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Scanning the Future of Entrepreneurship;

A Scenario Analysis for The Netherlands

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Purpose of this study

Increasingly, the importance of entrepreneurship and self-employment is being acknowledged by both scientists and policy makers. High degrees of entrepreneurship (innovation) and self-employment (the number of independent enterprises) are assumed to contribute to economic growth and job creation. Therefore, self-employment is explicitly stimulated in most western economies. So far modelling self-employment has been given little attention, however. This study aims to set up simple models linking the number of self-employed in The Netherlands to several determinants. Our main purpose is to pave the way for modelling self-employment in a more elaborate fashion in future years. Besides, the modelling exercises may give insight in the revival of entrepreneurship observed in The Netherlands in the past decade, and in the possible development of self-employment in the coming years.

Development of self-employment

The fraction of the labour force that is self-employed decreased in most Western countries until the mid 1970s. After that the self-employment rate started to rise again, first in the USA and subsequently in other economies. In The Netherlands, the self-employment rate has risen from the mid 1980s onwards. In the period 1987-1995 the yearly number of new entries increased. This number has stabilised since, although the annual number of exits still continues its upward trend.

When evaluating self-employment rates over time and across countries, a U-shaped relation with income per capita is observed. This secular trend is viewed as an equilibrium relation between self-employment rates and income per capita, resulting from the carrying capacity of the product market. In the present study this equilibrium rate curve is a maintained hypothesis in modelling the number of self-employed.

Modelling self-employment step by step

Each model builds on the preceding one. We distinguish four models:

1. Simple models in which an equilibrium relation plays no role,
2. Adding an equilibrium relation between self-employment rates and income per capita,
3. Adding entry and exit,
4. Adding explanatory variables.

Our first class of models demonstrates the expected behaviour of self-employment if the concept of an equilibrium rate of self-employment is omitted. These models are restricted by a constant net entry rate, which implies a constant (relative) growth of the number of enterprises. The reason for doing this is that the net entry was fairly constant for years in The Netherlands, after which it started declining in 1996. Our simple example shows, however, that fixing a constant net entry rate results in an unreasonably high simulated number of enterprises for the future.

In the second model the equilibrium relation between self-employment rates and income per capita is introduced. Using the historical entrepreneurship data of The Netherlands to estimate the error correction effect on the equilibrium rate, results in a more satisfactory output compared to the first model. In this second model, part of the substantial growth of self-employment is explained by an error correction resulting from the existing deficit compared to the equilibrium in that period. While the shortage decreases, the number of self-employed also declines because of the error correction. This causes the simulated yearly increase of enterprises in the future to be much smaller than in the first model.

The second model still needs some extensions. The dynamics underlying net entry can be shown only if the developments of gross entry and exit are included. Therefore, gross entry and gross exit equations are added in the third model. Net entry is then defined as the difference between gross entry and gross exit. Adding these variables appears to be an improvement in qualitative respect compared to the second model.

Literature suggests the influence of several other determinants on self-employment. These are not accounted for in the third model. The fourth model adds demographic structure, unemployment and profitability as explanatory values to the third model. This model is used for computing scenarios.

Scenarios: future development of self-employment

Scenarios are set up as deviations using the fourth model. Three specifications of the equilibrium relation between the self-employment rate and income per capita are considered. It is concluded that the outcome is very sensitive to the specification of the equilibrium relation. It is therefore necessary to pay considerable attention to specifying the correct relationship between the equilibrium rate of self-employment and income per capita.

The following aspects became apparent when simulating the future of self-employment. Stimulating new entries will come at the cost of more exits in the future. Furthermore, attention should be paid to the future influences of the changing demographic structure in The Netherlands. The ageing process, in particular, may result in a lower rate of business start-ups.

1 Introduction

Revival of entrepreneurship

In various countries the past decade has witnessed a revival of self-employment. In the Netherlands for example the number of new start-ups (excluding subsidiaries) increased from 25.000 in 1987 to about 42.000 in 1995, although it has levelled off since (40.000 in 1997). The yearly number of new subsidiaries rose even more quickly. The total number of enterprises (including subsidiaries) increased from 424.000 to about 629.000. The number of enterprises per 1000 inhabitants rose from 29 in 1987 to 42 in 1998. Likewise, the number of entrepreneurs (self-employed including director/owners)[1] has strongly increased.

The importance of entrepreneurship (self-employment) is acknowledged increasingly by both economic scientists and economic policy makers. Although the mechanisms are complex, both entrepreneurship (innovation) and self-employment (the number of independent enterprises) are key issues in explaining economic growth and job creation[2]. Following a long period of academic neglect by neo-classical economics, more recently economists have shown increasing interest in entrepreneurship and self-employment. Nevertheless, there is still little quantitative knowledge about determinants and effects.

Research programme on entrepreneurship

In the Netherlands EIM has carried out a long standing public research programme on SMEs, financed by the Dutch Ministry of Economic Affairs. The programme devotes prime attention to the collection of data as well as to scientific investigations. Strategic studies are carried out to explore new trends and aspects. The results of this research are disseminated through research reports and publications aiming both at the general public and at communication in scientific circles.

Within this programme increasing attention is being paid to aspects of autonomy and ownership (self-employment) as well as to innovative entrepreneurship. Since 1994 a panel of 2000 new start-ups has been surveyed annually, and a new panel was added in 1998. These micro data have created opportunities for in-depth research as to success and failure rates.

1 The terms entrepreneurship and self-employment will be discussed in section 2.1.
2 See Wennekers and Thurik (1999) and Carree et al (1999).

Within the framework of the European Observatory for SMEs (see EIM, 1996) a dataset on self-employment in 23 OECD countries from 1974-1994 was set up. These macro data have enabled various investigations to be made into the causes and consequences of self-employment at country level (see Audretsch and Thurik, 1998, Wildeman et al., 1998 and Carree et al, 1999). At aggregate level the analysis is complex because the number of enterprises/entrepreneurs must be viewed from the perspective of both the labour market (*supply side of entrepreneurship*) and the product market (*demand side of entrepreneurship*). Demand and supply of self-employed, as well as the (possibility of) equilibrium, depend on cultural, technological, economic and regulatory factors. Many determinants will therefore have to be considered. Furthermore, dynamics are introduced by the interactions between entry, exit and the number of enterprises.

At aggregate level econometric modelling can be a useful tool to specify measurable relationships and to study the dynamics involved. Modelling will also help to achieve a better understanding of past performance and to foresee possible developments.

Purpose of the study

The present study aims at using simple models for linking the number of self-employed (enterprises) in the Netherlands to several determinants. Using models we attempt to explain the revival of self-employment in the past ten years and to compute scenarios for the future. Though we do not intend to draw explicit policy conclusions from the models, we think they may serve as an eye-opener. Our main purpose is to pave the way for the systematic modelling of self-employment in future years.

Structure of this report

In this report, several simple models will be developed to explain the number of enterprises[1] in the Netherlands. The modelling is described in Part I, in which some attention is also paid to existing literature on the determinants of self-employment. Each subsequent model builds on the preceding models and in this way we attempt to develop a model suitable for computing scenarios.

Part I: Modelling

Chapter 2: Brief review of literature on the determinants of self-employment.

Chapter 3: Some simple models.

1 The terms enterprises and self-employed will be used interchangeably throughout this report; also see section 2.1.

Chapter 4: Adding an equilibrium relation between self-employment rates and income per capita (model 2).
Chapter 5: Adding entry and exit (model 3).
Chapter 6: Adding explanatory variables (model 4).

In Part II, model 4 is used to compute scenarios. First, the model is revisited adding two specifications of the equilibrium relation between the self-employment rate and income per capita. Next, some simple scenarios are presented:
- lower economic growth,
- stronger error correction,
- higher propensities to start up new businesses.

Finally we reach to our conclusion.

Part II: Scenarios
Chapter 7: Review of the model to be used for computing scenarios
Chapter 8: Change in the economic growth rate
Chapter 9: Change in the error correction parameters
Chapter 10: Changes in the propensities to start a business
Chapter 11: Reflections

PART I: MODELLING

2 Theory and Modelling

2.1 Definitions

The terms entrepreneurs and self-employed are often used indiscriminately. Strictly speaking entrepreneurs are only those who creatively destroy (see Schumpeter, 1950) and are a subset of the self-employed. For reasons of clarity we make the following distinctions. First, we distinguish between the concepts *entrepreneurial*, in the sense of perceiving and creating new economic opportunities, and *managerial* in the sense of organising and co-ordinating. Secondly, we make a distinction between business-owners or *self-employed* (including owner-managers of incorporated enterprises) and *employees*. Based on this double dichotomy of self-employed versus employee and entrepreneurial versus managerial, three types of entrepreneurs may be distinguished. These three types are the Schumpeterian entrepreneurs, the intrapreneurs and the managerial self-employed (business owners) who are entrepreneurs in a formal sense only. This is illustrated in Table 2.1.

Table 2.1 Three types of entrepreneurs

	self-employed	employee
entrepreneurial	**Schumpeterian**	**Intrapreneurs**
managerial	**Managerial business owners**	Executive managers

Source: Wennekers and Thurik (1999).

At present the number of self-employed is the only yardstick of entrepreneurship because statistical information is available only for the ownership dimension. For practical reasons we shall focus on modelling the number of self-employed.

When modelling self-employment one also has to distinguish between self-employed and enterprises. Although the two are linked, they are not identical. Large corporations as well as subsidiary enterprises often do without a person who has a controlling stake in the company. On the other hand, in many small and medium sized enterprises more than one self-employed person is active because of co-ownership and other partnerships. From a conceptual angle the self-employed are the relevant issue when considering the supply side of entrepreneurship and enterprises are relevant when considering the demand side, i.e. the carrying capacity of the market.

By and large, however, the total number of business owners will not differ much from the number of enterprises. This is certainly true for the Netherlands (the private sector excluding agriculture in 1994 counted about 600 000 of each). Quantitatively we shall for practical reasons henceforth equate the number of self-employed and the number of enterprises.

Finally it must be pointed out that we consider only the number of self-employed (business owners) outside the agricultural sector and that part-time business owners (devoting less than 15 hours per week to their business) are excluded.

2.2 Micro and meso perspective

Research on the various determinants of self-employment can be classified in three groups: the micro perspective, the meso perspective and the macro perspective. In this section we briefly discuss the first two. The macro perspective (country level) will be discussed in the next section.

Micro perspective

Studies on the micro perspective of self-employment concentrate on the decision-making of individuals. Why does an individual choose to be an employee or why does he or she choose to be(come) self-employed? Characteristics of the individual as well as aspects of his / her (direct or indirect) environment are assumed to influence this decision. This perspective includes psychological, sociological and economic issues.

Main topics in the psychological field are traits of individuals (Brockhaus, 1982). Major sociological issues are discussed by Shapero and Sokol (1982). For economic determinants see De Wit (1993) and Van Praag (1996). In the latter, a distinction has been made between the willingness and the opportunity to become an entrepreneur. As to outside factors that influence the individual decision making, Blanchflower and Oswald (1998) study financial issues, while Brüderl and Preisendörfer (1998) investigate direct (family) or indirect network support.

Meso perspective

Studies from a meso-economic perspective focus mainly on market specific features. Commonly, the number of entries and exits are explained by market specific determinants such as profit, production growth and capital intensity, as well as demographic variables. For

useful surveys we refer to Carree and Thurik (1996) and Siegfried and Evans (1994).

A recent investigation of the determinants of entry and exit for The Netherlands is provided by Bosma and Zwinkels. They find profit and production growth to be incentives for entry, whereas capital intensity is found to be a barrier to gross entry and exit. They also investigate the relation between the share of small enterprises and entry. This relation is estimated to be significantly negative. Thus an increasing share of small enterprises – which can be explained as the result of the increasing entrepreneurial activity that was observed in 1987-1995 in The Netherlands – results in a reduction of entry.

Another class of studies discusses the product market business cycle theory: similar to products, the evolution of product markets may show phases of start-up, growth, maturity and decline. This is especially the case for innovative product markets. See for example Klepper (1996) and Agarwal and Gort (1996). These market evolutions will obviously influence the number of entrepreneurs.

2.3 Macro perspective

The secular development of self-employment

The fraction of the labour force that is self-employed, in most Western countries, decreased over a very long period until the mid 1970s. Since then the self-employment rate has started to rise again in several of these economies. Blau (1987) observes that the proportions of both male and female self-employed in the non-agricultural U.S. labour force declined during most of this century but bottomed out in the early 1970s and started to rise until at least 1982. More recent data[1] regarding the period 1974-1994 show that the self-employment fraction in the USA continued to rise gradually since then. Even more recently self-employment in several other countries, notably Austria, Canada, the Netherlands, New Zealand and the UK, has also risen.

Negative relationship with per capita income

There are many reasons for the decline of self-employment, and small business presence in general, until recent years. Lucas (1978) shows how rising real wages may increase the opportunity cost of self-employment relative to the return. Given an underlying distribution of persons by 'managerial' talent this induces marginal entrepreneurs

1 See Wildeman et al. (1998).

(Lucas speaks only of managers) to become employees. This raises the average size of enterprises. Others stress economies of scale and scope during the period after the second industrial revolution in the second half of the 19th century. It was a period of relatively well-defined technological trajectories, stable demand and seemingly clear advantages of diversification.

Reversal of the trend

Evidence for the bottoming out or reversal of the trend towards less self-employment has been given by several authors. Acs et al. (1994) report that of 23 OECD-countries, 15 had an increase in the self-employment rate during the 1970s and 1980s. They show that the weighted average of the self-employment rate in OECD-countries rose slightly from 8.4% in 1978 to 8.9% in 1987. Carlsson (1989) provides data on the diminishing share of the Fortune 500 companies in total manufacturing. Other sources which show that the growing importance of large business has come to a halt in Western countries include Loveman and Sengenberger (1991).

There are several reasons to be given for the more prominent position of small business and self-employment in Western economies. It is obvious that some of these factors may have only a temporary effect. Particularly the current outsourcing and deregulation waves may dry up in coming years. On the other hand, there are more permanent effects like the new technologies favouring small scale production. Also an increasing variety of demand for specialised goods and services that seems related to growing per capita income, an increased appreciation of self-employment and the rise of the services sector all are secular trends.

Other determinants

In addition to the influence of technological development, demand differentiation, the rise of the services sector and deregulation of the demand for self-employment, there are also many other factors that may determine the supply.

First, individuals choose between earning a living as an employee or starting (or purchasing) an enterprise. We regard this as the supply side of self-employment (or alternatively the demand for enterprises). Based on Wildeman et al. (1998) and Wennekers (1997) the following positive and negative factors may be listed on the supply side: demographic trends (ageing, increasing female labour participation rates, immigration), (structural) unemployment, financial incentives (business profitability, opportunity costs of self-employment versus

salaried employment, replacement ratios) and entrepreneurship support policies, particularly regarding credit facilities, tax facilities and venture capital for start-ups.

Second, viewed from the perspective of the product market, technical conditions influence the optimal enterprise size and thereby the room for self-employment. This is traditionally viewed as the carrying capacity of the market (Carree and Thurik, 1999), but in present times of structural change and paradigm shift it is also viewed as the demand for entrepreneurship (Casson, 1995).

