The rise of catering related activities can be explained by growth in prosperity in combination with life cycle theory. Catering and other firm related services could be understood as new concepts that are at the beginning of a new life cycle, driven by prosperity. Summarising most of the developments in the hospitality sector are not explained by the scheme on services, so other factors must be at work. Severe competition, welfare which leads to internal growth and regulatory reasons are some discussion points as was shown in the previous chapter.

5.2.5 Transport

Transport industries belong to all four groups of the previous chapter, so again no uniform theoretical explanation is possible. The telecommunication industry is characterised by an impressive entry rate. This is clearly due to the rise in new technologies, for example mobile phones, so technological developments in combination with life cycle theory and the theory of market configurations deliver the best explanations during the sample period. The theory of market configurations predicts that small entrepreneurial effort will flourish in new markets where scale aspects are still not relevant. Prosperity and globalisation are the main determinants for the observed increase in the number of travel agencies. Increasing incomes and European integration led to an increasing demand for travel services and a corresponding entry of new firms. Other transport sectors profit from globalisation and the increase of international trade that increases the demand for their services. On the other hand, globalisation leads to severe competition on international markets. In order to lower transaction costs, transport firms try to increase their scale, which partly explains the observed increase in average firm size. Another element, which caused a decrease in average firm size during the sample period, is the rise of SWP: truckers who buy or lease a truck and start riding on their own account, often with their former employer as main principal. This development can be explained by the determinants labour developments and deregulation.
In short we can say that transport is a mixed industry in terms of developments in average firm size. No single determinant or theory is able to explain all movements. Important determinants are globalisation, deregulation and labour developments.

5.2.6 Car and Repair

The last sector to be discussed is the car and repair sector. Like in most other services industries, no uniform development in average firm size is seen.

Company car imports and personal car imports show a growing number of firms and a decrease in average firm size. These sectors profited from rising levels of prosperity, which led to a large demand for new cars. Company cars became more attractive due to regulatory and tax policy reasons, so this market was flourishing during our sample period. Due to globalisation, especially European Integration, importing became easier. So several factors were favourable to car imports in the period 1993-1998.

The developments in garages, petrol service stations and damage repair firms do not fit with predictions in the scheme on services, so other factors are at work here. A useful illustration is petrol service stations. These are heavily influenced by environmental requirements. So again no dominant determinant or framework is appropriate to describe all changes in average firm size.

5.2.7 Conclusion

Contrary to the manufacturing related sectors, the services related sectors do not show dominant tendencies in average firm size developments. Several determinants and theories are usable, dependent upon economic environments and sector- specific circumstances.

So if there is a new economy it certainly does not work out the same way in every industry. The same holds for the determinants, no equal or single weight can be attached to each of them. The influence of determinants is industry and time dependent.
6 Conclusion

The aim of the underlying thesis was threefold. At first the construction of a general theoretical framework on firm size and its determinants. Second a description of the main developments in Dutch firm size distributions in the period 1993-1998 and a search for main patterns in these developments. Third a combination of theory and empirical facts. This yields answers to the question whether the theoretical predictions have come true and if not, what kind of other explanations are possible.

This explorative study provided a theoretical framework on determinants of firm size. The framework considers exogenous determinants that each can be studied in the context of separate established theories regarding firm size. For instance, a specific determinant may have a different impact on firm size in the context of life cycle theories than in the context of transaction costs theories.

We made a first approach to confront theories with empirical data. An extensive dataset has been used, identifying 68 industries and nine size classes for the years 1993-1998. It was observed that - while the average firm size on the aggregate levels did generally not exhibit dramatic changes in firm size - at a more disaggregate level there were many interesting developments.

In many industries the most important mechanisms seem to take place in the tails of the firm size distributions. There may be firm size decreases due to increased activity in the small size classes, while at the same time firm size for large companies need to grow in order to survive.

Some observed developments could be directly linked to predictions from the theoretical framework. For some industries, there was an external explanation outside the framework as well, which could have mitigated the effect of the exogenous determinants considered. There were also industries in which opposing mechanisms could be at play.

These findings indicate that if we want to give judgements on determinants of firm size developments in the Dutch, more detailed industry-specific techniques should be used, for example advanced econometric techniques.
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