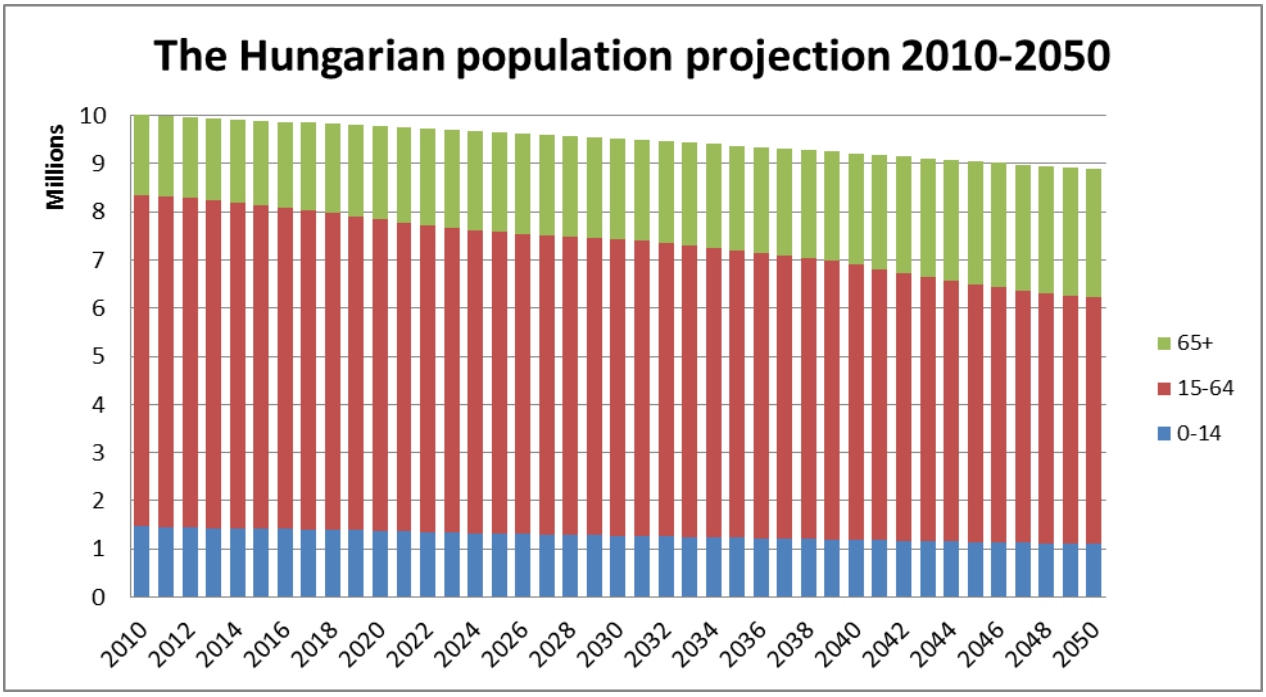
Economically active population projections for Hungary: labour force participation and the demographic loss of working age population



Source: Demographic Research Institute, 2012

Master Thesis Population Studies

Jelmer Dekker
University of Groningen
Population Research Centre
August 2012

Economically active population projections for Hungary: labour force participation and the demographic loss of working age population

Master Thesis Population Studies

Name: Jelmer Dekker
Email: jelmerdekker@hotmail.com
Student number: s1396706
Supervisor: Prof. dr C. H. Mulder
2nd Supervisor: Prof. dr. L.J.G. van Wissen
Date: August 2012
Organization: University of Groningen; Faculty of Spatial Sciences; Population Research Centre

Preface

One of the reasons to choose for the Population Studies master is my interest in population ageing, its causes and the various consequences of the greying of the population for policy makers, economists and of course demographers.
After acquiring the necessary skills in quantitative and qualitative research during a variety of courses in the Masters programme, the choice for a quantitative approach was made. Its subject: population ageing and its consequences for the economically active population.

The research area is Hungary, where I, as part of my previous master of Economic Geography, have followed courses and have written my previous thesis between February and June 2010. Here, the population decrease has been visible in the demographic statistics since the 1980s already, with population ageing to strengthen in the upcoming decennia, this is an interesting case for a demographer.

As population ageing involves changes in the size and the structure of the population, the participation rates, employment rates and economically active population are also affected. These rates and populations are important for the continuity of the government expenditures, as most governmental systems rely on the active population to pay for the pensions and social security.
The demographic effects on the sustainability of the government's expenditure were strengthened by the financial crisis, which made European governments introduce sobering social security and change pension systems. These changes are aimed at increased labour force participation, which, together with an increase in retirement age, are the proposed solutions for the population ageing effect.
These effects are studied in this thesis, as projections of the working age population with differing participation rates are resulting in different sizes and structures of the economically active population.

This thesis would not have been finished without the help of some persons and institutions which I would like to thank here. The data for the population projections were provided by Ms Földházi and Mr Spéder, both from the Demographic Research Institute, which is part of the Hungarian Central Statistical Office (HCSO). The HCSO also provided the necessary participation data in their online database.
The developments on the Hungarian labour market were strongly based on reports from the Institute of Economics at the Hungarian Academy of Science, whereafter Márton Czirfusz provided insight into the most recent developments.

Closer to home, my parents, friends, family and close relatives deserve to be mentioned, as they unconditionally supported me through the first and last stages of this thesis.
I am also very thankful for the PRC staff, where dr. F. Janssen's optimism was very helpful, dr. L. Meijering for her support on the research proposal and Prof. dr. L.J.G. van Wissen was available as 2nd supervisor.
Last, but definitely not least, I would like to thank my supervisor Prof. dr C. H. Mulder, who provided guidance and support in each step of the thesis and was always available for advice and clarification.

Groningen, August 2012

Jelmer Dekker

Summary

This thesis explores the possible effects of a rise in the labour participation of the Hungarian working age population on the economically active population. The fertility, mortality and migration developments over the last decennia have led to a decline in the population since 1982, which worsened by the system change in the beginning of the 1990s. The Demographic Research Institute's (2012) population projections show that the population decline continues into the future, leading to a decrease of both the working age and total population. The projection also shows a changing age structure, as the amount of elderly people increases and the number of young people decreases. The combined effect of these changes in the age structure will cause sustainability problems of the government expenditures, as an increasing amount of inactive people have to be supported by a declining active population.

The impact on the economically active population is calculated by multiplying the participation rates by the working age population. Therefore, five scenarios are created, each assuming a different development of the future participation rates, while the demographic developments are kept identical. These scenarios comprise changes in elderly, male, female or no change in participation levels.

The results show that all of the scenarios witness a strong decrease of the economically active population, which cannot be altered by any realistic value of the participation rate. The strongest decline in active population is visible when the current male and female participation levels are assumed to remain constant over time, while the smallest decline in active population occurs when the 1998-2011 participation trends are extrapolated until 2050. The effects of increased elderly participation are marginal.

The assumed rise of the working age participation rate, which is necessary to keep the government expenditures sustainable in the upcoming years, will strongly depend on the rise in labour force participation rates of young people, men older than 40 and women aged 25–40. This will only occur when a reform of the social security, the retirement agreements and the provision of part-time work within a family and worker friendly environment are realised in Hungary.

Keywords: Population ageing, Hungary, labour force participation, population decline, age group and gender-specific participation rates, sustainable government expenditures, labour market policies, family policies, economically active, labour supply projections, working age population, population projections, retirement age, 2050, labour market adjusted dependency ratios.

Table of Contents

List of Figures

List of Tables

1. Research introduction

1.1. Research background

The Hungarian population has witnessed tremendous changes since the start of the 20th century. Political and war related effects such as the Treaty of Trianon and the casualties of the First and Second World War are the strongest factors causing an interruption of the continuous growth of the Hungarian population until the 1980s (Cseh-Szombathy, 2003). Hereafter, for males in 1980 and for females in 1982, the population started to decrease consistently until the contemporary population size of 9,962,000 (HCSO, 2012a).

This decrease in population size has been the result of fertility and mortality trends, while international migration has not played a determining role in Hungary (Dobossy et al., 2003). The combination of these fertility and mortality processes is also called the demographic transition (Hilderink, 2000). For Hungary, this transition has also undoubtedly influenced these demographic processes, including the ageing process (Beets and Miltényi, 2000). Surkyn and Lestheage (2004) find evidence for both the Second Demographic Transition thesis and the economic crisis to explain the demographic changes that took place in Hungary.

Fertility is measured by the Total Fertility Rate (TFR), which is defined as '*the average number of children that would be born per woman if all women lived to the end of their childbearing years and bore children according to a given fertility rate at each age* (CIA World Factbook, 2012).' This is a period rate, which is widely used and measured among demographers. From this point forward, all TFR references are referring to the period total fertility rate, unless stated otherwise.

Although following the demographic transition, the Hungarian fertility development is standing out, as Hungary was the first European country in which the period total fertility fell below the replacement level after the Second World War. Hungarian women experienced a decrease in TFR from 5,4 around 1900, to 2,5 around 1940, and except for a four year baby boom period in the mid-1950s, fertility has remained below replacement level for the last 50 years (Spéder and Kamarás, 2008), reaching a TFR of 1,46 in 1996. In fact this was the motivation for the first fertility and family survey in Hungary (Kamarás, 1999).
After the 1990s a further decrease in TFR became visible, as the rate dropped below the 'lowest-low' level of 1,3. After the year 2000 however, a hesitant upward move was noticeable, resulting in a TFR of 1,35 in the year 2006 (Spéder and Kamarás, 2008). The most recent data by the Hungarian Statistical Office (2012) confirm this trend, but show that after 2006 there still was a downturn in the TFR, as it, while fluctuating around 1,3, resulted in a TFR of 1,24 in 2011 (HCSO, 2012a).