Positive legislation favouring entrepreneurs may be induced in order to stimulate self-employment. Etzioni (1984) and Baljé & Verdonkschot (1998) discuss the merits of positive legislation towards entrepreneurs. Also see OECD (1998).

2.4 Modelling the number of self-employed

Our study deals with determinants of the number of self-employed at the macro level.

Equilibrium relation between stage of development and self-employment rate

Following Acs et al. (1994), Wildeman et al. (1998) hypothesised a secular relationship between the stage of economic development and a U-shaped trend in the number of self-employed.

Carree et al. (1999) have pursued this line of reasoning further. This study views the U-shaped trend as an equilibrium relation resulting from the carrying capacity of the product market (based on minimum efficient scale, sectoral composition and the proportion of new product life cycles). Specifying a quadratic functional form and using data for 23 OECD countries during the 1974-1994 period Carree et al. (1999) have been able to estimate the parameters of this equilibrium relationship between self-employment rate and per capita income.

Alternatively one might specify a model where equilibrium results from the interplay of factors on both the demand and supply side of self-employment. However, in this report we will explore only the role of an equilibrium that is related to per capita income.

Of course many forces may cause the actual number of entrepreneurs to differ from the equilibrium rate. Such a disequilibrium may stem from cultural forces (values), institutional settings (regulation of

entry, incentive structures, functioning of the capital market) and economic forces (unemployment, profitability of private enterprise).

However, it is reasoned that in a market economy there will be underlying endogenous movements to restore equilibrium. Some examples may illustrate this point. A structurally low number of enterprises such as many Western economies manifested in the late seventies and early eighties, undoubtedly contributed to structural unemployment. Gradually higher unemployment resulted in a lower replacement ratio as well as in wage moderation helping to restore the profitability of private enterprise. In this manner renewed push and pull factors were created stimulating an increased supply of entrepreneurship. Likewise the number of entrepreneurs that structurally exceeds the equilibrium rate may be expected to diminish profitability, resulting in higher exit (failure rates) and lower entry.

Dynamics

Applying the concept of an equilibrium relation for self-employment to modelling the number of enterprises implies an error correction approach. To do so either net entry or both gross entry and exits have to be added to our model. This will create strong system dynamics because the number of self-employed, entry and exit are directly linked to one another. Changes in the number of enterprises result by definition from entry and exit, which are in turn influenced by changes in the equilibrium rate. Moreover, entry and exit may be interrelated through replacement and displacement.

In the following sections we will start with some very simple models that neglect either equilibrium rate or business dynamics. This will serve to illustrate our point, that an underlying equilibrium rate is needed to guarantee stability in the long term while explicit business dynamics are indispensable for analysing the possibilities of rise and decline in self-employment. Subsequently more complicated models including an equilibrium rate and dynamics will be introduced.

3 Some simple models

In this chapter some simple models that do not take into account an equilibrium rate of entrepreneurship are reviewed. The definitions of the used variables are listed in Appendix I.

3.1 Mixed equation for the number of self-employed

Here we follow Kleijweg (1990), who estimated a mixed equation for the net change of the number of enterprises, encompassing both supply and demand factors. This equation was incorporated in the first version on EIM's macro-sectoral model PRISMA. See Kwaak (1991). The equation in Prisma reads as follows:

$$\frac{ent_{i,t} - ent_{i,t-1}}{ent_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{w_t - w_{t-1}}{w_{t-1}} - \frac{p_t^{va} - p_{t-1}^{va}}{p_{t-1}^{va}} \right) + \alpha_2\ ulab_{t-1} + \alpha_3 \left(ulab_{t-1} - ulab_{t-2} \right) + \alpha_4\ gva_{i,t-1}^{str} + \alpha_5 \left(gva_{i,t-1}^{act} - gva_{i,t-1}^{str} \right) \tag{1.1}$$

In equation (1.1), subscript i relates to the sector index. The supply side of entrepreneurship enters the equation in two ways. First, the differences between the changes of the wage rate and the production price (real wage rate) influence the desire of people to start their own business. Secondly, unemployment also determines the supply of entrepreneurship. The level of unemployment has a positive influence (a high level of unemployment means that there is a large reservoir of potential entrepreneurs), while an increase of unemployment was found to have a negative influence as a signal of the increasing risk of entrepreneurship. The demand for entrepreneurship is represented by production growth. Besides long run growth of production, there is some influence from the business cycle as well.

When exploring the future, values of these exogenous determinants are often assumed to be constant. Equation (1.1) then calculates the net entry rate to be fairly constant in the long run.

3.2 Straightforward modelling of entry and exit

In this model, changes in the number of self-employed result from gross entry and exit. Entry and exit are modelled separately. A model of this type is incorporated in the present version of the PRISMA-model (see EIM, 1999):

(1.2a) $geq_t = \alpha_0 + \alpha_1 exq_{t-1} + \alpha_2 prof_{t-1} + \alpha_3 gva^{vir}_{t-1} + \alpha_4 capital_{t-1} + \alpha_5 intor_{t-1} + \alpha_6 ulab_{t-1}$

(1.2b) $exq_t = \beta_0 + \beta_1 enq_{t-1} + \beta_2 prof_{t-1} + \beta_3 gva^{vir}_{t-1} + \beta_4 capital_{t-1} + \beta_5 intor_{t-1} + \beta_6 ulab_{t-1}$

Gross entry and exit are assumed to interact: the gross entry rate (*geq*) of the current year is partly explained by the exit rate (*exq*) of the previous year and the other way around. Apart from the interaction, both gross entry rate and exit rate are explained by profitability, long run growth of production, capital intensity, international orien tation and unemployment.

Parameters are estimated from historical data. The net entry rate is easily derived by subtracting the exit rate from the gross entry rate. When exploring the future, the assumptions made appear to induce the net entry rate to remain constant.

3.3 Exercises with a constant net entry rate

Both models stated above have in common that the future development of the number of enterprises seems determined by a fairly constant net entry rate. As can be seen in the last column of Table 1 in Appendix II, the net entry rate was roughly constant for The Netherlands in the period from 1987 to 1995. After 1995 a decrease is observed. To obtain the effects of a constant net entry rate for future years, a simple model is specified in which the constant value of the net entry rate is the unique property that fully determines the yearly number of enterprises:

(1.3a) $neq = \varepsilon \quad \rightarrow \quad ne = \varepsilon \; ent_{-1}$

(1.3b) $ent = ent_{-1} + ne + sub$

The equation (1.3a) defines net entry as a constant fraction of the observed number of enterprises at the end of the last year. Equation (1.3b) is simply the definition of the number of enterprises at the end of the current year. This is equal to the number of enterprises at the end of the last year, added to the net entry and subsidiaries in the current year. Net entry is equal to entry (subsidiaries excluded) minus gross exit. Parameter *e* is estimated at 0.0224 from historical data in the period 1987-1996. If we impose this value for future values as well and combine this with our assumption that the future number of subsidiaries will grow with 1.5 percent annually[1], the figures of Table 3.1 are derived.

1 Assumptions for future values are listed in Appendix II.

Estimation result of equation (1.3a)

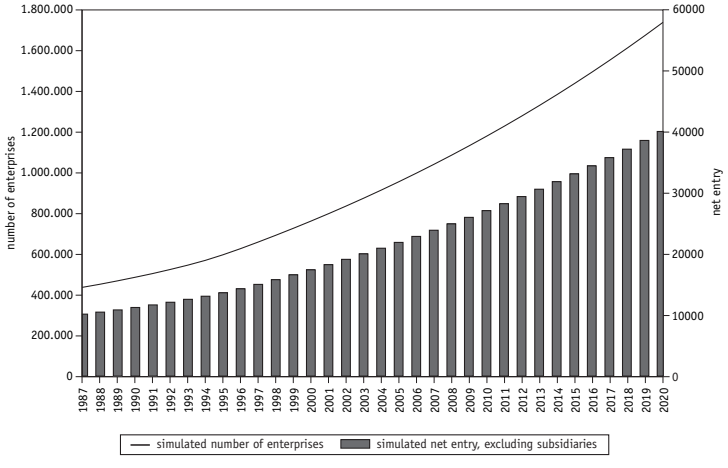
coefficient	estimate	standard error	T-statistic
ε	0.022414	0.000659	34.021821

A steady state based on the average net entry rate in the 1987-1996 period implies a very strong increase of the number of entrepreneurs per 1000 labour force, as can be derived from Table 3.1. The question is whether technological and market forces will allow for such an increase. If not, then apparently the average net entry in the 1987-1996 period is not sustainable in the future. We have reason to believe that this is indeed the case, which belief we will elaborate in Chapter 4.

Table 3.1 Simulation output using a constant net entry rate

Year	simulated enterprises	implied number of enterprises per 1000 labour force	simulated net entry (excluding subsidiaries)	new subsidiaries, implemented exogenously	net entry quote
1986	424,410				
1987	438,161	76	9,513	4,238	
1988	453,358	78	9,821	5,376	2.24
1989	470,016	80	10,162	6,497	2.24
1990	487,586	81	10,535	7,035	2.24
1991	505,863	83	10,929	7,348	2.24
1992	525,964	85	11,339	8,763	2.24
1993	547,169	88	11,789	9,415	2.24
1994	570,738	90	12,264	11,305	2.24
1995	598,088	93	12,793	14,557	2.24
1996	628,253	97	13,406	16,760	2.24
1997	660,530	100	14,082	18,195	2.24
1998	693,803	104	14,805	18,468	2.24
1999	728,099	108	15,551	18,745	2.24
2000	763,445	112	16,320	19,026	2.24
2001	799,869	116	17,112	19,312	2.24
2002	837,398	120	17,928	19,601	2.24
2003	876,063	125	18,770	19,895	2.24
2004	915,893	129	19,636	20,194	2.24
2005	956,918	134	20,529	20,497	2.24
2006	999,171	138	21,449	20,804	2.24
2007	1,042,683	143	22,396	21,116	2.24
2008	1,087,486	148	23,371	21,433	2.24
2009	1,133,616	152	24,375	21,754	2.24
2010	1,181,105	157	25,409	22,081	2.24
2011	1,229,991	163	26,474	22,412	2.24
2012	1,280 308	169	27,569	22,748	2.24
2013	1,332,094	174	28,697	23,089	2.24
2014	1,385,388	180	29,858	23,436	2.24
2015	1,440,227	187	31,052	23,787	2.24
2016	1,496,652	193	32,282	24,144	2.24
2017	1,554,705	199	33,546	24,506	2.24
2018	1,614,426	206	34,847	24,874	2.24
2019	1,675,859	212	36,186	25,247	2.24
2020	1,739,047	219	37,563	25,625	2.24

Figure 3.1 Simulated number of enterprises and net entry using a constant net entry rate



3.4 Conclusion

The simple models explored in this chapter indicate that if the net entry rate is held constant at the present level, in the longer run (2000-2020) the simulated number of enterprises will grow too rapidly. We opt for the implementation of an equilibrium rate of entrepreneurship, assuming that in a market economy there will be underlying forces to restore equilibrium.

4 Introducing an equilibrium rate and an error correction term

In the previous chapter, the necessity of implementing an equilibrium rate of self-employment for modelling the number of enterprises was argued. The model used in this chapter is an error correction model, in which entry depends on the difference between the observed number of enterprises and an equilibrium number of enterprises. Before describing the model, we will first pay attention to the concept of an equilibrium relationship for the number of enterprises / self-employed.

4.1 Model 2: Equilibrium relationship and error correction

An equilibrium relationship for business ownership

In Section 2.3 the theory of a secular trend regarding the rate of self-employment was set out. Applying this theory, a quadratic function is defined for the relation between the equilibrium number of enterprises and the income per capita. The parameters of this function were estimated in Carree et al (1999). In that study, a cross-section of several developed countries showed a U-shaped relation between the equilibrium number of business owners and income per capita. The estimated U-curve is plotted in Figure 4.1. In Figure 4.2 we have plotted the calculated equilibrium for the Netherlands in the period 1987-1996, using realised income per capita as well. Figure 4.2 shows that in this period the initial gap between the equilibrium number of enterprises and the realised number diminished and even reversed after 1994. We should mention that, in the estimation of the U-shaped curve by Carree et al., relatively few countries have observations that go beyond the income per capita level that generates the minimum equilibrium rate. Therefore, different specifications of the equilibrium relation must also be considered for future scenarios - as income per capita continue to rise. This is accounted for in the second part of this study. In this stage, however, our main interests lie in building a model that can be used for computing scenarios. In this first modelling part, we consider only one equilibrium curve, which is the following:

$$\left(\frac{ent}{lab}\right)^{*} = 0.46 - 0.039\ ycap + 0.0010\ ycap^{2} \qquad \text{(I)}$$

We stress that our simple models are set up tools to help to understand the consequences of modelling the number of self-employed in a particular way. In this chapter, we will observe what happens in the dynamics by adding an error correction to the model.

Figure 4.1 Estimated equilibrium number of enterprises (business owners) per 1000 labour force

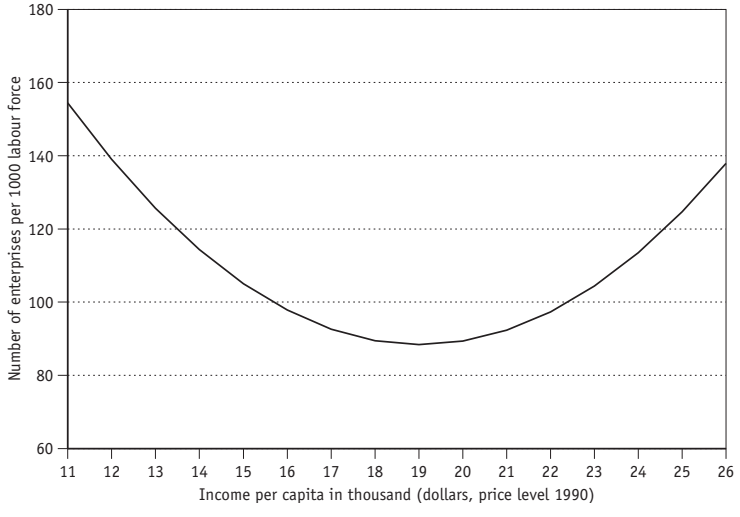
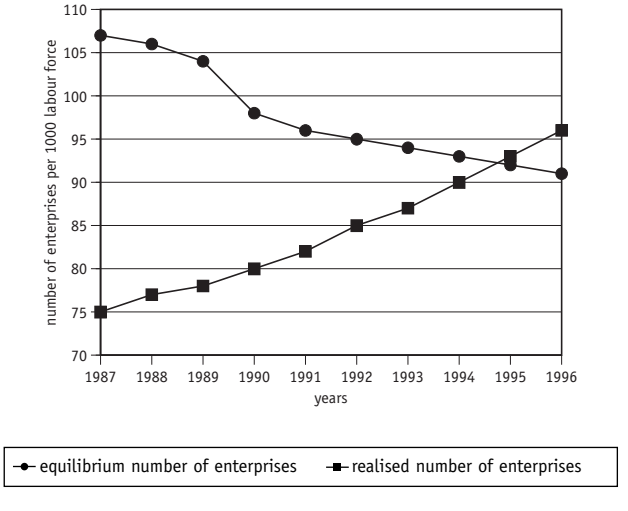


Figure 4.2 Equilibrium versus realisation for The Netherlands



Modelling the equilibrium rate by means of an error correction

The first model accounting for an equilibrium number of enterprises is the following:

(2a) $$\left(\frac{ent}{lab}\right)^{*} = 0.46 - 0.039\ ycap + 0.0010\ ycap^{2}$$

$$\rightarrow ent^{*} = lab\ (0.46 - 0.039\ ycap + 0.010\ ycap^{2})$$

(2b) $$ne = \alpha(ent^{*}_{-1} - ent_{-1})$$

(2c) $$ent = ent_{-1} + ne + sub$$

The first equation states the equilibrium number of enterprises, depending on the income per capita and the actual labour force level. In the model, we use the estimated U-curve as described in equation (I) in Section 4.1. The second equation reflects the error correction. It is hypothesised that a situation of disequilibrium affects only the 'real' new entries and not the number of starting subsidiaries. The last equation is the definition of the number of enterprises at the end of the year.

4.2 Exercises with model 2

Model 2 was estimated for 1987-1996 using ordinary least squares. The estimated error correction coefficient reads as follows:

Estimation result of model 2

coefficient	estimate	standard error	T-statistic
α	0.073557	0.029137	2.524501

The error correction parameter is thus estimated at 0.074, meaning that each year the simulated number of enterprises are adjusted towards the equilibrium with 7.4% of their difference in the previous period. This rate corresponds to the error correction rate estimated by Carree et al, in which a disequilibrium causes an adjustment of 12% in two years[1].

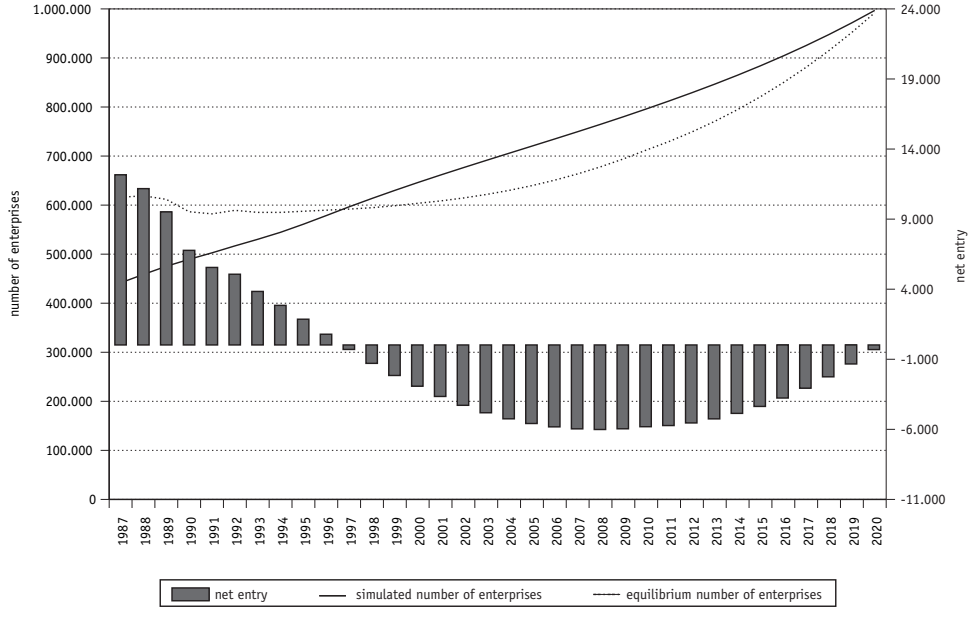
Simulation with the current model and the estimated value of parameter α results in the output of Table 4.1. To study the interactions of the different variables, a graph is constructed from this table, which is plotted in Figure 4.3.

1 Note that the subsidiaries are implemented exogenously in model 2 and that these determine the number of enterprises as well. In Carree et al. (1999), subsidiaries are included when determining the error correction.

Table 4.1 Simulation output: model 2

Year	equilibrium number of enterprises	equilibrium number of enterprises	simulated net entry, excluding subsidiaries	new subsidiaries	simulated enterprises/ labour force	equilibrium enterprises/ labour force	net entry quote
1986	424,410						
1987	441,526	615,959	12,878	4,238	77	107	3.03
1988	458,734	619,004	11,832	5,376	79	106	2.68
1989	475,301	611,704	10,070	6,497	81	104	2.20
1990	489,496	586,473	7,160	7,035	82	98	1.51
1991	502,710	582,181	5,867	7,348	83	96	1.20
1992	516,827	589,338	5,353	8,763	84	95	1.06
1993	530,293	585,167	4,051	9,415	85	94	0.78
1994	544,595	585,181	2,996	11,305	86	93	0.57
1995	561,100	587,489	1,948	14,557	88	92	0.36
1996	578,672	589,668	812	16,760	89	91	0.14
1997	596,525	591,892	–342	18,195	91	90	-0.06
1998	613,599	594,717	–1,394	18,468	92	89	-0.23
1999	630,033	598,732	–2,311	18,745	94	89	-0.38
2000	645,938	603,661	–3,121	19,026	95	89	-0.50
2001	661,350	608,536	–3,899	19,312	96	88	-0.60
2002	676,382	614,495	–4,569	19,601	97	88	-0.69
2003	691,145	621,622	–5,133	19,895	98	89	-0.76
2004	705,747	630,006	–5,592	20,194	100	89	-0.81
2005	720,296	639,739	–5,947	20,497	101	89	-0.84
2006	734,900	650,917	–6,200	20,804	102	90	-0.86
2007	749,665	663,641	–6,351	21,116	103	91	-0.86
2008	764,698	678,016	–6,400	21,433	104	92	-0.85
2009	780,107	694,152	–6,346	21,754	105	93	-0.83
2010	795,998	712,162	–6,189	22,081	106	95	-0.79
2011	812,309	729,673	–6,101	22,412	108	97	-0.77
2012	829,154	749,200	–5,903	22,748	109	99	-0.73
2013	846,647	770,852	–5,596	23,089	111	101	-0.67
2014	864,903	94,744	–5,180	23,436	113	104	-0.61
2015	884,036	820,996	–4,654	23,787	115	106	-0.54
2016	904,162	849,733	–4,018	24,144	116	109	-0.45
2017	925,396	881,084	–3,271	24,506	119	113	-0.36
2018	947,858	915,183	–2,412	24,874	121	117	-0.26
2019	971,665	952,170	–1,439	25,247	123	121	-0.15
2020	996,940	992,191	–351	25,625	126	125	-0.04

Figure 4.3 Net entry, simulated number of enterprises and an equilibrium number of enterprises: model 2



Discussion

In this simulation, the equilibrium number of enterprises is reached after 1996. Until 2020, the simulated number of enterprises still exceeds the equilibrium level, which results in negative net entry. However, the number of enterprises still rises because of the subsidiaries that are implemented exogenously in this model. Comparing the simulated number of enterprises from Table 4.1 with the realised ones in Table 1 of Appendix II, we see differences in the period 1987-1997, both regarding the number of enterprises and (particularly) regarding development of net entry. Although the number of enterprises is explained reasonably well, this does not apply for net entry; Net entry determined by disequilibrium only is too restrictive.

4.3 Conclusion

It has been demonstrated that implementing a particular equilibrium rate has a considerable effect and it seems to work out well for the simulated number of enterprises in the long run. Behaviour of net entry is not satisfactory, as a consequence of the very restrictive modelling. In addition, one shortcoming of modelling net entry is that we cannot say anything – in terms of gross entry and exit – about the causes of the variations when simulating this variable. Therefore we will model gross entry and exit explicitly in the next chapter.

5 Adding gross entry and exit

This chapter investigates a model that elaborates on model 2, based on the conclusions in the previous chapter. It considers entry and exit explicitly, instead of net entry.

5.1 Model 3: Modelling gross entry and exit separately

The model resembles Model 2, but it contains a few extensions. The number of exits depends on the number of enterprises in the previous year. A part of these exits will be replaced by new entries. The remaining entries are an error correction of a disequilibrium situation. The model is specified in equations (3a) - (3d):

(3a) $$\left(\frac{ent}{lab}\right)^{*} = 0.46 - 0.039\ ycap + 0.0010\ ycap^2$$

$$\rightarrow ent^{*} = lab\ (0.46 - 0.039\ ycap + 0.010\ ycap^2)$$

(3b) $$ge = \alpha_1 (ent^{*}_{-1} - ent_{-1}) + \alpha_2 ex_{-1}$$

(3c) $$ex = \beta_1 ent_{-1}$$

(3d) $$ent = ent_{-1} + ge - ex + sub$$

In equations (3b) and (3c) respectively gross entry and gross exit are defined. Gross entry has an error correction, reflected by parameter α_1. Besides the error correction, entry considers a rate of replacement: every exit in the previous year induces α_2 new enterprises to enter in the current year. Gross entry does not contain new subsidiaries. Gross exit is linearly related to the lagged number of enterprises, which implies a constant exit rate. Equation 3a is the same as equation (2a) in the previous chapter and equation (3d) is again the definition of the number of enterprises at the end of each period.

5.2 Exercises with model 3

The equations of model 3 are estimated simultaneously, leading to the following results.

Estimation results of model 3

coefficient	estimate	standard error	T-statistic
$\alpha 1$	0.020727	0.0099	2.10
$\alpha 2$	1.548992	0.0450	31.00
$\beta 1$	0.042948	0.0018	24.40

The estimated replacement coefficient is equal to 1.55, while the error correction coefficient is estimated very low at 2.07%. We reason that the replacement parameter should not exceed one[1]. The model is estimated again, fixing a_2 at 1:

Estimation results of model 3, fixing the replacement ratio at 1

coefficient	estimate	standard error	T-statistic
$\alpha 1$	0.114108	0.0245	4.65
$\alpha 2$	1.000000	fixed	
$\beta 1$	0.041271	0.0015	27.17

We see that the estimated error correction has become about five times higher as a result of fixing the replacement effect. The simulation of these last estimation results is printed in Table 5.1 and plotted in Figure 5.1.

Discussion

Figure 5.1 shows an improvement over the results of the previous model; development of entry and exit are reasonably fitted to observed data. The error correction observed for entry is probably too strong, as simulated entry decreases considerably in the nineties. It is possible that the entry and the exit equation should be modelled in another way. Exit may depend on the difference between the equilibrium and the realised number of enterprises as well. When the observed number of enterprises exceeds the equilibrium number, the number of exits may be higher compared to the situation where no disequilibrium exists. On the other hand, when the observed number of enterprises is below equilibrium, incumbent enterprises that would have been forced to exit in a more competitive situation may remain in business.

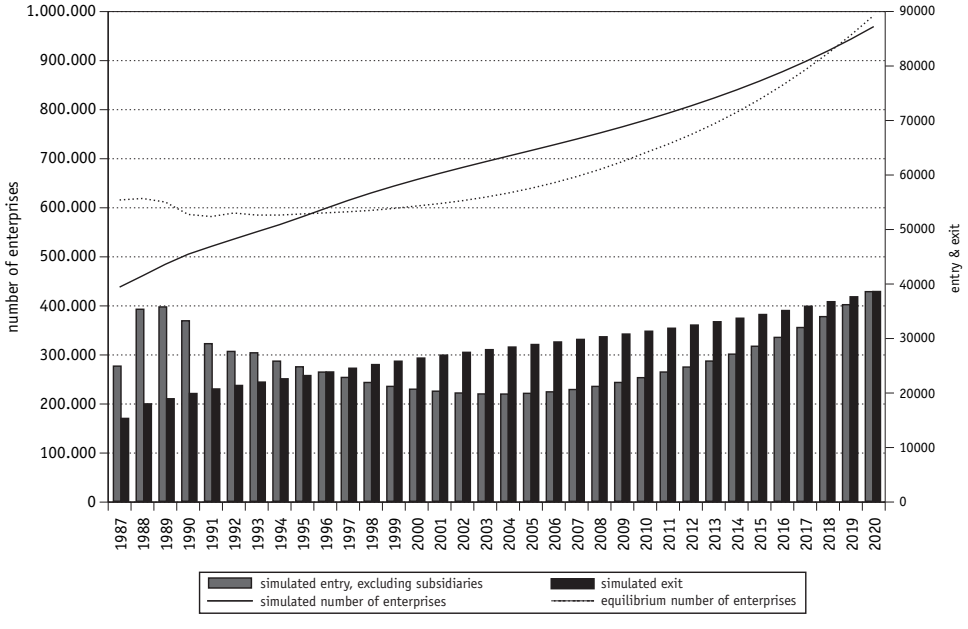
Furthermore, it may be that some entries are consequences of other effects not considered so far and that these are captured in the estimated replacement effect. Therefore we will consider two new explanatory variables for the next model: the labour income quote (as a measure of profitability) and unemployment. Both were already found to be significant causes of the number of entrepreneurs in the international comparative study by Wildeman et al. (1998). Additionally, we believe that demographic features of the population are important for the number of entries as well.

1 A replacement coefficient equal to one means that on average each exit is replaced by exactly one entering enterprise. Note that entering enterprises are generally smaller than exiting enterprises.

Table 5.1 Simulation output: model 3

year	simulated number of enterprises	equilibrium number of enterprises	entry, excluding subsidiaries	exit	net entry, excluding subsidiaries	enterprises per 1000 labour force	entry quote	exit quote
1986	424,410		24,300					
1987	438,352	615,959	25,094	15,389	9,705	76	5.91	3.63
1988	461,293	619,004	35,656	18,091	17,564	79	8.13	4.13
1989	484,839	611,704	36,087	19,038	17,049	82	7.82	4.13
1990	505,378	586,473	33,514	20,010	13,505	84	6.91	4.13
1991	521,132	582,181	29,263	20,858	8,406	86	5.79	4.13
1992	536,211	589,338	27,824	21,508	6,316	87	5.34	4.13
1993	551,066	585,167	27,570	22,130	5,440	88	5.14	4.13
1994	565,649	585,181	26,021	22,743	3,278	90	4.72	4.13
1995	581,833	587,489	24,972	23,345	1,627	91	4.41	4.13
1996	598,571	589,668	23,990	24,013	- 23	92	4.12	4.13
1997	615,059	591,892	22,997	24,704	- 1,707	94	3.84	4.13
1998	630,203	594,717	22,060	25,384	- 3,324	95	3.59	4.13
1999	644,274	598,732	21,335	26,009	- 4,674	96	3.39	4.13
2000	657,522	603,661	20,812	26,590	- 5,777	97	3.23	4.13
2001	670,141	608,536	20,444	27,137	- 6,693	97	3.11	4.13
2002	682,192	614,495	20,107	27,657	- 7,550	98	3.00	4.13
2003	693,865	621,622	19,933	28,155	- 8,222	99	2.92	4.13
2004	705,333	630,006	19,911	28,637	- 8,725	99	2.87	4.13
2005	716,761	639,739	20,041	29,110	- 9,069	100	2.84	4.13
2006	728,305	650,917	20,321	29,582	- 9,260	101	2.84	4.13
2007	740,114	663,641	20,751	30,058	- 9,307	101	2.85	4.13
2008	752,333	678,016	21,332	30,545	- 9,213	102	2.88	4.13
2009	765,103	694,152	22,065	31,050	- 8,984	103	2.93	4.13
2010	778,560	712,162	22,954	31,577	- 8,623	104	3.00	4.13
2011	792,840	729,673	24,000	32,132	- 8,132	105	3.08	4.13
2012	807,791	749,200	24,924	32,721	- 7,797	106	3.14	4.13
2013	823,577	770,852	26,036	33,338	- 7,303	108	3.22	4.13
2014	840,345	794,744	27,322	33,990	- 6,668	109	3.32	4.13
2015	858,237	820,996	28,787	34,682	- 5,895	111	3.43	4.13
2016	877,393	849,733	30,433	35,420	- 4,988	113	3.55	4.13
2017	897,952	881,084	32,264	36,211	- 3,947	115	3.68	4.13
2018	920,052	915,183	34,286	37,059	- 2,773	117	3.82	4.13
2019	943,831	952,170	36,504	37,972	- 1,468	120	3.97	4.13
2020	969,427	992,191	38, 923	38,953	- 30	122	4.12	4.13

Figure 5.1 Simulated and equilibrium number of enterprises, entry and exit for The Netherlands: model 3



5.3 Conclusion

Modelling entry and exit explicitly works out well. It helps to provide insight in the causes of a particular increase of the number of enterprises. However, the entry and the exit equations can be improved. It is possible that the relations with respect to entry and exit should be modelled in another way. Exit may depend on the difference between the equilibrium and the realised number of enterprises as well. Adding the labour income quote and unemployment as additional explanatory variables in the entry equation seems reasonable. Finally, we would like to implement some demographic features to consider their effects on entry. These insights are embroidered further in the next chapter.