The mortality trends in Hungary have also shown a diverging path from the average European mortality development. Hungary has been characterized by a high mortality level relative to the social, economic and cultural level of the country (Kamarás, 1999). This is related to a period of increasing mortality and decreasing life expectancy between the years 1964 and 1987, which affected the mortality rate until 1993 (Józan, 1991; Kamarás, 1999).
Between 1964 and 1987 the crude death rate (deaths per 1000 persons; CDR) rose from 10,2 to 13,4, whereby 27% of this rise is a consequence of the rise in age-specific mortality rates and the other 73% can be ascribed to the ageing of the population (Jozan, 1991). The increasing mortality affected the working age males and females (Valkonen, 1991), whereby the increasing mortality of middle-aged (30-59 years old) males was responsible for 85% of the mortality increase. Jozan (1991) relates the unhealthy lifestyle and Valkonen (1991) relates the increased amount of cardiovascular diseases to be the cause of male health deterioration.

Directly related to the mortality is the life expectancy at birth, which also suffered from the above mentioned mortality increases. A widening gap between male and female life expectancy arose between 1980 and 1996, resulting in a male life expectancy at birth of 69,8 and 77,8 years for females in 2008. Although male and female life expectancies at birth have witnessed growth over the past 20 years, they are still lagging behind the European average (HCSO DRI, 2010).

The population decrease occurred simultaneously with the ageing of the population. This is shown by an increasing number of the population aged 65+ and a decrease in the number of under 15 year olds, thereby changing the ratio of elderly persons to that of children (the ageing index) in the advantage of the elderly. The growing amount of elderly people has its impact on the dependency ratio (number of people aged 0-14 and 65+ divided by the number of people aged 15-64) and the old age dependency ratio (number of people aged 65+ divided by the number of people aged 15-64). This leads to an increased burden on the active labour force, which is paying the taxes that make the system of Hungarian social securities, pensions and retirements, work.

The development of the labour force therefore plays a crucial role in the maintenance of the public finances (Euwals et al., 2006). Measures to re-establish a stable supply of labour have to be taken, as ageing puts pressure on the (supply of) labour force and therefore on the public finances. The two most effective measures to increase the labour supply are an increase of the labour force participation and a reform of the social security and retirement agreements (Euwals et al., 2006).

Recent policy changes confirm the timeliness of this thesis, as the Hungarian parliament adopted a bill that relates to the labour force issues that are stated above: The New Labour Code. The bill has been accepted in December 2011 and will be effective as of July 1st 2012. Its main purpose is to create a labour law system which is in line with new market conditions, thereby aiming at more flexibility of employment (Bozsonyik and Pók, 2012), improvement of competitiveness (Liganet.hu, 2011) and ensuring increased job security (Politics.hu, 2011). Prime Minister Orban, speaking on behalf of the government, said the new bill aims at an improved employment rate and stimulates economic performance (Politics.hu, 2011). In an amendment to the New Labour Code, the Hungarian Ministry of National Economy (2011) further explained that "*a more simple and flexible employment legislation is necessary, including particularly the rules on working time and fixed-term or temporary employment* (Hungarian Ministry of National Economy, 2011)."

Besides the New Labour Code, there has also been the introduction of a job protection program, consisting of 10 points including major cuts in social security contributions and new simplified taxes for small businesses (Portfolio.hu, 2012a), the introduction of public work schemes and a recent report of the State Audit Office aiming at an increased efficiency of subsidy programs and job creation plans (Portfolio.Hu, 2012b). The European Commission also focuses on participation and employment, as the Lisbon Strategy 2010 targets for European Member States have already been determined in Lisbon in the year 2000. More recently, the new 2020 targets have been determined by the EU Commission, aiming at an overall employment rate of 75% and an average female employment rate of 70% (Medeiros and Minty, 2012).

With these policies and goal settings in mind, it can be expected that an increased flexibility and higher employment rates will result in increased labour participation rates for males and females, which is a necessity to overcome the increasing costs of an ageing society.

1.2. Research objective

As future demographic developments will have a major influence on the economic and social conditions of Hungary (De Beer and Van Wissen, 1999), this thesis attempts to develop economically active population projections, whereby scenarios, combining demographic developments with different labour force participation rates by age and gender, will result in different future economically active populations of Hungary.

The range of the projection is 2050.
For the projections to be realised, the following research questions are proven necessary.

1.3. Research questions

Main question:
How does increased labour force participation affect the projected economically active population of Hungary in 2050?

Sub questions:
Which factors are related to the decline of the current (working age) population of Hungary?
What are the demographic effects on the economically active population of Hungary in 2050?
Which groups within the Hungarian population can contribute to increasing the labour force participation?
What will be the effect of the planned increase in the statutory retirement age of 62 until 2014, to 65 in 2022 on the projections of the economically active population?

1.4. Structure of the thesis

This thesis uses the traditional quantitative research setup, as chapter one introduces the thesis and provides the research objective and questions.
The second chapter consists of the theoretical framework, where the combination of demographic and economic theories provides the necessary background for analysing population developments and the role of labour force participation in shaping the past, current and future economically active population.
The third chapter describes the Hungarian situation, both from a demographical and economical perspective. Current demographical changes are a result of economic changes related to the 1990's change in political system and the increase of more Western and modern values influencing younger people's behaviour, the so-called Second Demographic Transition.
The fourth chapter provides the assumptions that are used for the projections of the Hungarian population and labour force participation rates and their implementation in the scenarios.
The fifth chapter focuses on the data and methods used in this thesis.
The sixth chapter shows the results of the projections and provides context to these results.
The seventh chapter provides the conclusion, limitations and recommendations of this thesis.

2. Theoretical Framework

2.1. Introduction

This thesis aims to produce projections of the Hungarian economically active population, based upon assumptions on labour force participation and existing population projections from the HCSO Demographic Research Institute (2012), Population Projection of Hungary 2010-2050, medium variant. These assumptions have firm roots in the demographic transition theory, which offers a paradigm framework in which other theoretical contributions can be viewed as part of the total explanation of the generally observed trend from high to low fertility (Kirk, 1996). The demographic transition theory occurs through two transitions that are generally combined to explain the population dynamics: the fertility- and the epidemiological (mortality) transitions (Hilderink, 2000).
Furthermore, the economical context surrounding these fertility and mortality transitions, e.g. as stated by the New Home Economics and Human Capital theories and Labour Economics, is explained, as they are closely related to the labour force participation of women. Socio-economic factors such as occupation, education and income are also more or less related to mortality and unemployment, thereby also influencing labour force participation (Van Peer, 2002).
Hereafter the empirical and theoretical factors surrounding labour force participation will be analysed, as these factors provide valuable insights into the way labour force participation is related to other socially and economically grounded factors. These insights allow justification of the assumptions used to create the economically active population projections.

2.2. The demographic transition

The demographic transition in Europe started in France around the second quarter of the eighteenth century, resulting in a decreasing average family size from around 7 children in pre-industrial Europe, to around 3 or 4 children per family hereafter. The transition was expected to be completed by the end of the 1960s in Europe, which would have resulted in a relatively long period of stability of the population. The population developments of the years after the 1960s however, showed another halving of the average family size (Van Der Kaa, 1999; referred to in Van De Kaa, 2002). This further decrease of fertility and family size showed that another transition was taking place, the Second Demographic Transition (Lesthaeghe and Van de Kaa, 1986).

2.2.1. The demographic transition theory

The transition theory states that societies will eventually experience a modernization process from a pre-modern regime of high fertility and high mortality, to a post-modern regime of low fertility and low mortality (Kirk, 1996). It has a central role within demography as it is the only theory that can be used to forecast future population trends, or act as a guide to empirical research.
The first transition can be characterized as altruistic, as the attention towards the next generation (the attention towards the children) becomes a central element in society. Socio-economic factors such as capital and cultural aspects as secularization characterize this period, thereby making family the cornerstone of the society (Lesthaeghe and Van de Kaa, 1986).

In the recent years however, the disadvantages of the theory became apparent. The theory fails to predict the timing of the fertility and mortality decline, it failed to predict socio-economic conditions during the transition and it underestimated the role of nuptiality and other cultural aspects in the creation of widely divergent fertility levels in pre-modern and traditional societies (Chesnais, 1992; referred to in Kirk, 1996). These shortcomings find a great deal of attention within the theory of the second demographic transition. Still, modernization takes place on many levels in every society. Therefore it can be expected that these societies were also influenced by the changes described in this theory.

2.2.2. The second demographic transition theory

While during the first transition the family became a stronger institution, the weakening of that institution was considered to be characteristic of the second transition (Van de Kaa, 2002).
The Second Demographic Transition (SDT) theory (Lesthaeghe and Van de Kaa, 1986; Van de Kaa, 2002; Surkyn and Lesthaeghe, 2004) is partly based on the idea that family-demographic change is driven by value changes related to secularization, individualization, and a lessening of the influence of traditional values (Ohlsson-Wijk, 2011).
This led to major changes in fertility, a redefinition of the model of the family and improvements in mortality. Hereby, especially the meaning of family and relationship has changed, as it can be entered freely and can be exited if it ceases to satisfy the needs and expectations of the individual (Surkyn and Lesthaeghe, 2004).
Furthermore, Lesthaeghe and Van de Kaa (1986) state that from the Second Demographic transition's perspective of individualisation, most individuals try to gain their own income. This allows them to improve their economic situation, which is dependent upon their personal characteristics such as education, job experience and motivation.
The characteristics of the Second Demographic transition already visible in contemporary societies are the postponement of marriage and fertility. Premarital and post marital cohabitation, procreation within cohabitation and possible longer spells of single living are still expected to occur (Lesthaege and Surkyn, 2002).

It is clear that the individual stands out in this theory, which directly opposes the altruistic view of the original transition theory.
Nowadays, the SDT is one of the most widely used theoretical frameworks for interpreting and understanding demographic changes (Spéder, 2007). One of which is the arrival of the lowest-low fertility in Europe.

2.2.3. Lowest-low fertility

In an attempt to describe 'lowest-low fertility,' Kohler et al (2001) define lowest low fertility as a period total fertility rate below 1,3. Across Europe there has been a spread of lowest-low fertility during the 1990s and it is expected to expand over the next years. When these lowest-low fertility levels are persistent, population forecasts are assuming an annual decline of a stable population of 1,5 %, resulting in far-reaching economic and social consequences (Kohler et al, 2001).

Lowest-low fertility is caused by socio-economic and demographic factors, not necessarily unique to lowest-low fertility countries, but when placed in combination and interaction, will reinforce each other. Shortly summarized, these factors are the rapid postponement of childbirth, which is strengthened by economic uncertainty, social interaction effects and incompatibility of female labour force participation and childbearing due to inflexible labour markets and insufficient childcare provision (Kohler et al, 2001).
Unfortunately, Kohler et al (2001) do not see lowest-low fertility as a short-term phenomenon, pointing towards the persistent character of lowest-low fertility, thereby even expecting a further increase of lowest-low fertility among European and South-East Asian countries.

2.2.4. The epidemiological transition theory

Besides fertility, mortality also plays an important role in the demographic transition. As with the stages model of demographic transition, the epidemiological transition theory also uses a staged model to show the development of mortality patterns over time.
Omrans (1971) original theory of epidemiological transition attempts to account for the extraordinary advances in health care made in industrialized countries since the 18th century (Casselli et al, 2002; referred to in Omran, 1998). His 1971 work distinguishes three stages: the age of pestilence and famine; the age of receding pandemics; and the age of degenerative, stress, and man-made diseases (Omran 2005). Later, two more stages were added in order to fit recent health and life expectancy developments in the Western society: the age of declining cardiovascular mortality, ageing, lifestyle

modification, emerging and resurging diseases; and the age of aspired quality of life, with paradoxical longevity and (futuristic stage) persistent inequities (Omran 1998).
Furthermore, Omran (2005) provides an overview of the models that show the way in which countries go through the different stages of the epidemiological transition. The countries of Central Eastern and Eastern Europe are classified to the semi-western/ accelerated model, which shows that mortality and fertility declines have occurred later than in the Classical (Western) model, that most countries have not entered the fourth stage of transition yet, that cardiovascular mortality still increases and that some member countries of the former USSR have lost years of life expectancy associated with the social and economic crisis (Omran, 1998).

2.3. The economics of demography

There are various economic theories and practicalities surrounding the fertility and mortality transitions, thereby providing a background for contemporary and future economic consequences of demographic developments. This thesis uses two theories that relate fertility to economics: the New Home Economics theory and the Human Capital theory. Furthermore, an economic approach towards the relation between working hours, full- and part time work, parental leave, child-care services, retirement, pensions and female employment opportunities is provided by Labour Economics.

2.3.1. The New Home Economics

The New Home Economics (NHE) consist of economic theories and applications of economic analysis dealing with home-based (intra-household or family dynamics) decision-making. The essential idea behind NHE is the economics of production in the home (O'Hara, 1999).
The New Home Economics theory provides theoretical arguments relating economic theory with fertility. It considers fertility to respond differently to changes in men's earnings and women's wages in families with and without employed wives, and that the probability that a married woman of childbearing age will enter paid employment is a function both of her husband's earnings and of her own earning capacity (Ermisch, 1979).
Central in the NHE are the opportunity costs of time of children. These opportunity costs rise for working wives as women's wages increase, and, for any given level of men's incomes, this induces them to have fewer children and space them more closely. Unemployed women are also, more indirectly, affected by increases in women's wages, as their expanding earning capacities induce a greater proportion of women of childbearing age to enter employment. This leads to an increase in the proportion of families, whose fertility is negatively affected by rising women's wages, thereby enhancing their negative impact upon aggregate fertility (Ermisch, 1979).
The increased opportunity costs of time of children for working women is confirmed by the findings of Willis (1973) that labour force participation will have a negative influence on the fertility. This effect is further enlarged by the increased amount of gender equality, leading to better jobs with higher wages for women in the economically active population, resulting in an increase of income loss (increase in opportunity costs) among them who choose to have children (Van Peer, 2002).
Finally, Ermisch (1979) adds that the educational level of women, changes in the industrial and occupational structure, a decreasing wage gap between men and women and changes in social attitudes toward women working outside the home, will all lead to expanding employment opportunities for women, thereby leading to an increased negative impact upon aggregate fertility.

Child benefits and parental leave arrangements can mitigate the increase in opportunity costs of time of children when more women are working. The higher the amount of money and time given to (future) parents in order to lessen the financial burden of raising a child, the more positive effects on the fertility of women and the willingness to raise children (Corman, 2002).

Contrary to the opportunity costs statements of the NHE, Andersson (2000) finds a strong positive gross effect of female earnings on Swedish women's entry into motherhood. Together with a heavily subsidized childcare system as in Sweden, as in accordance with the statement of Corman (2002), this can increase the fertility levels of women. This makes the Swedish system an example for other European countries, as Sweden has one of the highest fertility rates in Europe (Van Peer, 2002).

As his findings contradict the basic ideas of the New Home Economics, Andersson (2000) states that '*models can then not give a full understanding of complex processes such as childbearing'* and that they '*neglect all kinds of interactions of couples or individuals with the wider social and economic environment* (Andersson, 2000)*.'* The use of New Home Economics in this thesis is to create a context surrounding the fertility decisions of women in relation to their labour participation, thereby dealing with national policies and educational and income differences that influence the decision making process. This is further explained from the Labour Economics perspective presented below.

2.3.2. The Human Capital Theory

Human capital theory suggests that education or training raises the productivity of workers by imparting useful knowledge and skills, hence raising workers' future income by increasing their lifetime earnings (Becker, 1964; referred to in Esping-Andersen, 2000).
The Human Capital theory also aims at explaining the relationship between the female level of education and fertility (Mellens, 1999). As highly educated women usually build up a considerable human capital and they want to increase this by acquiring job experience, this leads to postponement of motherhood and an increased risk of involuntary childlessness due to reduced fecundity at older ages. Furthermore, highly educated women who are having children, usually have a smaller number of children than less educated women.
Mellens (1999) concludes that the health factor is also positively influenced by education, as highly educated people have better access to information and practice their job under better health conditions. This points towards a positive relation between education and life expectancy, but to a negative relationship between education and fertility. Furthermore, Spijker (2004) points out that education, occupation, income and employment status are all very much interrelated, as they result in similar behaviour and material factors. This also has consequences for the fertility levels related to these statuses.

2.3.3. Labour Economics

Boeri and Van Ours (2008) provide an extensive overview of working hours, retirement programs and family and labour market policies from the Labour Economics perspective.

Working Hours

First it is important to recognize the labour supply as point of view in this thesis, as it directly relates to changing demographic situation, the family- and working policies. Hereby, the neoclassical economic theories state that an individual chooses the number of hours they want to work on the basis of the hourly wage rate and their preferences for leisure and income. Saczuk (2004) labels this as the labour-leisure approach, which treats the participation decision as a choice between labour and leisure (all non-market activities), resulting in the choice between marginal/additional utility gains/losses if an additional hour is spent on work or leisure. In practice this is restricted to a limited set of working hours, namely full time, part-time or no job at all (Boeri and Van Ours, 2008).
From the above stated theories about leisure versus jobs, the choice is difficult when only fulltime jobs are available, leading to fewer participants in the labour market. The introduction of part-time jobs however, increases the overall employment. Because it is now possible to work more flexibly, allowing a combination of work, household tasks and leisure, labour supply increases. This in turn, makes the wages fall, and as fewer people are willing to work full-time for the lower wages, decreases the amount of full-time employees (Boeri and Van Ours, 2008).
The labour demand on the other hand, also benefits from the introduction of part-time jobs in at least three ways. The first concerns optimal staffing, as it makes it easier to match workers to the changing workload during the day or week. The second concerns the lower hourly wages and flexibility, as part-time employees have less employment protection. The third and last is related to vacancies, as some vacancies cannot be filled or workers cannot be retained if no part-time jobs are offered to them (Jaumotte, 2003).

The choice for part-time work instead of full-time work concerns decisions by workers and employers, both within the context of rules and regulations that originated from government interference or through collective agreements between unions and employers (Boeri and Ours, 2008). Therefore, any attempt to increase part-time employment should be rooted in institutions and in policy, as they significantly affect part-time work. This asks for an improvement in the legal framework affecting part-time positions and the creation of financial incentives such as subsidies and an improved social protection (Buddelmeyer et al, 2005).
Finally, Boeri and Van Ours (2008) conclude that '*there is no economic argument against workers working fewer hours as long as they are not forced to do so*.'