6 Adding explanatory variables to the entry equation

So far, the only variables used in the models were variables that contained information on self-employment. In this chapter, a number of explanatory variables are added. These are described below.

Labour income quote

The labour income quote is defined as the ratio between wages and value added. A low value for the labour income quote means a high profit share. We expect that this will have a (delayed) positive effect on the number of entries. When adding the term labour income quote to the equation we expect a significant negative effect on the number of entries.

Unemployment

We expect the delayed unemployment rate to have a positive effect on entry. There are two reasons for this hypothesis. First, not being able to find a job may induce individuals to start a enterprise on their own. Second, high unemployment may give starting entrepreneurs more opportunities to engage suitable employees.

Demography

The demographic structure is another new factor that characterises model 4. Different demographic groups are assumed to have their own propensity for starting up a business. One can see this as the supply side of starting entrepreneurs, as a result of demographic characteristics of the labour force. The decision to become an entrepreneur is obviously rather complicated and cannot be described in a single equation, each motivation for the decision to enter having its own (hard to quantify) story on the micro level. In this micro perspective, age and gender do not seem to have a decisive influence. On the macro level, however, it is believed that demographic structures do (partly) determine the supply side of entrepreneurship.

6.1 Model 4: Explanatory variables

In Model 4, both the entry equation and the exit equation are changed as compared to Model 3. The error correction will now be included both in the entry equation and the exit equation. It is assumed that the difference between equilibrium and realised number of enterprises affects the number of exits in a similar way to which it is assumed to affect the number of entries: an abundance of

enterprises causes the number of entries to decline and the number of exits to rise (and the other way around in case of a shortage of enterprises). For the entering entrepreneurs, Model 4 considers the three additional determinants as discussed above: the demographic structure, the labour income quote and the unemployment rate.

In the study by Wildeman et al. (1998), the labour income quote and the unemployment rate were related to the number of enterprises. This suggests that we should relate the observed yearly differences to the yearly difference in the number of enterprises, that is: entry plus subsidiaries minus exits. In other words, the model does not distinguish the subsidiaries from the 'real' new entries. The argument behind this is that the subsidiaries may fill the space that would have been filled by 'real' new entries otherwise.

(4a) $$\left(\frac{ent}{lab}\right)^{*} = 0.46 - 0.039\ ycap + 0.0010\ ycap^{2}$$

$$\rightarrow ent^{*} = lab\ (0.46 - 0.039\ ycap + 0.010\ ycap^{2})$$

$$ge + sub = \sum_{a,g} pe_{a,g} lab_{a,g} +$$

(4b) $$lab\left(\alpha_1 (liq_{-2} - \overline{liq}) + \alpha_2 (ulab_{-2} - \overline{ulab})\right) + \varepsilon_1 (ent^{*}_{-1} - ent_{-1})$$

(4c) $$ex = \beta\ ent_{-1} - \varepsilon_2\ (ent^{*}_{-1} - ent_{-1})$$

(4d) $$ent = ent_{-1} + ge + sub - ex$$

with pe = propensity to start up a business
a = age
g = gender

6.2 Exercises with model 4

Obviously not all parameters can be estimated with the current data set of nine observations. We therefore simulate the model with fixed parameters. The fixed values are mostly obtained using the results of other studies in similar estimations.

We apply the following approach. First, values are fixed for α_1, α_2, β, ε_1 and ε_2 using the results of similar studies and our previous estimations. With these values, the propensities to start up a business in the year 1994 are derived from the *EIM firm founders survey 1994*. The calculated numbers can then be interpreted as the propensities to start up a business under the conditions of normal profitability, normal unemployment and no disequilibrium. We simulate the following model:

$$(1) \quad \left(\frac{ent}{lab}\right)^{*} = 0.46 - 0.039\ ycap + 0.0010\ ycap^{2}$$

$$\rightarrow ent^{*} = lab\ (0.46 - 0.039\ ycap + 0.010\ ycap^{2})$$

$$(2) \quad ge + sub = \sum_{a,g} pe_{a,g} lab_{a,g} + lab\Big(-0.0175(liq_{-2} - \overline{liq}) + 0.0395(ulab_{-2} - \overline{ulab})\Big) + 0.035(ent^{*}_{-1} - ent_{-1})$$

$$(3) \quad ex = 0.046\ ent_{-1} - 0.035\ (ent^{*}_{-1} - ent_{-1})$$

$$(4) \quad ent = ent_{-1} + ge + sub - ex$$

The values of the *pe*'s are calculated for 1994, given the fixed parameter values of α_1 (equal to -0.0175), α_2 (0.0395), the error correction coefficients (both 0.035) and the firm founders survey data. For the years preceding 1994, we assume a yearly increase of 7% for all propensities to start up a business, reflecting the increasing popularity of entrepreneurship in the past decade. The propensities used are shown in Table 6.1.

Table 6.1 Propensities to start up a business, model 4

MEN	1987	1988	1989	1990	1991	1992	1993	1994-2020
15-19	0.001230	0.001316	0.001408	0.001507	0.001612	0.001725	0.001846	0.001975
20-24	0.003766	0.004029	0.004311	0.004613	0.004936	0.005282	0.005651	0.006047
25-39	0.006719	0.007189	0.007693	0.008231	0.008807	0.009424	0.010083	0.010789
40-49	0.004930	0.005275	0.005644	0.006039	0.006462	0.006915	0.007399	0.007916
50+	0.002768	0.002962	0.003169	0.003391	0.003628	0.003882	0.004154	0.004445

WOMEN	1987	1988	1989	1990	1991	1992	1993	1994-2020
15-19	0.000587	0.000628	0.000672	0.000719	0.000770	0.000824	0.000881	0.000943
20-24	0.001695	0.001813	0.001940	0.002076	0.002221	0.002377	0.002543	0.002721
25-39	0.004029	0.004311	0.004613	0.004936	0.005281	0.005651	0.006046	0.006469
40-49	0.003383	0.003620	0.003873	0.004144	0.004434	0.004745	0.005077	0.005432
50+	0.001517	0.001623	0.001737	0.001859	0.001989	0.002128	0.002277	0.002436

Propensities to start up a business are multiplied by (predicted) labour force values[1] to retrieve the expected number of entrants in each demographic group. Characteristic trends that are expected for Dutch labour force in the near future are the ageing process and the increasing participation of women. The calculated number of starting entrepreneurs as a result of demography is printed in Table 6.2 for 1994 and 2020.

1 Values were obtained from CBS/CPB (1997).

Table 6.2 Starting entrepreneurs due to demography in The Netherlands, 1994 vs. 2020

	MEN		WOMEN	
AGE	1994	2020	1994	2020
15-19	192	132	72	66
20-24	2,395	1,869	1,030	846
25-39	19,450	15,893	7,569	7,906
40-49	8,480	7,814	3,138	4,851
50+	3,018	6,289	623	2,899
Total	33,535	31,996	12,432	16,568

The output resulting from simulation with this model is shown in tabular form and in graphical form in Table 6.3 and Figure 6.1 respectively.

Discussion

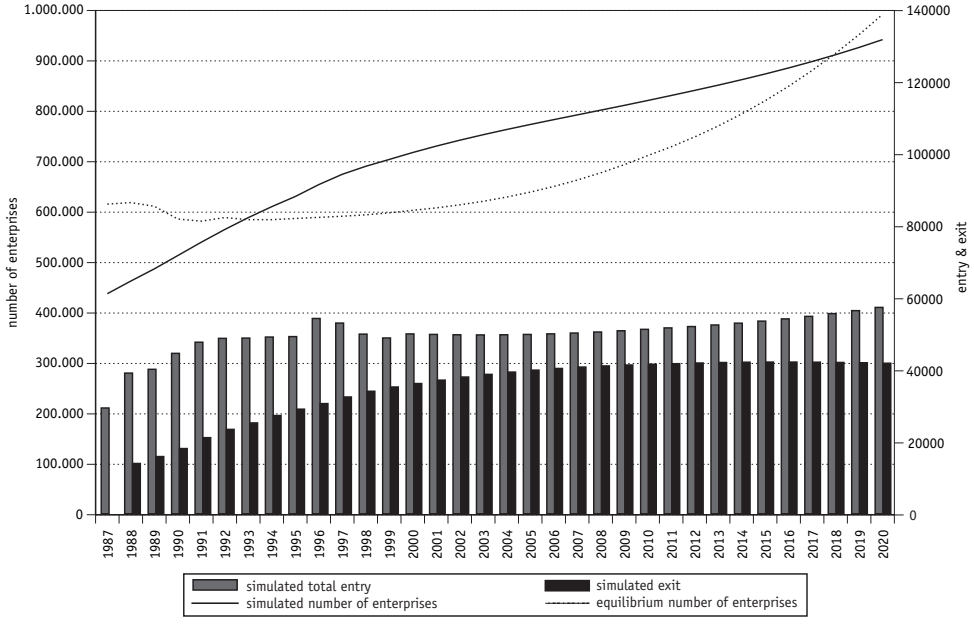
Figure 6.1 presents the simulated actual and equilibrium number of enterprises (self-employed), as well as the simulated entry and exit. From this figure, we first see a shortage of self-employment (as compared to the assumed equilibrium) in the eighties being reversed to an abundance in the late nineties. Twenty years later the model predicts the number of self-employed to be below equilibrium again, the situation as it was in the eighties. This reversal can partly be explained by the error correction mechanism. It is also supported by the future demographic development in The Netherlands, as the ageing process will roughly stabilise the absolute number of entries related to demography, while the labour force is assumed to keep growing at an average rate of 0.75 percent annually.

The overall prediction is that in the first decades of the next century the number of enterprises (self-employed) in The Netherlands will keep growing, be it at a lower rate than in the eighties and nineties of the 20th century. After jumping from 29 to 42 between 1987 and 1998, the number of enterprises (self-employed) per 1000 inhabitants is expected to grow more gradually to about 53 in 2020.

Table 6.3 Simulation output: model 4

year	simulated number of enterprises	equilibrium number of enterprises	total entry, (subsidiaries included)	exit	net entry, (subsidiaries included)	enterprises per 1000 labour force	entry quote	exit quote
1986	424,410							
1987	438,352	615,959	29,332			76	6.91	0.00
1988	463,406	619,004	39,002	13,948	30,430	79	8.90	3.18
1989	487,593	611,704	40,058	15,871	30,684	83	8.64	3.42
1990	513,986	586,473	44,478	18,085	33,428	86	9.12	3.71
1991	540,444	582,181	47,564	21,106	33,805	89	9.25	4.11
1992	565,679	589,338	48,635	23,400	33,998	92	9.00	4.33
1993	589,197	585,167	48,711	25,193	32,933	94	8.61	4.45
1994	610,949	585,181	48,996	27,244	33,057	97	8.32	4.62
1995	631,065	587,489	49,121	29,006	34,672	98	8.04	4.75
1996	654,658	589,668	54,147	30,554	40,353	101	8.58	4.84
1997	675,137	591,892	52,868	32,389	38,674	103	8.08	4.95
1998	690,978	594,717	49,810	33,970	34,308	104	7.38	5.03
1999	704,565	598,732	48,741	35,154	32,332	105	7.05	5.09
2000	718,320	603,661	49,869	36,114	32,781	105	7.08	5.13
2001	730,993	608,536	49,728	37,056	31,984	106	6.92	5.16
2002	742,704	614,495	49,623	37,912	31,313	107	6.79	5.19
2003	753,643	621,622	49,590	38,652	30,833	107	6.68	5.20
2004	763,979	630,006	49,625	39,288	30,530	108	6.58	5.21
2005	773,871	639,739	49,724	39,832	30,389	108	6.51	5.21
2006	783,465	650,917	49,887	40,293	30,398	108	6.45	5.21
2007	792,896	663,641	50,110	40,679	30,547	109	6.40	5.19
2008	802,292	678,016	50,393	40,997	30,829	109	6.36	5.17
2009	811,772	694,152	50,735	41,255	31,235	109	6.32	5.14
2010	821,450	712,162	51,136	41,458	31,759	109	6.30	5.11
2011	831,373	729,673	51,535	41,612	32,335	110	6.27	5.07
2012	841,478	749,200	51,907	41,803	32,852	111	6.24	5.03
2013	851,884	770,852	52,344	41,938	33,495	112	6.22	4.98
2014	862,705	794,744	52,844	42,023	34,257	112	6.20	4.93
2015	874,051	820,996	53,409	42,063	35,133	113	6.19	4.88
2016	886,025	849,733	54,037	42,063	36,118	114	6.18	4.81
2017	898,728	881,084	54,731	42,027	37,209	115	6.18	4.74
2018	912,259	915,183	55,490	41,959	38,405	116	6.17	4.67
2019	926,714	952,170	56,317	41,862	39,702	117	6.17	4.59
2020	942,189	992,191	57,212	41,738	41,100	119	6.17	4.50

Figure 6.1 Simulated and equilibrium number of enterprises, entry and exit for The Netherlands: model 3



6.3 Conclusion

Model 4 will be the model for which we will compute various scenarios – generated by shocks and alternative model specifications – in Part II of this study. The main reasons to opt for this model are the following:

- It considers demographic structure as a determinant of entry, thus referring explicitly to the supply side of entrepreneurship.
- It considers an equilibrium level of enterprises and a balancing mechanism towards this equilibrium. This represents the space (demand) for entrepreneurship.
- It takes entry and exit into account separately. This enables us to separate these variables to investigate the underlying dynamics of the development of the number of firms. Furthermore, the extent of turbulence (the sum of entry and exit) can also be determined.