Retirement and pensions
It is widely known that the ageing of the population causes pressure on the government finances and pensions (Pestieau, 2003; Euwals et al., 2006).
One of the problems causing the financial problems of the pensions in an ageing society is the gap between the statutory and the effective retirement age, as early retirement programs allow workers to retire long before the mandatory retirement age. Pestieau (2003) relates this to the existence of early retirement programs, professions whereby the official retirement age is lower than the standard (e.g. teachers or police) and the use of unemployment insurances and disability programs by those unable to work. He further states that many political obstacles have to be encountered in order to reform the contemporary social security system, especially as recent economic research proves that renewed retirement programmes would benefit most retirees, particularly those with few resources (Pestieau, 2003).

The 'problem' of early retirement and therefore low participation rates of elderly persons has been created in the 1980s, as EU countries introduced policies that supported the early retirement of elderly workers, mostly based upon the assumption that this would make room for young workers and that it would lead to a reduction of unemployment (Boeri and Van Ours, 2008).
The contemporary policies of many EU countries aim at the exact opposite as achieved in the 1980s e.g. to increase the participation of elderly workers, in order to improve the labour supply and the financial picture created by the ageing society.
However, this is not easily accomplished, as stated by Pestieau (2003) above. On top of the many political hurdles, many employers view elderly workers as expensive and, as productivity deceases with age, less productive (Daniel and Heywood, 2007). Employers have negative perceptions about the capacity to adapt to technological and organizational changes and there are concerns of ill health difficulties with longer working hours (Boeri and Van Ours, 2008).
Finally, there is a tendency that older workers, who have lost their job, find it extremely difficult to acquire a new job. It takes older workers a long time to find another job, whereby they may face large potential wage losses.

Summarizing the discussion on the retirement age, Boeri and Van Ours (2008) conclude that '*all in all there is little reason not to abolish early retirement programmes*.' However, as stated by Pestieau (2003) large political obstacles have to be encountered in order to do so.

Family Policies
Family policies are directly related to the labour force participation of mothers, as the employment rate of females with children is lower and/or because the share of part-time work is higher than females without children.
These policies consist of parental leave facilities and child care arrangements, whereby parental leave, often equivalent to maternity leave, allows raising children and staying attached to the labour market and child care arrangements affect mother's choices with respect to leisure versus working time (Boeri and Van Ours, 2008).

Studying female labour participation in OECD countries, Jaumotte (2003) draws two family policy related conclusions: the first is that child benefits generate an income effect that reduces female labour

supply, particularly of potential part-time workers, and that therefore childcare subsidies are a better alternative, as they increase the return on market work.
The second conclusion is that the provision of paid parental leave tends to boost female labour participation, as it helps women to reconcile work and family life and strengthens their attachment to the labour market through a job guarantee.

These findings are supported by the labour supply models in Boeri and Van Ours (2008), who find that '*providing child care subsidies may increase labour force participation of females and may increase working hours of those who are already participating*.' They also find support for Jaumotte's (2003) second conclusion, as parental leave will have a positive effect on the labour supply of mothers. There is however, an increase in labour costs because of the parental leave, leading to a reduction in demand for female labour. When taken together, parental leave will result in a small increase in employment for mothers, but there is also a drop in female wages (Boeri and Van Ours, 2008).

Labour economics and demography
Concluding, it can be stated that the labour economics provide a decent framework to provide the demographic developments with an economic context. This is best shown by the change in the cross-country correlation between female labour force participation and fertility rates (Boeri et al., 2005), whereby the demographic and economic factors interrelate.
Until the late 1980s there was a trade-off in time or opportunity costs, as suggested by New Home Economics, between paid work and having to take care of children. Hereafter, the correlation between the two factors changed, resulting in a positive correlation between high female labour participation and high fertility in most countries. The factors causing this positive relation are a more generous parental leave, greater availability of child care and greater opportunities for flexible working hours and part-time employment (Boeri and Van Ours, 2008). This is an important outcome for many countries having to deal with the ageing of the population, as it provides a solution for the short-run challenge of raising female labour participation rates and simultaneously deals with the long-run challenge of raising fertility that these countries are facing.

2.4. Factors determining labour force participation

There are many factors, both economic and non-economic, that show a strong relation to growth and decline of labour force participation rates. Jaumotte (2003), Roodenburg and Van Vuuren (2004), Saczuk (2004), Euwals and Van Vuuren (2005), Euwals et al (2006) and Van Vuuren and Euwals (2006) find ten factors to strongly determine (future) labour force participation, as they combine empirical and theoretical aspects/factors surrounding labour force participation.

The first factor is demography. Analysing the age structure of any European population will show that different labour participation rates are found among different age groups. Over time, two developments occurring in the population are of importance: the ageing (55 and older) and the decrease of young people (25 and less). Ageing leads to lower labour force participation, as elderly workers possess lower participation rates than younger workers. The other way around, a decrease in the population aged 25 years and younger, will lead to higher labour force participation, as younger people have lower participation rates then elderly workers (Euwals and Van Vuuren, 2005).

The second factor is a cohort-effect, which is the result of behavioural changes in the past (Roodenburg and Van Vuuren, 2004). These cohort-effects are especially strong among the female part of the population. As a result of socio-cultural changes in the past, like emancipation and individualization, the participation, especially under among the young age groups, rose. This leads to the current day situation whereby younger generations, with higher labour force participation rates, replace older generations, with lower labour participation rates, in the economically active population. As a result, the participation rates among the elderly workers increases over time, which also increases the average participation of women.

The third factor is labelled by Roodenburg and Van Vuuren (2004) as autonomous causes, which are behavioural changes of the future. It involves the future continuation of the current socio-cultural trend as stated by the cohort-effects, which still shows room for behavioural change, resulting in more women to enter the labour market (Euwals and Van Vuuren, 2005). Saczuk (2004) uses the term 'social habits,' to relate to these attitudes and institutional conditions that disable or enforce certain behaviour of individuals now and in the future.

The fourth factor, the implementation of previous and future policy, will also influence future labour supply. Boeri and Van Ours (2008) find earlier implemented retirement, family, social security, pension system, working hours and other working-related policy to strongly determine the future development of the labour force participation. Jaumotte (2003) finds public spending on childcare (formal day care and pre-primary school) and paid parental leaves (although the marginal effect becomes negative for very long, 20 weeks and more, leaves) to have a positive impact on female participation. Also, the increase in statutory retirement age, which was and will be implemented in every country of Europe, is a good example of these policy changes (Roodenburg and Van Vuuren, 2004).

The policy on social security is closely related to the business cycle and active population, as leaving the labour market would not be possible, were it not for social security (Saczuk, 2004). These social and disability benefits provide non-market income, making them compete with employment related income, especially among lower educated and skilled workers. Therefore, generous benefits in comparison with individual earnings discourage people from work, especially in worse periods of the business cycle. Although protection of real health problems, disability and inability to earn income are socially desirable, practice shows that disability claims are over-sensitive to changes of benefits from social security and pension systems (Coleman, 2000; referred to in Saczuk, 2004).
Pension systems are a specific type of social security aimed at elderly, as elderly people (55+ years of age) are in a difficult situation on the labour market and/or inability to work in many cases. Most common problems with older workers are the declined mobility, health problems and problems with technological development. These problems result in a negative employer's attitude towards these older workers, resulting in relatively low employment and high (long-term) unemployment. Blöndal and Scarpetta (1999) find these factors to have a significant influence on decisions on labour market leave, especially into earlier retirement when possible.
Nowadays social security and pension systems do not award additional years of labour activity properly and offer various benefits that are competitive with potential earnings from market work. For an improvement of this situation, the penalization of early retirement with a low rate of substitution (the ratio of benefits after retirement to the last achievable wage) and an association of the benefits with the years of employment are to be implemented (Roodenburg and Van Vuuren, 2004; Saczuk, 2004). Boeri and Van Ours (2008) also conclude that early retirement programmes should be abolished.
Family policies comprises of child care subsidies, provision of parental leave and child care development and accessibility. These policies make combining motherhood and professional career simpler, and therefore facilitate participation. Saczuk (2004) finds child care to influence economic activity of women to the greatest extent, especially among the youngest and middle age groups. Jaumotte (2003), based upon OECD country data, draws similar conclusions on childcare subsidies and the provision of parental leave.

The fifth factor, the business cycle, is labelled by Saczuk (2004) as the most quoted economic factor that facilitates participation. When economic development is positive, simultaneously the wages and wage expectations grow and the unemployment declines, which stimulates the inactive population to start participating in the economy. This is strengthened by the effects that employers face limited choice in potential workers, which makes them offer more worker friendly conditions as part-time work, in other words the employer becomes more flexible. The other way around, crisis years will firstly lead to a decline in active population and wages, secondly to an increase in unemployment and thirdly, employers will, due to increased choice in personnel, become less flexible in offering working conditions. This discourages potential workers, whereby especially older workers (55+) are hit, making them choose early retirement instead of finding a new job (Saczuk, 2004).

Van Vuuren and Euwals' (2006) conclusions are similar to those of Saczuk (2004), as they find the business cycle to determine labour force participation, based upon the 'discouraged workers effect' and the 'additional worker effect.' The discouraged workers effect makes persons with low changes of finding a job retreat from the labour market and become inactive in times of a bad business cycle period. The additional worker effect means exactly the opposite, resulting in more persons becoming active on the labour market in times of good economic developments. Gregg (1994; referred to in Van Vuuren and Euwals, 2006) however, finds the discourage workers effects to dominate the additional worker effects, resulting in lower labour supply and participation in the bad years of the business cycle.

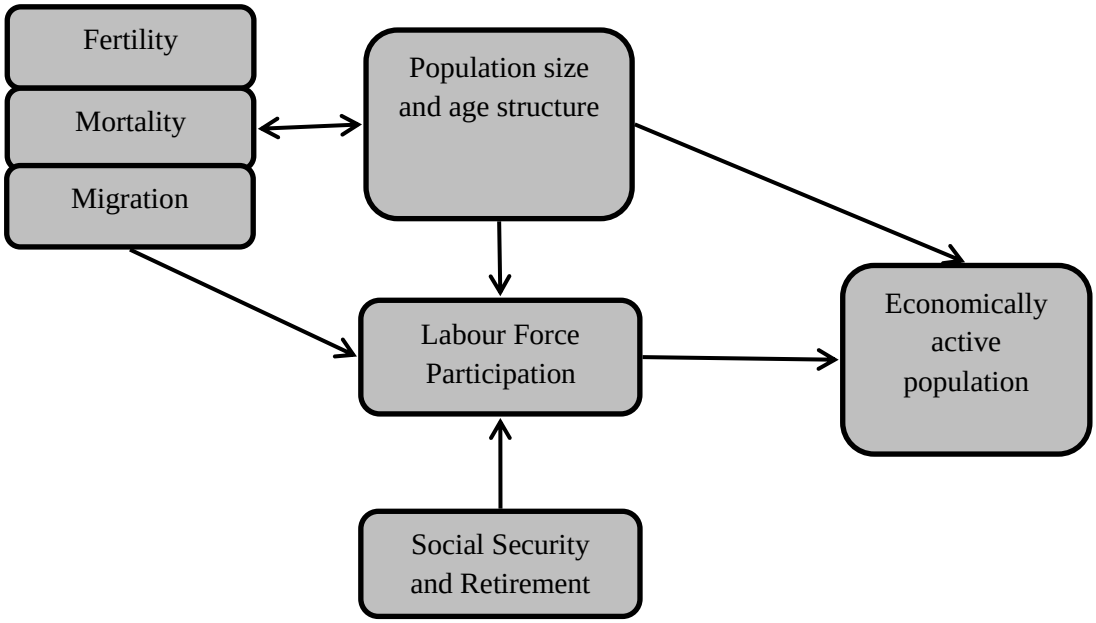
The sixth factor, education, can be classified as a behavioural change of the future, but as there is strong evidence that a rise in education results in a rise of labour supply (Euwals et al, 2006), it is treated as a separate factor in this this overview. Education has an important role in the Human Capital theories, which suggest that higher educated women postpone motherhood, increase their risk on childlessness and have on average fewer children (Mellens, 1999). Saczuk (2004) concludes that education '*can severely depress participation* (Saczuk, 2004)' and that enrolment into educational institutions often precludes any employment, so that people extending their education are forced to be off the market. Jaumotte (2003) also finds the level of female education to determine the female labour force participation to a significant extent.

The seventh factor is unemployment. Unemployment is of importance for labour participation (Van Peer, 2002), as continuous high unemployment discourages persons to find a job, resulting in withdrawal of these persons from the labour force (Saczuk, 2004). This increase of inactive population is related to the discouraged workers effect (Van Vuuren and Euwals, 2006), rises with age (Saczuk, 2004) and decreases with education (Euwals et al, 2006).
The eighth factor is poverty. Poverty is expected to have the exact opposite behavioural response as unemployment, as people living in poverty are forced to work to support themselves and their family, as no non-market income is generated (Saczuk, 2004). This should stimulate the search for jobs and therefore labour force participation.
The ninth and tenth factors are provided by Jaumotte (2003), who based upon econometric estimates of the determinants of female labour force participation, concludes that:
The ninth factor, the wedge between the tax rates of second earners and single individuals, can influence female labour force participation, as there is ample evidence that high marginal tax rates reduce labour supply. And as labour supply is more elastic for females than for males, the equal taxation of second- and individual earners could significantly influence female labour force participation in a negative way.
The tenth factor, the flexibility of working-time arrangements, in Jaumotte's research represented by the share of part-time in female employment, contributes to boost female participation. An increase in part-time work allows women to combine having a child or enjoying education, while still being active on the labour market.

2.5. The conceptual model

The conceptual model provides an overview of the factors involved in the economically active population projections created in this thesis and the relations between them.

Figure 2.1: The Conceptual Model



Based upon the main and sub questions, the conceptual model as given in Figure 2.1, shows the influence from the fertility, mortality and migration trends on both population size and age structure and the labour force participation, thereby indirectly influencing the economically active population. The other way around, a changing population structure whereby e.g. the amount of elderly is increasing, has consequences for labour force participation, the fertility, mortality and migration developments and the economically active population.

The labour force participation influences the economically active population and the fertility, mortality and migration trends, thereby indirectly influencing population size and age structure. This last connection is however not part of this thesis, as there is no feedback included in the economically active population projections. Still the relation between female labour participation and fertility does exist (Andersson, 2000); Ermisch, 1979), which is taken into account when the economically active population projection scenarios are analysed.
The social security and retirement systems are influencing the labour force participation, as increases in statutory retirement age or more sober social security system increase labour force participation. The social security and retirement systems therefore indirectly influence the economically active population.

The final part of the conceptual model, which is basically the goal of the thesis, is the economically active population. The economically active population is under influence from population size and structure and the labour force participation.
Although not accounted for in the model, the economically active population can also influence the social security and the labour force participation, as sustainability of the social protection system against the background of a (sharply) increasing elderly population and a shrinking labour force stands out in contemporary Europe (Van Solinge et al, 1998). Van Solinge et al (1998) state that population, labour and social protection can be viewed as corners of a triangle, whereby future considerations require the explicit recognition of mutual interdependencies.

3. The Hungarian situation

3.1. Introduction

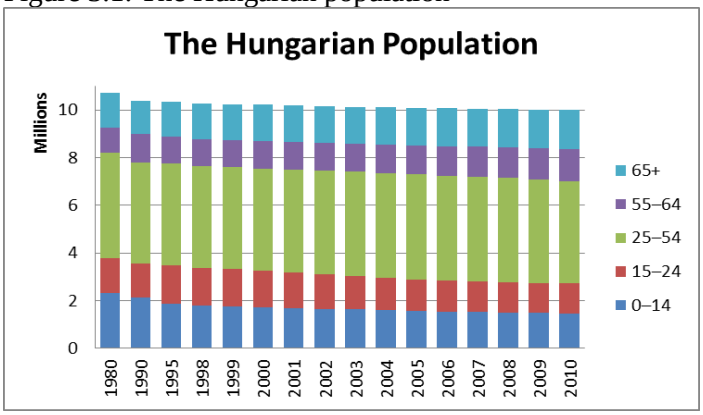
This chapter serves to contextualize the theoretical framework. It gives an overview of the demographic, socio-economic and cultural factors that play a role in Hungary, thereby also creating a base for the assumptions underlying the population projections of the remaining chapters. Furthermore, the factors and policies that are related to the labour participation are presented here.

3.2. Population developments

When applying the theoretical framework to the Hungarian situation, there is one important aspect that has remained in the background in theory, which in practice has been of great importance: the effects of the political and economic change during the 1990s.
The fall of the Communist regime and the economic crisis following this political change, have strongly impacted the Hungarian population development. Kohler et al (2001) find that the postponement of childbirth is directly related to the crisis, which is one of the factors causing the lowest-low fertility rates in Hungary.
During the years after the system change, scholars ascribed the lowest-low fertility levels to be solely caused by the political and economic crisis, thereby linking the demographic changes to the rising unemployment, a reduction in activity rates particularly for women, to the end of life-long employment guarantees, the drop in real household incomes, the decline of state supports for families and the enhanced visibility of poverty (Leasthaege and Surkyn, 2002).
Only in later years, empirical research showed that the economic crisis was not the sole explanation for the demographic changes in Central and Eastern Europe, but that patterns of value differentiation between people with different types of living arrangements strongly supported the Second Demographic transition thesis (Surkyn and Lesthaege, 2004).
Nowadays a combination of the two main causes of the characteristic population development of Hungary is put forward in demographic research, although there are still differences in defining which factor is the most important. Macura et al (2002) conclude that ideational and cultural changes (as stated by the Second Demographic Transition) '*have reinforced the impact of the social and economic crisis on fertility, in an independent and negative manner*,' while Surkyn and Lesthaege (2004) focus on the Second Demographic Transition as the main factor causing the low fertility levels.

Despite the debate about the main cause of the societal, economic and population changes, scholars do agree that the resulting population changes in Hungary are a major concern for the future. Shrinkage of the population already started in the 1980s and has continued ever since. With a minor contribution from migration, the balance between births and deaths has been negative since 1982 (HCSO, 2012a). As figure 3.1 shows, the population numbers have not been rising until 2012.