PART II: SCENARIOS

7 Scanning the future by means of scenarios

7.1 Introduction

For computing scenarios, the simulation model 4 – as discussed in chapter 6 – will be used as a reference scenario. Results of all other scenarios will be compared to this reference. In Chapter 6, it is argued that model 4 best fits the aims stated in the introduction. In section 7.2, more characteristics are given. The specification of the equilibrium curve for the number of enterprises may be decisive in the outcomes as it is the maintained hypothesis of this study. Therefore, alternative specifications are dealt with in section 7.3.

We may run the scenarios by creating a shock (from 2000 onwards) for all exogenously given variables or by doing sensitivity analyses for the parameters. In fact, we will study the effect of alternative assumptions regarding the following factors:

1. *Economic growth*
   We will study the effects if the assumed annual growth rate is reduced. This will affect the values for the equilibrium number of enterprises, which are determined by income per capita. The scenarios are presented in Chapter 8.

2. *Error correction mechanism*
   We will examine the effects of doubled error correction coefficients. What are the consequences when the adjustments towards equilibrium are greater than assumed in the reference scenario? This can be read in Chapter 9.

3. *Policy*
   Consequences of promoting entrepreneurship by means of policy can be demonstrated by changing the future propensities to start up a business, as compared with the propensities used in the reference scenario. This is done in Chapter 10.

7.2 Characteristics of the reference scenario

In this section a number of characteristics of the reference scenario is reviewed. From Figure 6.1 it follows that the general trend is that the number of Dutch enterprises experienced a respectable growth in the

late eighties, making up for the deficit that existed in that period. After that, growth continued even far beyond the equilibrium in the middle nineties. That is more or less the observed situation until 1997, provided that the assumed equilibrium level is not misspecified. It is believed that the situation of 1997, characterised by 'too many enterprises', will have a negative effect on entries and a positive effect on exits in the future. Entry and exit are, of course, also affected by other determinants.

A large part of entry is determined by demographic structures. The underlying determinants are the propensities to start up a business, that were calculated for 1994. These calculations were based on the demographic distribution in the *EIM firm founders survey 1994*. This distribution was projected on the total number of entries under the circumstances of a normal unemployment rate, normal labour income quote[1] and no difference between equilibrium and realised number of enterprises. It was furthermore assumed that these propensities increased in the period 1987-1994 with 7 percent (yearly) and retained the value of 1994 afterwards. The resulting exogenously implemented propensities for 1987 until 1994 are shown in Table 6.1.

Table 7.1 serves to capture to what extent the determinants affect entry and exit. Due to the ageing process, the growth of the number of start-ups linked to the demographic aspects of the labour force is very small with 2.3% in the period 1997-2020, while the total labour force increases with 21% in the same period. Therefore, assuming the propensities to start up a business for the future to be fixed at the 1994 level, the expected demographic features of the future have a negative influence on the number of enterprises relative to labour force.

The effect of unemployment on the number of start-ups is positive for the whole period, as the unemployment rate for The Netherlands is above the assumed international average (5.6 percent) for 1988-2020. The number of start-ups caused by unemployment ranges from 2329 to 7684 in the historical period, but remains close to 4000 in the reference scenario. From Table 7.1, we observe a negative effect on profitability in the years 1988,1989 and 1995. Values range from -1668 to 4838 in the historical period, but are stable between 3000 and 3500 in the reference scenario.

1 Normal values were calculated as the average values of variables which applied in the period 1974-1996 over several countries, as in Carree et al. (1999).

The effects of error correction are certainly not negligible. The largest deficit is in the first year, resulting in 6216 more starters and an equal number fewer exits than would be the case in equilibrium. This means that due to the disequilibrium only, net entry is raised by over 12000 in 1988. The biggest adjustment in the other direction is in 2005, where both entry and exit contribute 4689 fewer to net entry than would be the case in an equilibrium situation.

The overall prediction is that in the first decades of the next century the number of enterprises (self-employed) in The Netherlands will keep growing, be it at slower rate than in the eighties and nineties of the 20th century. After jumping from 29 to 42 between 1987 and 1998, the number of enterprises (self-employed) per 1000 inhabitants is expected to grow more gradually to about 53 in 2020.

Table 7.1 Individual effects of the determinants on gross entry and exit, reference scenario

	GROSS ENTRY EQUATION					EXIT EQUATION		
	effect demo-graphy	unemploy-ment effect	labour income quote effect	error correction effect	TOTAL ENTRY	enterprises stock effect	error correction effect	EXIT
1988	27,398	6,312	-925	6,216	39,002	20,164	-6,216	13,948
1989	29,791	6,489	-1,668	5,446	40,058	21,317	-5,446	15,871
1990	32,682	6,487	965	4,344	44,478	22,429	-4,344	18,085
1991	35,795	4,807	4,424	2,537	47,564	23,643	-2,537	21,106
1992	39,068	3,268	4,838	1,461	48,635	24,860	-1,461	23,400
1993	42,551	2,329	3,003	828	48,711	26,021	-828	25,193
1994	45,968	2,489	681	-141	48,996	27,103	141	27,244
1995	46,439	5,169	-1,586	-902	49,121	28,104	902	29,006
1996	46,711	7,684	1,277	-1,525	54,147	29,029	1,525	30,554
1997	47,196	6,888	1,059	-2,275	52,868	30,114	2,275	32,389
1998	46,300	5,117	1,308	-2,914	49,810	31,056	2,914	33,970
1999	46,608	3,581	1,921	-3,369	48,741	31,785	3,369	35,154
2000	46,916	3,624	3,033	-3,704	49,869	32,410	3,704	36,114
2001	47,016	3,661	3,064	-4,013	49,728	33,043	4,013	37,056
2002	47,117	3,698	3,095	-4,286	49,623	33,626	4,286	37,912
2003	47,217	3,734	3,126	-4,487	49,590	34,164	4,487	38,652
2004	47,318	3,771	3,156	-4,621	49,625	34,668	4,621	39,288
2005	47,418	3,808	3,187	-4,689	49,724	35,143	4,689	39,832
2006	47,518	3,845	3,218	-4,695	49,887	35,598	4,695	40,293
2007	47,619	3,881	3,249	-4,639	50,110	36,039	4,639	40,679
2008	47,719	3,918	3,279	-4,524	50,393	36,473	4,524	40,997
2009	47,820	3,955	3,310	-4,350	50,735	36,905	4,350	41,255
2010	47,920	3,992	3,341	-4,117	51,136	37,342	4,117	41,458
2011	47,985	4,015	3,360	-3,825	51,535	37,787	3,825	41,612
2012	48,049	4,038	3,380	-3,559	51,907	38,243	3,559	41,803
2013	48,114	4,061	3,399	-3,230	52,344	38,708	3,230	41,938
2014	48,178	4,084	3,418	-2,836	52,844	39,187	2,836	42,023
2015	48,243	4,107	3,437	-2,379	53,409	39,684	2,379	42,063
2016	48,307	4,130	3,457	-1,857	54,037	40,206	1,857	42,063
2017	48,372	4,153	3,476	-1,270	54,731	40,757	1,270	42,027
2018	48,437	4,176	3,495	-618	55,490	41,341	618	41,959
2019	48,501	4,199	3,515	102	56,317	41,964	-102	41,862
2020	48,566	4,222	3,534	891	57,212	42,629	-891	41,738

7.3 Alternative equilibrium curves

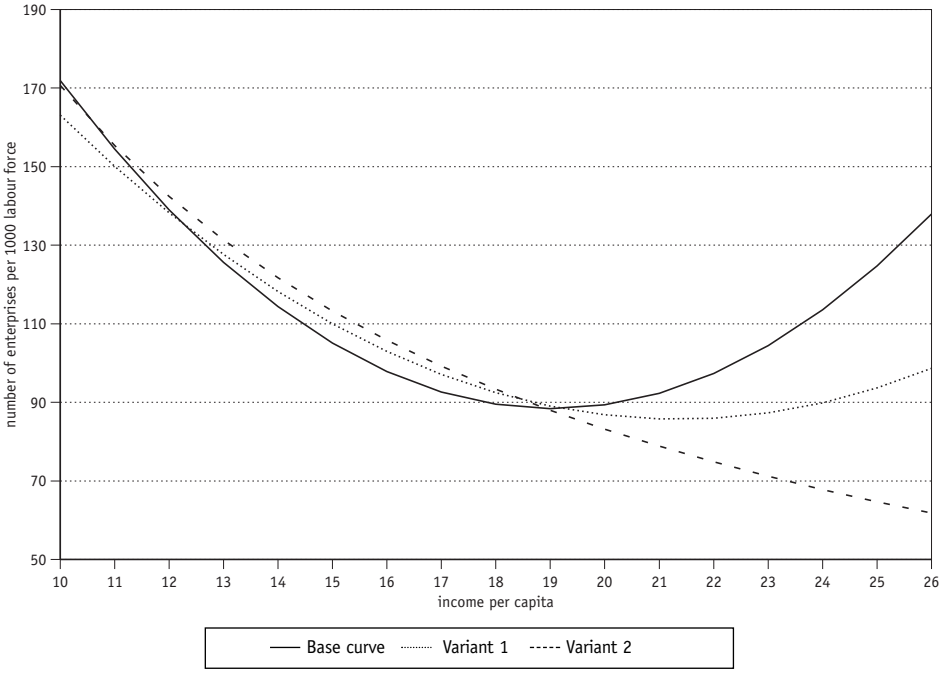
In this report, it is stressed that although there is much support for the concept of an equilibrium number of enterprises curve, the correct specification of this curve is hard to determine. Therefore, when simulations are made, it should be tested whether the impact of specifying an alternative curve alters the results. In particular the right hand tail of the curve is ambiguous, while the equilibrium self-employment rate is increasing rather dramatically with income per capita for the curve as assumed up to now. This right hand tail of the

curve is based on only a few observations, as most of the countries examined in Carree et al. (1999) had not (yet) reached the income per capita at which the number of enterprises per labour force is minimised. We will therefore study two alternative specifications in addition to the curve we dealt with earlier (and to which we will refer from now on as the 'base curve'):

1. Variant 1: the parameter of the quadratic term of the parabola is fixed at a smaller value in order to impose a 'flatter' curve.
2. Variant 2: instead of assuming a parabola, the parameters of a hyperbola are estimated.

The alternative curves are estimated using the same data as used by Carree et al. (1999). The estimated curves result in slightly less explained variance and all parameters are estimated significantly different from zero. Differences mainly affect future values, which will be important for our aim of scanning future entrepreneurship. For comparison, all three curves are plotted in Figure 7.1.

Figure 7.1 Three different specifications for the equilibrium relationship between income per capita and the self-employment rate



Whereas the realised number exceeded the base curve equilibrium by 1995, this is achieved one year later for the variants. From Figure 7.1, most important differences are to be expected for high income per

capita. This is of course of interest for our scenarios as the income per capita is expected to rise continuously after 1997.
Running our reference scenario with the alternative equilibrium curves results in the developments as plotted in Figure 7.2. The development of the number of enterprises is reasonably equal for the three alternatives until 2005. Starting from 2005, the simulated number diverges. This happens because the gap between the equilibrium and the realised number of enterprises is larger for the variants (as compared to the base curve), resulting in a higher error correction effect which negatively influences the number of enterprises. The difference between the base curve and variant 2 is nearly 150 000, a relative deviation of 16.7%. Variant 1 is in the middle of these two, as Figure 7.2 shows.

Figure 7.2 Simulated number of enterprises for the reference scenario using different equilibrium curve specifications

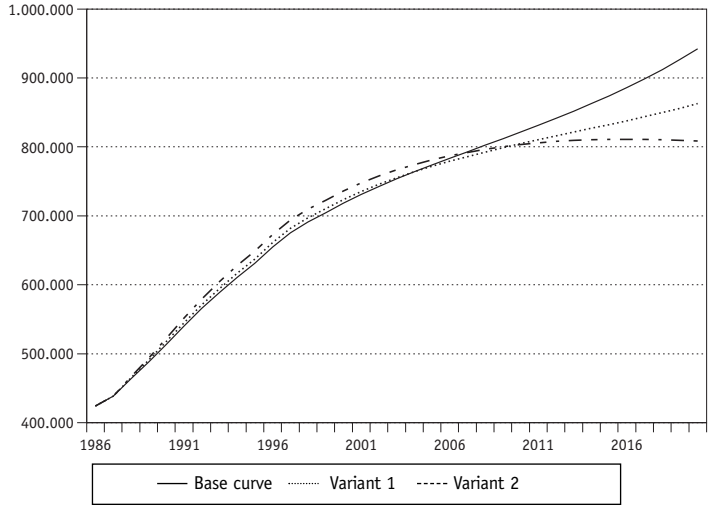


Table 7.2 shows that there are differences in entry and exit as well, as could be expected. Variant 1 produces lower entry and higher exit than the base curve and taken together this implies less net entry. This is caused by the error correction effects, as the gap between simulated and equilibrium number of enterprises is larger for variant 1. In this respect, variant 2 is even more deviant from the base curve results. From 2017 onwards, exit actually exceeds entry, resulting in negative net entry and thus in an absolute decrease in the number of enterprises. We can see these developments on the number of enterprises in Figure 7.2.

Table 7.2 Simulated entry and exit for the reference scenario, using different equilibrium curve specifications

	Entry			Exit		
	Base curve	Variant 1	Variant 2	Base curve	Variant 1	Variant 2
2000	49,869	49,035	50,086	36,114	36,033	36,962
2001	49,728	48,774	49,708	37,056	37,056	38,115
2002	49,623	48,534	49,342	37,912	38,000	39,185
2003	49,590	48,351	49,024	38,652	38,831	40,141
2004	49,625	48,222	48,749	39,288	39,563	40,995
2005	49,724	48,141	48,510	39,832	40,207	41,761
2006	49,887	48,106	48,305	40,293	40,770	42,447
2007	50,110	48,115	48,130	40,679	41,263	43,063
2008	50,393	48,166	47,980	40,997	41,692	43,617
2009	50,735	48,256	47,852	41,255	42,064	44,115
2010	51,136	48,385	47,745	41,458	42,385	44,565
2011	51,535	48,492	47,594	41,612	42,659	44,971
2012	51,907	48,560	47,392	41,803	42,963	45,402
2013	52,344	48,671	47,214	41,938	43,214	45,781
2014	52,844	48,825	47,055	42,023	43,416	46,113
2015	53,409	49,020	46,915	42,063	43,574	46,406
2016	54,037	49,255	46,790	42,063	43,694	46,662
2017	54,731	49,531	46,680	42,027	43,779	46,887
2018	55,490	49,847	46,582	41,959	43,832	47,084
2019	56,317	50,203	46,495	41,862	43,857	47,256
2020	57,212	50,600	46,418	41,738	43,857	47,407

8 A change in the economic growth rate

What will happen if there is an economic stagnation from 2000 onwards? Assume the income per capita grows with 0.5% from 2000 onwards instead of 1.5%. What are then the consequences for the number of enterprises in our model?

From Table 8.1, we see that there are major differences for the three alternative equilibrium curves.

- For the two parabolas (base curve and variant 1), the shock first results in an increase of the equilibrium number of enterprises, as this change takes place before the minimum, so the equilibrium falls when income per capita rises. The consequences for entry and exit are positive and negative respectively, as realised number of enterprises (still) exceed the equilibrium.

  This effect is reversed after the minimum of the parabola has been reached. As mentioned in the context of Figure 7.1, the minimum is reached at a later stage for variant 1, as compared to the base curve. After this reversion, the equilibrium is lower in comparison to the reference scenario (1.5 percent economic growth).