Figure 3.1: The Hungarian population



Source: Fazekas and Molnár, 2011

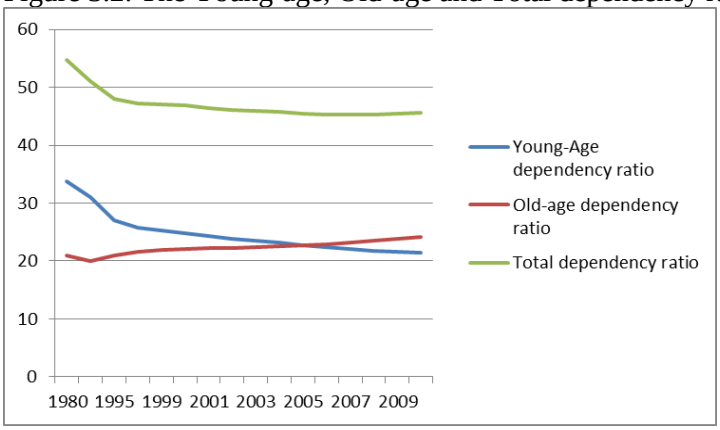
Analysis of the different age groups shows that the shrinkage of the population has affected most age groups. The 0-14, 15-24 and the 25-54 age groups saw a decrease in numbers between 1980 and 2010, with respectively 36,9 %, 14,4 % and 2,4 %. The 55-64 and 65+ age groups saw an increase in numbers, as they grew with respectively 25,8% and 14,8% (Fazekas and Molnár, 2011). These changes in the size of the age groups, with an increase in the elderly age groups and a decrease of young age groups, are clear signs of an ageing society.

Dependency ratios

To further investigate the changes in the age groups over time, the dependency ratios provide an overview of the young and old populations (those generally economically inactive) in relation to the population of working age. There are three types of widely used dependency ratios that show the relation between the assumed active and inactive population:

- Young-age dependency ratio: the population aged up to and including 14 years divided by the population aged between 15 and 64 years, multiplied by 100;
- Old-age dependency ratio: the population aged 65 years or older divided by the population aged between 15 and 64 years, multiplied by 100;
- Total dependency ratio: the population aged up to and including 14 years and aged 65 years or older divided by the population aged between 15 and 64 years, multiplied by 100.

Figure 3.2: The Young-age, Old-age and Total dependency ratio



Source: Fazekas and Molnár, 2011

As shown in figure 3.2, the Young-age dependency ratio has witnessed a sharp decrease over the years, resulting in fewer young people, compared to the 15-64 year old people. On the short term this positively influences the total dependency ratio, as fewer young people have to be supported by the working age population. On the long term however, this means that fewer young people are moving into the economically active population, resulting in an eventual decrease of the working age population.

The old-age dependency ratio has grown over the years, which is a logical occurrence due to the ageing of the society. The total dependency ratio declined due to the declining number of young people until around 2007. Hereafter the ageing effect became strong enough to more than compensate for the declining amount of young people in the total dependency rate.

With future expectations about the Hungarian population size and structure in mind, the old-age and total dependency ratios will increase towards high levels, which is a worrying thought for the future sustainability of the Hungarian social security, pension and retirement system.

Projections

To gain more insight into the expected population development, this thesis uses projections from Eurostat, the UN Population Division and the Demographic Research Institute of the Hungarian Statistical Office (DRI). All three institutions produce population projections in Hungary until 2050 or 2060.

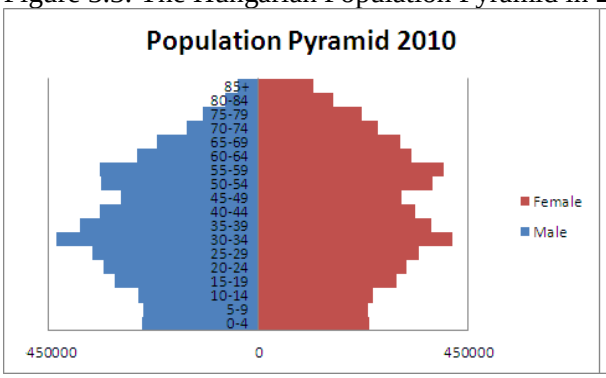
The Europop2010 (Eurostat Population Projections 2010-based) convergence scenario projects the total population of Hungary in 2050 to be 9176536, which is a 8,4% population decline (Eurostat, 2010).

The UN World Population Prospects, the 2010 Revision medium fertility variant, projects the Hungarian population to decrease to 9243000 in 2050, which is a 7,7% population decline (UN Population Division, 2011). Finally, the National population data 2050 projection of the DRI projects the Hungarian population numbers in 2050 to be 8968223 (DRI, 2012). This is a 10,4% decline of the Hungarian population.

The changing structure of the population is best presented by the population pyramid, which provides an overview of the (relative) size of the age groups of the population. Figure 3.3 and figure 3.4 show the already visible trend of increasing elderly age groups and decreasing young age groups as visible in figure 3.1 to be strongly continuing until 2050, resulting in the dramatic increase of the number of elder Hungarians and in the ratio of persons of working age to those in retirement. With a very small base of active population this will have major consequences for pensions, public expenses and tax systems, especially considering the fact that the economically active population supports the aged population through the tax system.

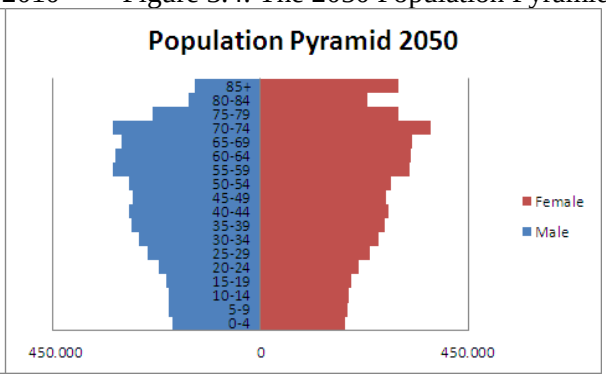
The shape of the age-pyramids gradually changes from a bell to a pillar, as the bulge shifts upwards towards older age cohorts reflecting the baby-boom generation reaching retirement age and much smaller cohorts of young people due to below-replacement fertility rates.

Figure 3.3: The Hungarian Population Pyramid in 2010



Source: Eurostat, 2010

Figure 3.4: The 2050 Population Pyramid



Source: Eurostat, 2010

To re-establish a stable supply of labour in order to afford the increasing public finances, two effective measures to increase the labour supply are known: an increase of the labour force participation and a reform of the social security and retirement agreements (Euwals et al., 2006). This is what is aimed for, and taken in account with, when the projections of the future economically active population are compiled.

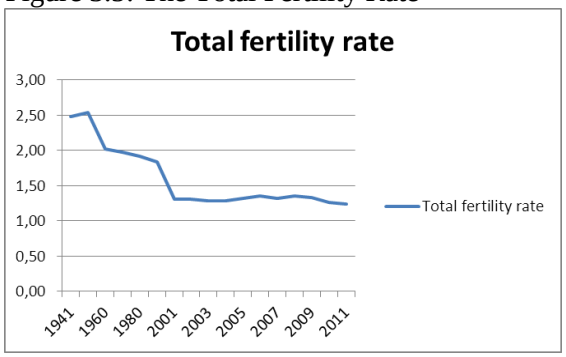
3.3. The determinants of population change

The development of the fertility, mortality and the migration levels over time are presented below. These levels show the relatively unimportant role of migration in Hungary and show that the demographic transition has been occurring in Hungary, resulting in the nowadays situation of population decrease.

3.3.1. Fertility

Hungarian women experienced a decrease in Total Fertility Rate (TFR) from 5,4 around 1900, to 2,5 around 1940. In the 1960s the TFR declined below 2,0 (Sobotka, 2002), resulting in a TFR of 1,84 in 1990 (HCSO, 2012a). The 1990s turned Hungary around from a relatively high-fertility country, to one of the lowest-low fertility countries with a TFR under or around 1,3 (HCSO, 2012a). This shift, presented in figure 3.5, went hand in hand with some widely recognised changes in fertility and relationship behaviour.

Figure 3.5: The Total Fertility Rate



Source: HCSO, 2012a

The first, an increase in mean age of mother at birth of the first child during the second half of the 1990s, led to an increase in the mean age of 2-3 years between 1990 and 2000. This indicates fertility postponement, which was partly responsible for the fall in TFR (Sobtoka, 2004).
The second, the rapid transformation in the patterns of union formation, sums up the changes in marriage and cohabitation. On the one hand the marriage rates declined rapidly and the mean age at first marriage rose. Philipov and Dorbritz (2003) find the TFMR (Total first marriage rate, '*The probability of first marriage for a person if he or she were to pass through his/her lifetime conforming to the age-specific first marriage rates of a given year* (Council of Europe (COE), 2001)', to decline from around 0,9 in 1980 to around 0,50 in 2000. The MAFM (Mean age at first marriage) rose from 21,2 in 1980 to 24,6 in 2000 (Philipov and Dorbritz, 2003). On the other hand cohabitation gained popularity and became more widely accepted, resulting in a substitution effect for the decline in marriage rates (Sobotka, 2004). Macura and Beets (2002) confirm this, as they find evidence that 1960s cohorts substitute cohabitation with marriage as first union.
The third factor, the rise of extra-marital births, is related to the second factor, as cohabitation gained popularity and many cohabitating couples had their first child without being married. Philipov and Dorbritz (2003) find the number of extra-marital births relative to all births to increase drastically from the 1990s, whereby Hungary saw an increase from 13,1 extra-marital births per 100 births in 1990, to 29 in 2000 and 40,9 in 2010 (HCSO, 2012a). This was also one of the causes of the decreasing TFR, as the TFR of married women usually is higher than those of non-married women.
The fourth factor is a decline in number of abortions and the rise of birth control. The general abortion rate (GAR), the number of abortions per thousand women aged 15-44, declined from 41,2 in 1990 to 30,9 in 2000. In the same decennium Philipov and Dorbritz (2003) also find an increase in usage of modern contraception methods in Hungary over time. Macura and Beets (2002) state that the low fertility level could have never been reached without effective and modern birth control methods, the use which is widespread among men and women in Hungary.

Sobotka (2004) adds the fifth, sixth and seventh factor that contribute to lower fertility and later childbearing patterns: higher education, a new nature of work (e.g. flexibility and insecurity) and the emergence of the consumer society.
The fifth factor, the expansion of higher education, can be characterized by the rapid growth of participation in secondary and university education, especially among women. As it is difficult to combine studying with child care and having a family, women with university diplomas put more emphasis on career and non-family interests and have on average fewer children than those who are less educated (Sobotka, 2004). This basically summarizes the Human Capital and the New Home Economics theories, as higher educated women have higher opportunity costs when the choice for having a child is to be made, which results in a negative relation between fertility and educational level. Kamarás (1999) also finds educational level to have a considerable effect on both number of children and timing of the births.
The sixth factor, the more flexible and insecure nature of work, is one of the critical issues for fertility development. This makes access to employment and the easy combination of career and childcare of high importance for future fertility levels. As more women participate in the labour force, thereby experiencing self-realisation, using their education and support themselves financially, this results in fewer women that are willing to become housewives, after they have gained personal freedom and economic autonomy (Sobotka, 2004). Together with the weak legal protection and the scarce opportunities for part-time work, this strongly interferes with childbearing and family life.
The seventh factor, the emergence of the consumer society, is strongly related to the freedom and choice after the system change. This allows a person to travel, consume and study, thereby creating an individualistic lifestyle, whereby partnerships are consumed and commitments are avoided (Sobotka, 2004).

The eighth and final factor is the discrepancy between the actual and the desired number of children of young women. The rate of realisation of intentions of short-term (2 year) fertility in the middle of the 2000s shows 40% in Hungary. When compared to Western European countries as the Netherlands, with a realisation of intensions rate of 75%, this is very low. Spéder (2011) relates this to the frequent social change, which obstructs the realisation of intentions in post-communist countries. Kamarás (1999) concludes that despite the falling fertility rates among young women in Hungary, they did not have the desire to have fewer children than their parents. This means that the decline in fertility includes a significant element of fertility timing.

3.3.2. Mortality

Two interrelated demographic features stand out in Hungary: the life expectancy and the mortality. They are basically two sides of the same coin, as based upon life table calculations the life expectancy depends on the death rate. Life expectancy ($e0_x$) is a function of T_x (person-years lived above age x), which is calculated from the nL_x (person-years lived between x and x+n), whereby nL_x is partly based on the nd_x (number of people dying between x and x+n). Life expectancy at birth is however, a much better indicator of mortality than the Crude Death Rate (CDR) (Beets and Miltényi, 2000).
Still, for a more in-depth view of mortality, both factors are studied. Their development can be characterised by three epidemiologically different periods.
The first stage is the period between 1948 and 1966 and can be characterized as the hopeful beginnings (Jozan, 2008). These years are characterized by an improvement in mortality, as both the number and rates of death improved. The number of deaths declined from 130000 around 1944, to 105000 annual deaths in 1966, whereby the death rate of 12.9 per thousand around 1948 fell to 10.0 by 1966. Life expectancy also improved: the generation born in 1948/49 had a life expectancy at birth of 60.9 years, a figure which had risen to 69.6 by 1965/66 (Jozan, 2008). Main causes of the improvements are the fundamental changes in the effectiveness of, and access to health care, better nutrition and decreasing the infant mortality rate. Jozan (2008) relates this to the Communist regime, as '*it was part of the ethos of dictatorial Communist rule to improve the health of the people* (Jozan, 2008).' This led to the extension of employment and social insurance to the whole population, resulting in access to health care and other social infrastructure, such as kindergartens, for every member of society.

The second period, between 1967 and 1993, can be ascribed as the chronic qualified epidemiological crisis (Jozan, 2008). Between 1966 and 1993, men's life expectancy at birth decreased by 2.7 years and women's increased by 1.8 years (Jozan, 2008) and between 1964 and 1987 the crude death rate (deaths per 1000 persons; CDR) rose from 10,2 to 13,4.
Most striking of the deterioration in life expectancy was that it did not affect the population under 30 or over 75. Increasing mortality of middle-aged (30-59 years old) males was responsible for 85% of the mortality increase, thereby deteriorating their life expectancy. Jozan (1991) relates the unhealthy lifestyle and Valkonen (1991) relates the increased amount of cardiovascular diseases to be causing this deterioration of male health. Jozan (2008) concludes that nearly two thirds of the deterioration in mortality is derived from the increased frequency of death from cancer, cardiovascular diseases and diseases of the digestive system. Alcohol, smoking, unhealthy nutrition, obesity, lack of exercise and sustained or recurrent stress are the factors causing these diseases.

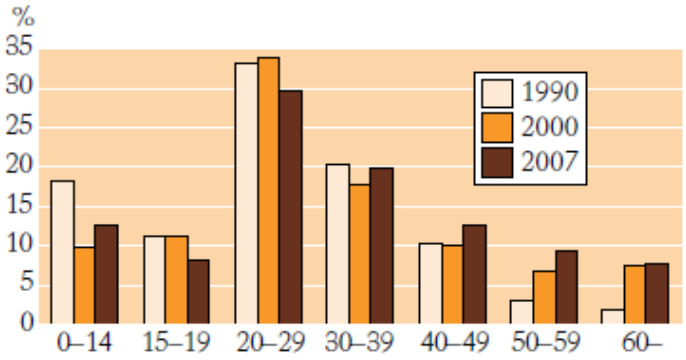
The third period describes the developments from 1994 until around 2006 and can be seen as a new era in epidemiological development (Jozan, 2008). Death rates decreased considerably in every age group, whereby the improvement in age-specific mortality was very high up to the ages of 50–55 and more modest among older people. In 2006 the population of Hungary faced a life expectancy of 73.2 years, an improvement of 4.1 years compared to 1993. This was the results of an increase in life expectancy of men from 64.5 years in 1993 to 69.0 years in 2006, and of women from 73.8 to 77.4. Jozan (2008) finds highly effective medicines, the provision of emergency care throughout almost the entire country and the now-routine nature of surgical interventions in the coronary artery system to be causing the improvements in mortality and life expectancy. Furthermore, perceptible changes in lifestyle (particularly regarding nutrition and exercise) among the upper and professional upper middle classes become visible (Jozan, 2008).
The contemporary life expectancy levels, with a male life expectancy at birth of 69.8 and 77.8 for females in 2008, have undergone improvement over the past 20 years, but they are still lagging behind the European average (HCSO DRI, 2010). The gap between male and female life expectancy widened between 1980 and 1996, but data from the years hereafter show that this gap is closing, which is '*for the first time in the [Hungarian] history of modern epidemiological development* (Jozan, 2008).' The principal factor of this development is the change in smoking behaviour, as more women start to smoke and the number of smokers among man is no longer increasing since two decades. Recently introduced policies however aim at the prevention of smoking and increasing healthy behaviour, as tax on cigarettes has been raised, since April 2012 it has been permitted to smoke in pubs, cafés and restaurants and even a tax on unhealthy (chips, chocolate, cola) has been introduced (Hungarian Ministry of Human Resources, 2012).

3.3.3. Migration

Although international migration has not played a determining role in Hungary since the 1900s (Dobossy et al., 2003), annually, migration contributes to the population of Hungary, whereby especially attention has to be paid to the age- and gender-specific rates of fertility and mortality, which influence the national rates.

Hungary became involved in international migration in the late 1980s and can be considered moderate with regards to both the number of immigrants and their rate per thousand inhabitants (Gödri, 2009). The OECD (2010) classifies the inward and outward international migration movements to play a limited role compared to other OECD countries.
Between 1990 and 2007 two thirds of the immigrants arrived from four neighbouring countries Romania (45 %), the former Yugoslavia and the Ukraine, and to a smaller degree Slovakia. The other large group is that of those arriving from Asia, primarily from China (Gödri, 2009). Since 1990 there has been a positive net migration, which gradually incremented the stock of foreign citizens, but with very low impact on the population. OECD (2010) data shows that immigrants accounted for only 1.8% of the country's total population in 2008.

Figure 3.6: Immigrants by age group



Source: Gödri, 2009

Analysing the age of the immigrants is important for the future developments of Hungary. Figure 3.6 represents the distribution of the age groups of the immigrants to Hungary, whereby the large 20-39 age group attracts attention. The rate of these young and economically active groups is even exceeding the Hungarian average of the respective age groups (Gödri, 2009). This is a positive increment for Hungary from both demographic and economic point of view.

The gender differences in immigrants are also of importance to the future development of the population. At the beginning of large-scale migration there was a male surplus, with numbers over 60 %. This domination however, slackened in the course of the 1990s and disappeared by the end of the millennium (Gödri, 2009).

Finally, the education and labour participation of the immigrants can be analysed. These rates show a higher number of persons with higher education both among those born abroad and among foreign citizens than among the receiving Hungarian population. The immigrants also show a higher labour participation than the Hungarian population, as their level of employment is above the Hungarian average (Gödri, 2009).