- For variant 2 (hyperbolic equilibrium curve), the equilibrium is higher compared to the reference scenario assumption of an increment of 1.5% for every year. Thus, entry will be increased, exit reduced and the total number of enterprises will therefore continuously increase in comparison to the reference scenario.

Table 8.1 Percentage differences resulting from a decrease of the income per capita growth rate with 1 percent point.

	Base curve			Variant 1			Variant 2		
	Firms	Entry	Exit	Firms	Entry	Exit	Firms	Entry	Exit
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.01	0.10	-0.13	0.04	0.31	-0.41	0.06	0.47	-0.61
2002	0.03	0.13	-0.15	0.11	0.57	-0.69	0.18	0.91	-1.09
2003	0.04	0.08	-0.08	0.21	0.78	-0.88	0.34	1.33	-1.47
2004	0.03	-0.03	0.07	0.31	0.95	-0.98	0.54	1.73	-1.76
2005	0.00	-0.22	0.30	0.43	1.07	-1.01	0.77	2.10	-1.99
2006	-0.06	-0.48	0.59	0.55	1.14	-0.97	1.03	2.46	-2.15
2007	-0.16	-0.81	0.94	0.66	1.17	-0.88	1.32	2.81	-2.27
2008	-0.30	-1.21	1.35	0.76	1.14	-0.75	1.63	3.13	-2.35
2009	-0.49	-1.69	1.81	0.85	1.07	-0.56	1.96	3.45	-2.39
2010	-0.74	-2.24	2.31	0.92	0.95	-0.34	2.31	3.75	-2.40
2011	-1.06	-2.86	2.86	0.97	0.78	-0.08	2.67	4.04	-2.38
2012	-1.43	-3.55	3.44	0.98	0.55	0.22	3.05	4.31	-2.32
2013	-1.88	-4.30	4.05	0.96	0.27	0.54	3.43	4.57	-2.24
2014	-2.40	-5.12	4.69	0.90	-0.05	0.90	3.83	4.82	-2.15
2015	-2.99	-6.01	5.37	0.81	-0.43	1.28	4.24	5.06	-2.04
2016	-3.67	-6.96	6.09	0.66	-0.86	1.68	4.66	5.30	-1.92
2017	-4.42	-7.98	6.84	0.47	-1.34	2.10	5.08	5.52	-1.79
2018	-5.25	-9.05	7.62	0.23	-1.88	2.55	5.51	5.74	-1.65
2019	-6.17	-10.18	8.43	-0.08	-2.46	3.02	5.94	5.95	-1.51
2020	-7.17	-11.37	9.28	-0.44	-3.10	3.51	6.38	6.15	-1.36

Figure 8.1 Effects of a 1% point decrease in the income per capita growth rate, base equilibrium curve

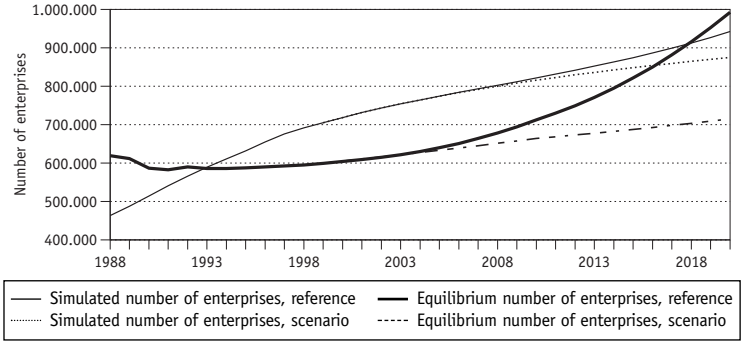


Figure 8.2 Effects of a 1% point decrease in the income per capita growth rate, variant 1

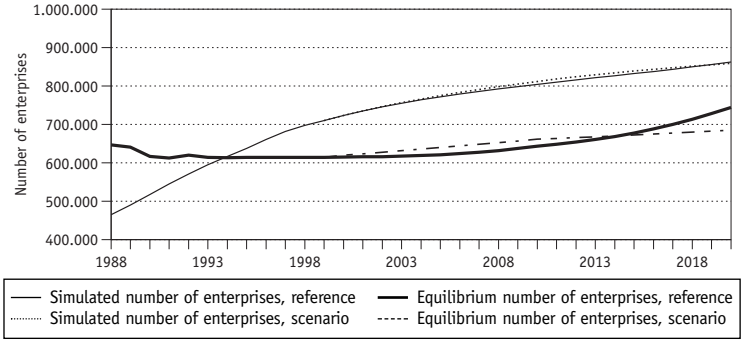
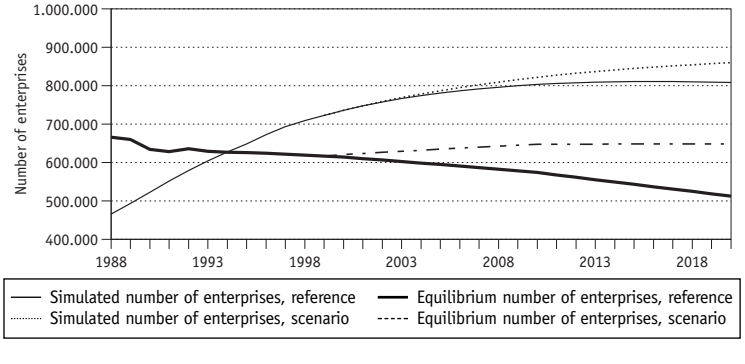


Figure 8.3 Effects of a 1% point decrease in the income per capita growth rate, variant 2



9 A change in the error correction parameters

What will happen if the assumed error corrections are larger than the ones used in the base line model? As a sensitivity exercise, the error correction parameters are doubled from 2000 onwards.

At first, entry will decrease while exit will increase. Both effects are direct results of the higher error correction parameter values. This means that net entry decreases and so does the simulated number of enterprises. This has two indirect effects:

1. The gap between equilibrium and realised number of enterprises becomes smaller. This means that, after a while, the total error correction effect may be diminished, even though the parameter itself has been raised!

2. The decrease of the number of enterprises has a negative influence on exit. This lagged negative effect dominates the positive effect of the high error correction and results in reduced exit.

Table 9.1: in all three alternatives it is observed that initially entry decreases and exit increases as compared to the reference models. Due to the indirect effects mentioned, these developments are reversed. The reversion is strongest for exit, because exit is affected by the second indirect effect and entry is not. Comparing the three variants, it becomes clear that the specification of the equilibrium curve does matter when scanning future numbers of enterprises, entry and exit. To see the effects of the increased error correction graphically, see Figures 9.1 - 9.4.

The main general long term effect is, of course, that using higher error correction parameters makes the simulated number of enterprises 'oscillate' closer to the equilibrium level. In the model with the base curve, the number of entrepreneurs from the model with increased error correction effects even exceeds the number in the reference model after 2020. This is caused by the rapidly increasing equilibrium curve, resulting in high positive net entry (due to high large error correction parameters).

Table 9.1 Percentage differences resulting from an increase of the error correction effects with 100%

	Base curve			Variant 1			Variant 2		
	Firms	Entry	Exit	Firms	Entry	Exit	Firms	Entry	Exit
2000	-1.03	-7.43	10.26	-0.93	-6.84	9.31	-1.01	-7.41	10.04
2001	-1.92	-7.03	8.51	-1.77	-6.79	8.10	-1.95	-7.53	8.92
2002	-2.69	-6.65	7.00	-2.54	-6.74	7.04	-2.83	-7.66	7.93
2003	-3.35	-6.22	5.60	-3.24	-6.63	6.00	-3.66	-7.72	6.97
2004	-3.90	-5.75	4.30	-3.87	-6.45	5.01	-4.43	-7.73	6.05
2005	-4.35	-5.23	3.09	-4.44	-6.23	4.07	-5.14	-7.71	5.18
2006	-4.69	-4.69	1.97	-4.93	-5.97	3.18	-5.81	-7.67	4.37
2007	-4.95	-4.12	0.92	-5.36	-5.69	2.35	-6.43	-7.61	3.61
2008	-5.11	-3.53	-0.06	-5.72	-5.38	1.57	-7.01	-7.54	2.92
2009	-5.18	-2.92	-0.98	-6.03	-5.05	0.84	-7.55	-7.46	2.27
2010	-5.17	-2.29	-1.83	-6.27	-4.71	0.15	-8.05	-7.39	1.68
2011	-5.08	-1.66	-2.64	-6.46	-4.36	-0.49	-8.52	-7.33	1.14
2012	-4.93	-1.16	-3.20	-6.62	-4.15	-0.92	-8.98	-7.43	0.79
2013	-4.72	-0.62	-3.77	-6.73	-3.89	-1.36	-9.43	-7.49	0.43
2014	-4.45	-0.04	-4.35	-6.81	-3.59	-1.82	-9.86	-7.53	0.07
2015	-4.12	0.58	-4.94	-6.83	-3.26	-2.28	-10.27	-7.55	-0.29
2016	-3.73	1.23	-5.52	-6.82	-2.89	-2.73	-10.67	-7.55	-0.64
2017	-3.28	1.90	-6.10	-6.75	-2.50	-3.18	-11.05	-7.56	-0.97
2018	-2.76	2.60	-6.67	-6.64	-2.08	-3.61	-11.42	-7.55	-1.28
2019	-2.19	3.31	-7.23	-6.48	-1.64	-4.04	-11.77	-7.55	-1.58
2020	-1.57	4.04	-7.78	-6.27	-1.18	-4.46	-12.11	-7.54	-1.86

Figure 9.1 Effects of an increase in the error correction for the number of enterprises, base equilibrium curve

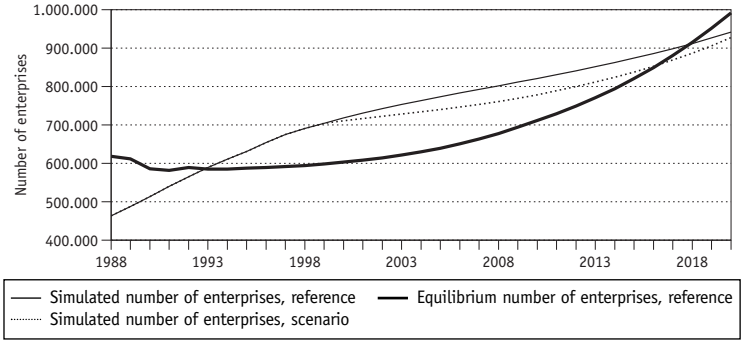


Figure 9.2 Effects of an increase in the error correction for the number of enterprises, variant 1

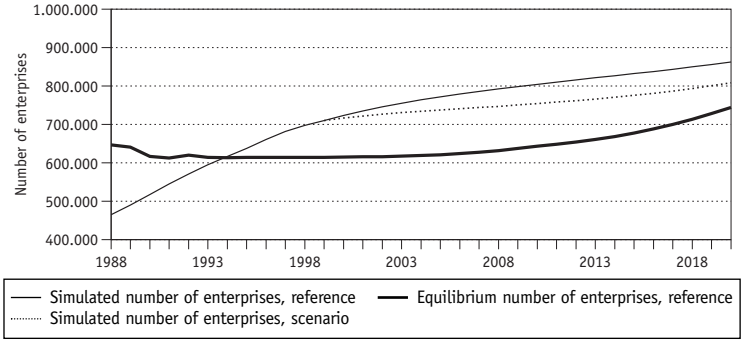


Figure 9.3 Effects of an increase in the error correction for the number of enterprises, variant 2

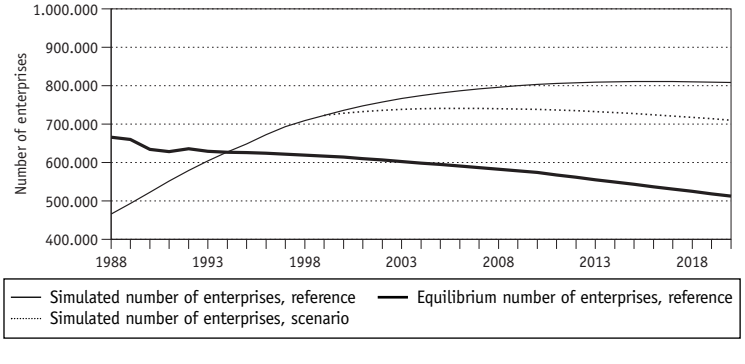
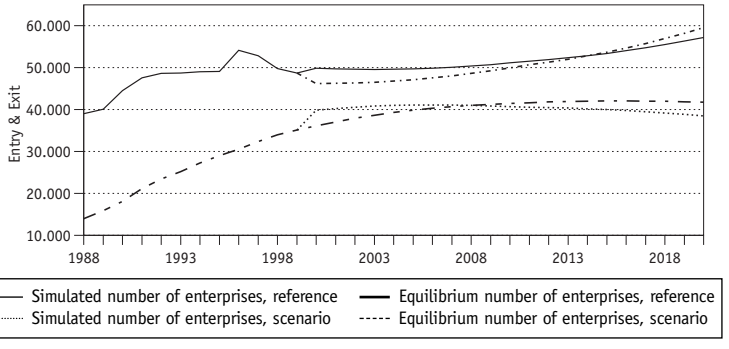


Figure 9.4 Effects of an increase in the error correction for entry and exit, base curve



10 Changes in the propensities to start up a business

Relevant in the context of economic policy is to study the effects of increasing or decreasing propensities to start up a business. We will run simulations using the following scenarios:

An increase in the propensities to start up a business for people younger than 25 years
There is little attention for entrepreneurship in Dutch education programs in comparison to the UK and the USA. Extension of the teaching of 'enterprise' in The Netherlands may invoke the attraction of entrepreneurship to rise for younger people. What are then the consequences on the macro-level?

An increase in the propensities to start up a business for women
For the future, the female share in labour force is expected to rise. In the reference scenario, the female propensities to start up a business are assumed to remain at their comparatively low level (compared to males). It is conceivable that these propensities will rise as well as a part of more general tendency to labour market emancipation.

An increase in the propensities to start up a business for people older than 39 years
As mentioned in Chapter 6, the share of older people in labour force will be very large in the future. The people in this group are – from 2000 onwards – for an important part people that belonged to the category 25-39 in 1994, the category with the highest propensity to start up a business in that year. If there is a cohort effect involved here, then an increase in the propensities to start up a business for people older than 39 years from 2000 onwards is an interesting scenario.

These three scenarios will be computed for all three alternatives of the equilibrium curve, as described in Chapter 7.

10.1 Increase in propensity to start up a business for young people

Suppose the propensity to start up a business has increased with 20% from 2000 onwards for the two youngest groups, these are men and women below the age of 25. Increase of this group of potential entrepreneurs may be achieved by means of extensive educational attention for entrepreneurship[1].

1 Van der Kuip (1998) deals with this subject comprehensively.

Table 10.1 Percentage differences resulting from an increase of 20% for the propensities to start up a business for people younger than 25 years

	Base curve			Variant 1			Variant 2		
	Firms	Entry	Exit	Firms	Entry	Exit	Firms	Entry	Exit
2000	0.10	1.48	0.00	0.10	1.47	0.00	0.10	1.47	0.00
2001	0.19	1.44	0.16	0.19	1.43	0.16	0.19	1.44	0.16
2002	0.27	1.40	0.30	0.26	1.40	0.29	0.26	1.41	0.29
2003	0.33	1.37	0.41	0.32	1.37	0.40	0.32	1.38	0.40
2004	0.39	1.34	0.51	0.38	1.35	0.50	0.38	1.36	0.49
2005	0.44	1.31	0.60	0.43	1.32	0.58	0.43	1.34	0.57
2006	0.48	1.29	0.68	0.47	1.30	0.65	0.47	1.33	0.64
2007	0.51	1.26	0.74	0.51	1.29	0.72	0.51	1.31	0.70
2008	0.54	1.24	0.80	0.54	1.27	0.77	0.55	1.30	0.75
2009	0.57	1.22	0.86	0.57	1.25	0.82	0.58	1.29	0.80
2010	0.59	1.20	0.90	0.59	1.24	0.86	0.61	1.28	0.84
2011	0.61	1.17	0.95	0.61	1.21	0.90	0.63	1.26	0.88
2012	0.62	1.13	0.98	0.63	1.19	0.94	0.65	1.24	0.90
2013	0.63	1.11	1.01	0.64	1.16	0.96	0.67	1.22	0.93
2014	0.64	1.08	1.04	0.65	1.14	0.99	0.68	1.21	0.95
2015	0.65	1.05	1.07	0.66	1.12	1.01	0.70	1.19	0.97
2016	0.65	1.02	1.09	0.67	1.09	1.02	0.71	1.18	0.98
2017	0.65	0.99	1.11	0.67	1.07	1.04	0.72	1.16	0.99
2018	0.65	0.97	1.12	0.68	1.05	1.05	0.73	1.15	1.00
2019	0.64	0.94	1.14	0.68	1.03	1.06	0.73	1.14	1.01
2020	0.63	0.92	1.15	0.68	1.01	1.07	0.74	1.13	1.01

The number of entries increases as a result of the extra educational attention for entrepreneurship. However, exit increases as well. This effect is indirect: as the number of start-ups increases, the direct effect is the increase of the number of enterprises and this makes the number of exits to increase. However, both the entry increase and the exit increase are marginal. For the year 2020, the total number of enterprises rises with less than one percent for all three alternatives.

10.2 Increase in propensity to start up a business for women

In addition to the expected increasing female share in labour force as a result of labour market emancipation, it could be that women may be more attracted to entrepreneurship in future years. For the reference scenario, the propensities to start up a business were calculated in 1994 at a comparatively low level (compared to males) and held constant afterwards. The results of an increase of 20% from 2000 onwards are printed in Table 10.2.

Figure 10.1 Effects of an increase in the propensities to start up a business for young people, base equilibrium curve

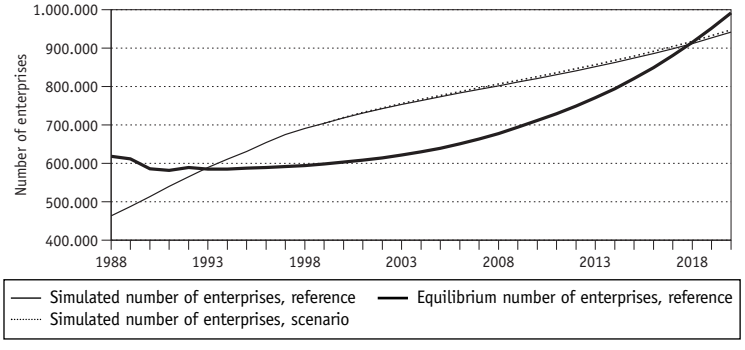


Figure 10.2 Effects of an increase in the propensities to start up a business for young people, variant 1

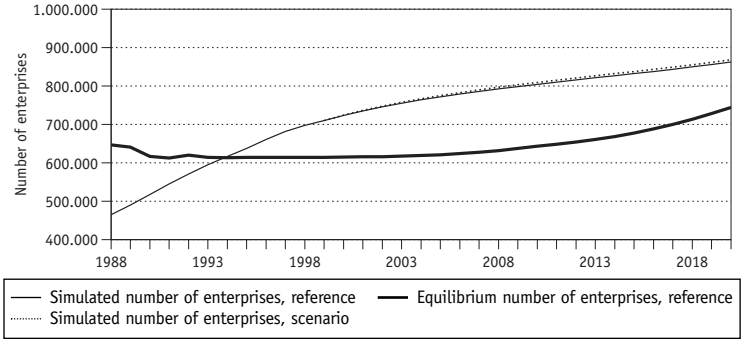


Figure 10.3 Effects of an increase in the propensities to start up a business for young people, variant 2

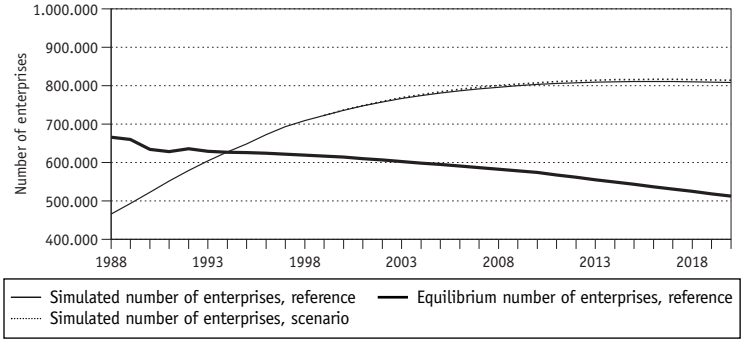


Table 10.2 Percentage differences resulting from an increase of 20% for the propensities to start up a business for women

	Base curve			Variant 1			Variant 2		
	Firms	Entry	Exit	Firms	Entry	Exit	Firms	Entry	Exit
2000	0.10	1.48	0.00	0.10	1.47	0.00	0.10	1.47	0.00
2000	0.40	5.71	0.00	0.38	5.68	0.00	0.39	5.68	0.00
2001	0.74	5.60	0.62	0.72	5.58	0.61	0.72	5.60	0.60
2002	1.04	5.51	1.15	1.01	5.50	1.13	1.01	5.53	1.12
2003	1.30	5.42	1.61	1.26	5.44	1.57	1.27	5.48	1.55
2004	1.52	5.35	2.01	1.49	5.38	1.95	1.50	5.44	1.93
2005	1.72	5.28	2.36	1.69	5.33	2.29	1.70	5.41	2.25
2006	1.89	5.22	2.68	1.86	5.29	2.59	1.88	5.38	2.54
2007	2.05	5.16	2.95	2.02	5.25	2.85	2.05	5.37	2.79
2008	2.18	5.11	3.21	2.16	5.23	3.08	2.19	5.36	3.01
2009	2.30	5.06	3.43	2.28	5.20	3.29	2.33	5.36	3.21
2010	2.40	5.01	3.64	2.39	5.18	3.48	2.45	5.36	3.38
2011	2.48	4.95	3.83	2.49	5.14	3.65	2.56	5.35	3.54
2012	2.56	4.90	4.00	2.58	5.12	3.80	2.66	5.36	3.68
2013	2.62	4.85	4.16	2.65	5.10	3.94	2.75	5.37	3.80
2014	2.67	4.80	4.30	2.72	5.07	4.07	2.84	5.38	3.91
2015	2.71	4.74	4.44	2.78	5.05	4.19	2.92	5.39	4.02
2016	2.74	4.69	4.56	2.84	5.03	4.30	3.00	5.41	4.11
2017	2.77	4.64	4.69	2.88	5.01	4.40	3.07	5.43	4.20
2018	2.79	4.58	4.80	2.92	4.99	4.50	3.13	5.45	4.28
2019	2.80	4.53	4.92	2.96	4.96	4.59	3.20	5.48	4.35
2020	2.80	4.47	5.03	2.99	4.94	4.68	3.26	5.50	4.42

Table 10.2 shows a similar pattern as in the previous exercise, the effects being somewhat higher now. Differences between the alternatives are not spectacular.

10.3 Increase in propensity to start up a business for older groups

A characteristic of our reference scenario was the effect of ageing. Assuming the same propensities to start up a business as in 1994, this effect resulted in relatively less enterprises. However, future senior citizens may be more attracted to entrepreneurship than present ones. This may be due to a cohort effect, but also to a more entrepreneurial public opinion or to less attractive social security benefits for older people loosing their jobs in restructuring. As the share of people older than 39 years in the labour force will become high in the future, increasing the propensities to start up a business for this group may have considerable effects. The results of an increase of 20% for this group from 2000 onwards are presented in Table 10.3.

Figure 10.4 Effects of an increase in the propensities to start up a business for women, base equilibrium curve

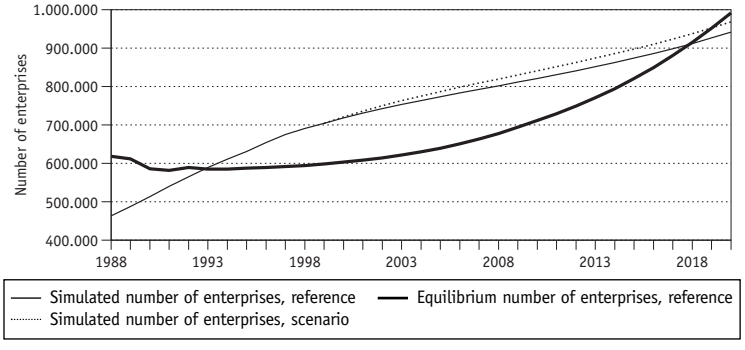


Figure 10.5 Effects of an increase in the propensities to start up a business for women, variant 1

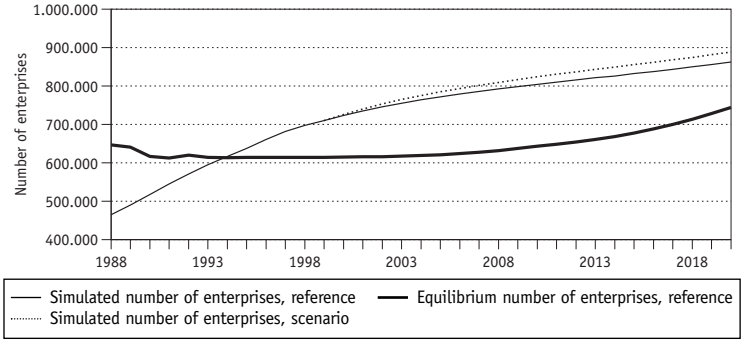


Figure 10.6 Effects of an increase in the propensities to start up a business for women, variant 2

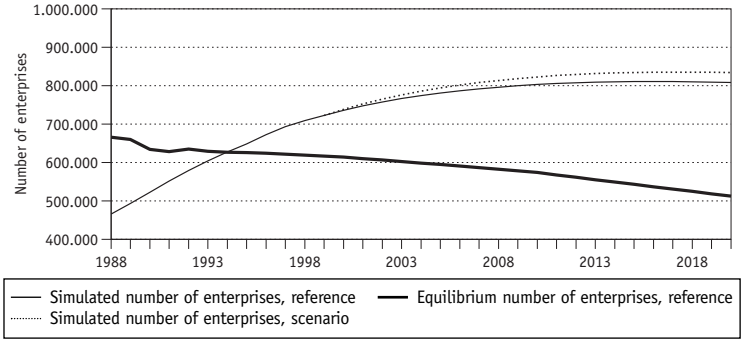


Table 10.3 Percentage differences resulting from an increase of 20% for the propensities to start up a business for people older than 39 years

	Base curve			Variant 1			Variant 2		
	Firms	Entry	Exit	Firms	Entry	Exit	Firms	Entry	Exit
2000	0.49	7.00	0.00	0.47	6.96	0.00	0.47	6.96	0.00
2001	0.91	6.96	0.76	0.89	6.94	0.75	0.89	6.95	0.74
2002	1.29	6.94	1.42	1.25	6.93	1.39	1.26	6.97	1.38
2003	1.62	6.93	2.01	1.58	6.94	1.95	1.59	7.00	1.93
2004	1.92	6.92	2.52	1.88	6.96	2.45	1.89	7.04	2.41
2005	2.19	6.92	2.98	2.14	6.99	2.89	2.16	7.09	2.84
2006	2.43	6.93	3.40	2.39	7.02	3.29	2.41	7.15	3.23
2007	2.64	6.94	3.79	2.61	7.06	3.65	2.64	7.22	3.57
2008	2.84	6.95	4.14	2.81	7.11	3.98	2.85	7.29	3.89
2009	3.01	6.96	4.47	2.99	7.16	4.28	3.05	7.37	4.17
2010	3.17	6.97	4.78	3.16	7.21	4.57	3.24	7.46	4.44
2011	3.30	6.80	5.07	3.31	7.07	4.83	3.40	7.36	4.68
2012	3.41	6.65	5.31	3.43	6.95	5.05	3.54	7.27	4.89
2013	3.49	6.50	5.54	3.54	6.84	5.25	3.67	7.20	5.06
2014	3.56	6.36	5.73	3.63	6.73	5.42	3.78	7.13	5.22
2015	3.61	6.22	5.91	3.70	6.62	5.58	3.88	7.07	5.35
2016	3.64	6.08	6.07	3.76	6.52	5.71	3.97	7.02	5.47
2017	3.66	5.95	6.22	3.81	6.43	5.83	4.05	6.97	5.57
2018	3.67	5.82	6.35	3.85	6.33	5.94	4.13	6.92	5.65
2019	3.66	5.69	6.48	3.88	6.24	6.04	4.19	6.88	5.73
2020	3.65	5.56	6.59	3.90	6.15	6.13	4.25	6.85	5.80

In comparison with the increase in propensities to start up a business for younger people, the ultimate effects are higher for the older groups, as this group is greater in size. It should be noted that the model used does not specify difference between older entrepreneurs and younger ones at the exit side. On the one hand, survival in the first years may be better for older people as they may be better to assess the risks involved in starting an enterprise. On the other hand, young enterprise founders may remain entrepreneurs for a long time in spite of possible early exits. They often start up new businesses after an exit, the gained entrepreneurial experience helps them to perform better the next time.

Figure 10.7 Effects of an increase in the propensities to start up a business for older people, base equilibrium curve

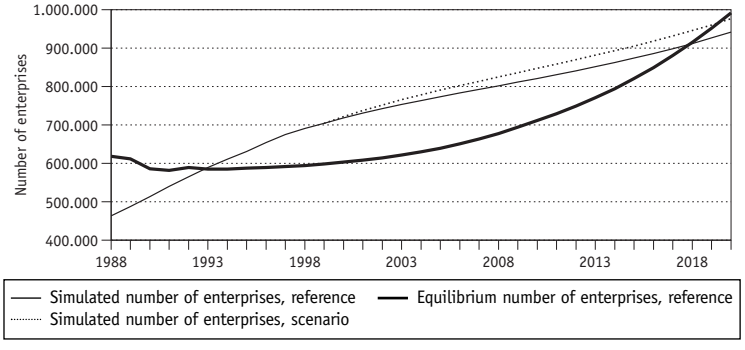


Figure 10.8 Effects of an increase in the propensities to start up a business for older people, variant 1

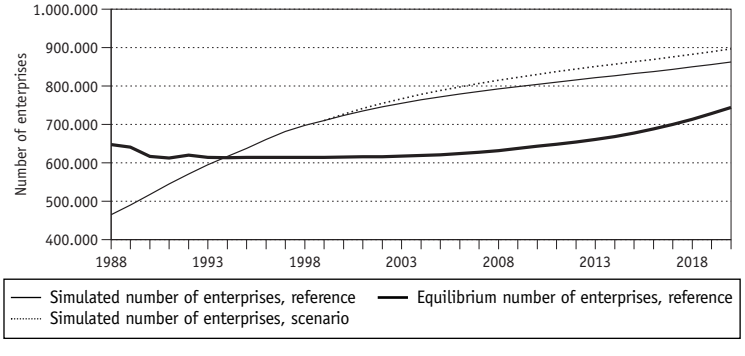
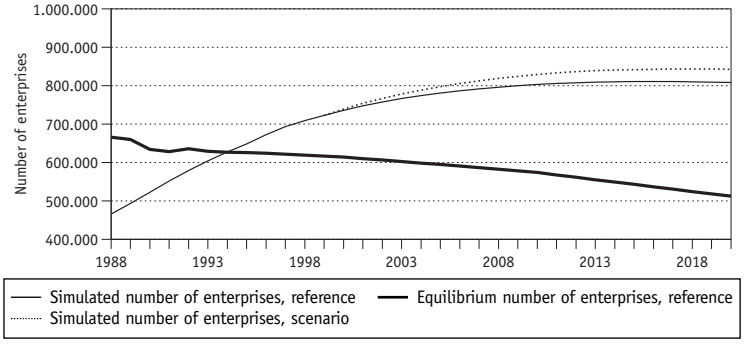


Figure 10.9 Effects of an increase in the propensities to start up a business for older people, variant 2



11 Reflections

In this study, we made a first attempt at modelling self-employment, in order to scan future entrepreneurship. In this preliminary respect, the purpose of the study is to serve as an eye-opener both in the technical sense and the qualitative sense. To reflect on the major findings of this study, we separate contributions, conclusions and our intentions for future research.

Contributions

- Application of the model by Carree et al. (1999) to The Netherlands. This model assumes a U-shaped equilibrium rate of self-employment as related to income per capita. Additionally, it is assumed that in a market economy there will be underlying forces to restore equilibrium.
- Adding gross entry and gross exit in modelling self-employment. To understand the dynamics of enterprise behaviour, this addition is essential.
- Adding subsidiary enterprises. Development of the number of starting subsidiary enterprises has shown significant differences compared to the developments of the new start-ups.
- Adding demographic features. Future demography may seriously influence the supply side of entrepreneurship. Relevant features for The Netherlands are the future ageing process and the increasing labour participation of women.
- Analysis of long term properties of self-employment models. Doing sensitivity analyses and investigating the effects of policy measures is a useful tool in exploring the future of self-employment.

Conclusions

- Modelling self-employment is feasible. The assumption of an equilibrium rate of self-employed is essential in setting up stable models. Using the equilibrium rate, the substantial rise of the number of enterprises can be partly be explained by an overtaking manoeuvre. For the future, the number of enterprises is expected to rise at a slower rate, because the gap between equilibrium and realised number has been diminished or even reversed. The notion that an equilibrium should be implemented in modelling the number of self-employed has been strengthened, as significant parameters were obtained in the estimations.
- The static model with a constant net entry shows a huge, unrealistic number of enterprises in the future. More in general, explanatory models with net entry rate as the variable to be explained can

probably not hold for longer periods and should only be used for short-term analyses or cross-sectional studies.
- The correct specification of the equilibrium curve is still hazardous. The next years will show what will happen after the assumed minimum, as income per capita will rise. To account for this uncertainty, it is necessary to model these uncertainties as scenarios.
- The equilibrium approach implies that continued stimulation of entry may come at the cost of exits, more than in previous years. The challenge is therefore to induce entry increment particularly in a qualitative respect, not only in a quantitative one.
- Demographic features of the labour force are also relevant for the future number of self-employed. If the propensities to start up a business remain the same, less entries will be observed due to the ageing effect. Of course these propensities may in fact not be constant and may be influenced by government policy as well.

Future research

Although much insight is gained, the models used are too simple yet to draw conclusions from their scenarios. More determinants should be added and the possibilities of interaction between variables should be investigated as well. The intended elaborations are the following:
- Improvement of the theoretical underpinning of the equations describing supply, demand and equilibrium rate of self-employment. Improvement of the calibration techniques[1] to be used.
- Further researching the shape of the equilibrium curve. Further efforts have to be made to study this shape. The availability of new data in the future will be helpful to this study.
- Improvement of the models by continuing to specify, estimate and test the models of the type as described in this study. Developing the used shock-scenarios towards more sophisticated, integrated scenarios.
- Making a first attempt to include equations modelling the consequences of self-employment.
- Make a sectoral approach. Distinguishing differences between sectors will improve the quality of the models seriously. Specifying equilibrium rates of self-employment on the sector level will be

1 Calibration, as is done in Model 4, will probably be the technique that is to be used in modelling self-employment. We can look for analogies to the business cycle models – with Kydland and Prescott as its main practitioners – in which calibration is done as well. Especially in the field of methodology, there are opponents and advocators to the technique applied in these business cycle models. The opponents apply the standard view of model building, i.e. a sharp distinction between the context of discovery (model building) and the context of justification (model testing). Most recent developments in the methodology literature reveal an increasing positive attitude towards calibration as an example of model building where justification is built in.

difficult though. It is by all means necessary to derive an acceptable macro-model first.

Literature

Acs, Z.J., D.J. Audretsch and D.S. Evans (1994), *The determinants of variations in self-employment rates across countries and over time*.

Agarwal, R. and M. Gort (1996), The evolution of markets and entry, exit and survival of enterprises, *Review of Economics and Statistics* 78, 489-498.

Audretsch, D.B. and A.R. Thurik (1998), *The knowledge society, entrepreneurship and unemployment*, Research Report 9801/E, Zoetermeer: EIM.

Baljé, S.H. and I.R. Verdonkschot (1998), Ondernemerschap in Nederland *(Self-employment in The Netherlands, in Dutch)*, *Economisch Statistische Berichten,* 5-6-1998, 464-466.

Blau, David, 1987,*'A time-series analysis of self-employment in the United States'*, Journal of Political Economy, 95, pp. 59-68.

Blanchflower, D.G.and A.J. Oswald (1998), What makes an Entrepeneur, *Journal of Labour Economics,* 1998 vol. 16 no.1, 27-60.

Bosma, N.S. and W.S. Zwinkels (1999*), Determinanten voor toe- en uittreding van ondernemers (Determinants of entry and exit of self-employed, in Dutch)*, Zoetermeer: EIM.

Brockhaus, R., 1982, The psychology of the entrepreneur, in: C. Kent, D. Sexton and K. Vesper (eds.), *Encyclopedia of Entrepreneurship*, Prentice-Hall Inc., Englewood Cliffs, NJ.

Brüderl, J. and P. Preisendörfer (1998), Network Support and the Success of Newly Founded Business, *Small Business Economics* 10, 213-225.

Carlsson, B. (1989), The evolution of manufacturing technology and its impact on industrial structure: an international study, *Small Business Economics*, Vol. 1, pp. 21-37.

Carree, M.A., A. van Stel, A.R. Thurik and A.R.M. Wennekers (1999), *Business ownership and economic growth; an empirical research,* forthcoming Research Report, Zoetermeer: EIM.

Carree, M.A. and A.R. Thurik (1996), Entry and Exit in Retailing: Incentives, Barriers, Displacement and Replacement, *Review of Industrial Organization*, 11, 155-172.

Carree, M.A. and A.R. Thurik (1999), Carrying capacity and entry and exit flows in retailing, *International Journal of Industrial Organization*, forthcoming.

Casson (1995), *Entrepreneurship and business culture, studies in the economics of trust*, Vol. 1, Edward Elgar.

CBS/CPB (1997), *Bevolking en arbeidsaanbod: drie scenarios tot 2020 (Population and labour supply: three scenarios until 2020, in Dutch)*, SdU Uitgevers, Den Haag.

Etzioni, A., 1987, Entrepreneurship, adaptation and legitimation: a macro-behavioral perspective, *Journal of Economic Behavior and Organization*, Vol. 8, 175-189.

Klepper, S. (1996), Entry, Exit, Growth and Innovation over the Product Life Cycle, *American Economic Review,* Vol.86 no. 3, 562-583.

Kuip, I. van der (1998), Early development of entrepreneurial Qualities, *Strategic Study B9802*, Zoetermeer: EIM.

Loveman, G. and W. Sengenberger (1991), The re-emergence of small-scale production; an international comparison, *Small Business Economics*, Vol. 3, pp. 1-37.

Lucas, R.E., Jr. 1978. On the Size Distribution of Business Enterprises, *Bell Journal of Economics,* **9,** 508-523.

OECD (1998), *Fostering entrepreneurship*, Paris.

Praag, C.M. van (1996), *Determinants of successful entrepreneurship*, Amsterdam: Thesis Publishers.

Siegfried, J.J., and L.B. Evans (1994), Empirical studies of entry and exit: a survey of the evidence, *Review of industrial organisation* 9, 121-155.

Wennekers, A.R.M. (1997), *The revival of entrepreneurship in the Netherlands,* Updated version of a paper presented at the EIIW Conference on business start-ups and SME-policy in Europe, Potsdam 13-14 March 1997, mimeo.

Wennekers, A.R.M. and A.R. Thurik (1999), Linking entrepreneurship and economic growth, *Small Business Economics* (forthcoming).

Wildeman, R.E., G. Hofstede, N.G. Noorderhaven, A.R. Thurik, H.J. Verhoeven and A.R.M. Wennekers (1998*), Culture's Role in Entrepreneurship; Self-Employment out of Dissatisfaction*, Research paper 9815, Rotterdam Institute for Business Economic studies, Erasmus University Rotterdam.

Wit, G. de, 1993, Models of self-employment in a competitive market, *Journal of Economic Surveys*, Vol. 7, no. 4, 367-397.

Appendix I: Used variables and indices

Variables

capital	capital intensity (share of depreciation in value added)
elab	realised number of enterprises per 1000 labour force
*elab**	equilibrium number of enterprises per 1000 labour force
en	number of entries during the current year, excluding subsidiaries
ent	realised number of enterprises at the end of the current year
*ent**	equilibrium number of enterprises at the end of the current year
ex	number of exits during the current year
exq	exit rate
ge	gross entry ($en + sub$)
geq	gross entry rate
gva^{act}	actual growth of value added
gva^{str}	structural growth of value added
intor	international orientation (share of export in total sales)
lab	labour force in thousands
liq	labour income quote
ne	net entry
neq	net entry rate (ne / ent_{-1})
pe	propensity to start up a business
p^{va}	price of production (value added)
prof	profitability of private business
u	unemployment in thousands
ulab	unemployment rate (u / lab)
w	wage cost per employee
ycap	income per capita, in thousands US dollar (price level 1990)

Indices

a	age
g	gender
i	sector
t	time

Appendix II: Data and assumptions for future values

Historical entrepreneurship data

Table II.1 Historical entrepreneurship data 1986-1997 for the Netherlands.

year	number of enterprises	entry	new subsidiaries	exits	net entry	enterprises per 1000 labour force	entry rate	exit rate	net entry rate
1986	424,410								
1987	438,352	25,094	4,238	15,389	9,705	76	5.91	3.63	2.29
1988	453,131	25,833	5,376	16,430	9,403	78	5.89	3.75	2.15
1989	470,277	27,060	6,497	16,412	10,649	80	5.97	3.62	2.35
1990	488,154	27,815	7,035	16,972	10,843	81	5.91	3.61	2.31
1991	508,015	30,562	7,348	18,049	12,514	84	6.26	3.70	2.56
1992	528,863	32,969	8,763	20,884	12,085	86	6.49	4.11	2.38
1993	550,025	35,111	9,415	23,366	11,746	88	6.64	4.42	2.22
1994	573,968	39,061	11,305	26,423	12,638	91	7.10	4.80	2.30
1995	601,437	41,530	14,557	28,617	12,912	94	7.24	4.99	2.25
1996	629,145	39,559	16,760	28,611	10,948	97	6.58	4.76	1.82
1997	656,037	40,139	18,195	31,442	8,697	100	6.38	5.00	1.38

Assumptions

Simulation is run for the period 1987-2020. The assumptions made with respect to exogenous variables for the period after 1997 are listed in Table II.2. Resulting values for the period 1986-2020 are printed in Table II.3.

Table II.2 Assumptions for future values (1998-2020) of the determinants in computing the reference scenario

Variable	Assumption for 1998-2020
subsidiaries	yearly 1.5 percent increase
income per capita	yearly 1.5 percent increase
labour income quote	fixed at the measured value of 1998
unemployment rate	fixed at 7 percent
population	rise from 15.5 million in 1998 to 16.9 million in 2010 and to 17.7 million in 2020
labour force	rise from 6.7 million in 1998 to 7.5 million in 2010 and to 7.9 million in 2020, distinguished by age and gender

Value $\overline{ulab}$: (weighted average of unemployment rates over western countries): 5.6%
Value $\overline{liq}$: (weighted average of labour income quoteover western countries): 0.851

Table II.3 Exogenous variables 1986-2020 for the Netherlands

	labour force in thousands	income per capita in $1000, price level 1990	labour income quote	unemploy-ment in thousands	unemploy-ment rate (%)
1986	5,651	14,470	0.860	475	8.4
1987	5,751	14,759	0.867	486	8.5
1988	5,830	14,867	0.842	490	8.4
1989	5,897	15,164	0.810	452	7.7
1990	5,993	15,995	0.807	419	7.0
1991	6,066	16,315	0.824	400	6.6
1992	6,182	16,433	0.845	411	6.6
1993	6,246	16,763	0.865	481	7.7
1994	6,315	16,994	0.840	547	8.7
1995	6,409	17,249	0.842	533	8.3
1996	6,495	17,508	0.840	494	7.6
1997	6,574	17,770	0.835	438	6.7
1998	6,651	18,037	0.826	466	7.0
1999	6,732	18,307	0.826	471	7.0
2000	6,813	18,582	0.826	477	7.0
2001	6,882	18,861	0.826	482	7.0
2002	6,951	19,144	0.826	487	7.0
2003	7,020	19,431	0.826	491	7.0
2004	7,089	19,722	0.826	496	7.0
2005	7,159	20,018	0.826	501	7.0
2006	7,228	20,318	0.826	506	7.0
2007	7,297	20,623	0.826	511	7.0
2008	7,366	20,932	0.826	516	7.0
2009	7,435	21,246	0.826	520	7.0
2010	7,504	21,565	0.826	525	7.0
2011	7,547	21,889	0.826	528	7.0
2012	7,591	22,217	0.826	531	7.0
2013	7,634	22,550	0.826	534	7.0
2014	7,677	22,888	0.826	537	7.0
2015	7,721	23,232	0.826	540	7.0
2016	7,764	23,580	0.826	543	7.0
2017	7,807	23,934	0.826	546	7.0
2018	7,850	24,293	0.826	550	7.0
2019	7,894	24,657	0.826	553	7.0
2020	7,937	25,027	0.826	556	7.0

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