Emigration rose in Hungary since the 1980s, as it became a transit country, where especially the foreigners left the country again. At the very beginning of the 1990s the number of emigrating foreigners reached about 25-30 % of the number of immigrants. From 1993 on this figure constantly remained below 20 %, and around the turn of the millennium it even remained below 10. Hungarian nationals emigrating for a certain period, or finally, are according to the Hungarian statistics only a few hundred persons per year. Philipov and Dorbritz (2003) confirm the Hungarian emigration number to be very low, they state that '*Emigration from Hungary is virtually non-existent* (Philipov and Dorbritz, 2003).' Emigration numbers did witness a boost after 2004, as the accession of Hungary to the European Union stimulated both foreigners and Hungarians to emigrate, especially towards Germany (Gödri, 2009). This flow declined hereafter, thereby continuing the low emigration numbers of the previous years. Recent data on 2008, 2009 and 2010 however, suggests that emigration numbers saw quite a large increase (Eurostat, 2012).

3.4. The Hungarian labour market

The development of the Hungarian labour market over the recent years is of crucial importance for the future expectations of the market. Labour market characteristics as unemployment, employment, inactivity and labour force participation are presented here. As the way in which the labour market can or will develop is also strongly shaped by the socio-economic policies that are implemented by the Hungarian government, an overview and an analysis of recent and upcoming policies and bills is provided.

3.4.1. Recent tendencies in the Hungarian labour market

Unemployment and inactivity

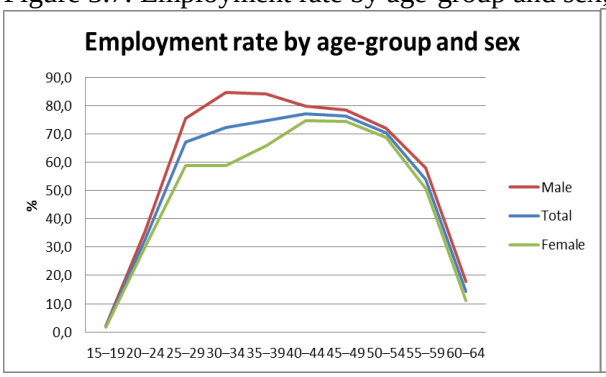
The unemployment rate (ratio of unemployed persons to the economically active population) has reached its peak (12.5 %) in 1993 and has been decreasing continuously until 2001, whereafter it started rising again due to the financial crisis, resulting in an unemployment rate of 11% in 2011 (HCSO, 2011). What is important to keep in mind is that low unemployment rates are partly due to the abandonment of job search by the non-employed which was facilitated by the welfare system (Varga, 2007). This is shown by the employment rate development.

Inactivity is explained by the exact opposite factors as employment and economic activity, therefore not thoroughly discussed here. The factors related to inactivity are the discouraged workers effect, as inactivity is more frequent among the long-term unemployed, the large informal economy and the fact that only 60 % of registered participants seek work actively (Bálint et al, 2011).

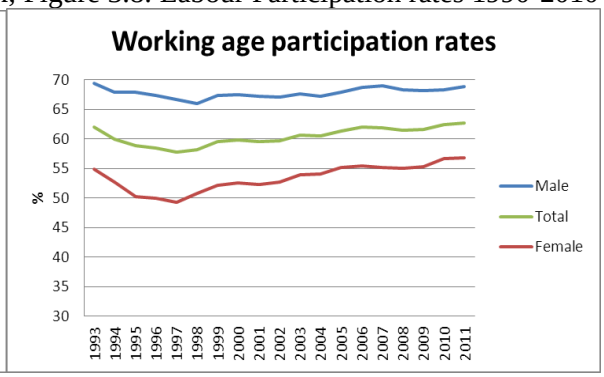
Employment and labour force participation

Figures 3.7 and 3.8 give an overview of the development of the employment rate and the labour force participation over time. After World War II more and more women entered the labour market as economic developments triggered an increase in labour demand. This resulted in a rise of women in the labour force from 29 % in 1949, to 42% in the 1960s. This growth continued at a moderate pace up to 46% of the economically active population at the second half of the 1980s (Kamarás, 1999).

Figure 3.7: Employment rate by age-group and sex; Figure 3.8: Labour Participation rates 1990-2010



Source: HCSO, 2011



Source: ILO, 2012

During the 1990s economic and societal transformation there was a rapid reduction of male economic activity, resulting in lower participation rates until around 1996. Female economic activity also saw a drop in participation rates. Both decreases in economic activity can be ascribed to the ageing of the population and the emergence of unemployment, which did not exist before the system change, but rose up to 12 %. The sectors in which most people are employed also saw a change over time, as between 1950 and 1990 the agriculture and industry sector shrunk and the service sector saw more employed persons. The combined consequences of these sectoral developments and the emergence of unemployment disproportionally affected unskilled males and industrial workers (Kamarás, 1999). This is closely related to the development of education, which was an important policy feature after the 1950s of the Hungarian government, as in all socialist countries.

The current employment rate (ratio of employed divided by the total population) is in international comparisons also low in Hungary. The employment rate among the 15–64 year-old population rose steadily but at a slow pace until 2003, and then, following a minor dip, stabilised at about 57 %. As a result of the crisis, it dropped from 56.7 % in the fourth quarter of 2008 to 55.5 % in the fourth quarter of 2009 and further to 54.5 % in the first quarter of 2010 (Bálint et al, 2011).

A closer look on the employment rate reveals that there are three groups for which the figures indicate substantially lower employment rates in Hungary compared to the European average: young people, men older than 40, and women aged 25–40.
The young people, classified as the 15-24 year olds, had the lowest employment rate (18%) in the OECD in 2010 (ILO, 2012). This is strongly influenced by the increased enrolment in (higher) education, usually for a longer time. Saczuk (2004) relates this to the increase in opportunities related to education after the system change in the 1990s. Before the fall of the Communist system education could hardly influence the labour market position, but after the system change a general shortage of people with adequate skills and experience to be able to fill in the managerial posts attracted many young people to choose the longer years of education as a step towards a quick career. Although these rapid career path possibilities have run out over the years, the economic studies still attract large amounts of students.
Another aspect that relates to these low employment levels is the availability of part-time work in Hungary, which in other European countries allows a combination of study and work. In Hungary these part-time jobs are unavailable, resulting in the choice of young people to study fulltime.
Finally, the more general explanation towards educational attainment in the younger years is explained by the low opportunity costs at the beginning of the working life (Becker, 1975; referred to in Saczuk, 2004), as earnings in the beginning of a person's working life are relatively low. Furthermore, more and more individuals decide to spend extra years on education, as the expected return is greater than the costs. This rationale has been strengthened by the technological progress and related structural changes in the labour market, which have increased the awards for skills and education. In Hungary the employment rates are low among the uneducated, while the employment rates of middle-aged and relatively highly educated people approach the EU average. The hereby occurring income effects from education are also large in Hungary, as men with tertiary education earn 174 % more than men with upper secondary education, where tertiary educated women earn 208% more than upper secondary educated women (OECD, 2005; referred to in Boeri and Van Ours, 2008).

The elderly workers were also affected by the societal changes of the nineties, especially as this group of people was not well prepared to compete for jobs in the new economic and societal setting. As a solution, the Hungarian government eased the tense social situation, by letting these elderly workers join the social pension system earlier. This solution of the previous years is now one of the main reasons the labour participation rates among the elderly workers is very low (Saczuk, 2004).
The older workers that are still capable and willing to work are facing the dilemma that employers possess negative perceptions about their capacity to adapt to technological and organizational changes. Furthermore, the elderly worker is seen as expensive and, as productivity deceases with age, less productive (Daniel and Heywood, 2007) and there are concerns of ill health difficulties with longer working hours.
Because of these perceptions, elderly people looking for work face long periods of unemployment, which makes them very vulnerable to the discouraged worker effects, resulting in the large amount of older people that leave the labour market via various social security arrangements and, if possible, early retirement (Blöndal and Scarpetta, 1999).

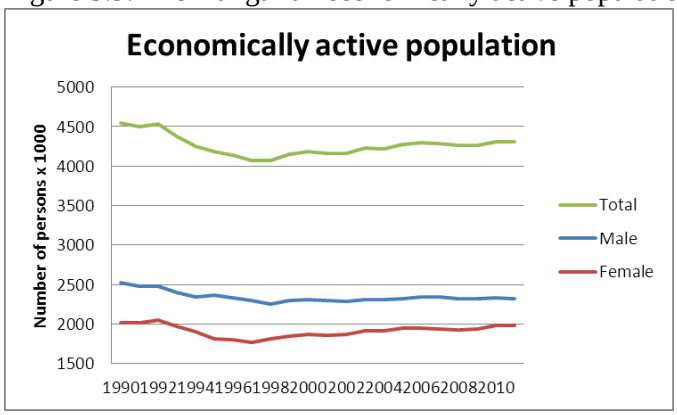
The women aged 25-40, as visible in figure 3,7, show a large decrease in employment in the childbearing age. These low employment rates are especially apparent among young women with young children (Bálint and Köllő, 2007; referred to in Varga, 2007).
Again, part-time work availability plays an important role, as only 7% of Hungarian women and 4% of Hungarian men work part-time (Eurostat, 2010), but child care availability and benefits also play a

role here. There is still a great struggle between working and having children, This is further explained in the policy subchapter, which aims at creating solutions for this problem. Participation of women over time did show a positive development, their fertility however, has slowly but steadily decreased. In 1993, there were 76.4 children for every 1000 women in this status group and by 2000 this went down to 69.3 (Spéder, 2002).

In an attempt to summarize the employment situation in Hungary, Fazekas (2004) relates four factors to the decreasing participation rate in Hungary since the late 1990s. Despite many governmental efforts, these negative developments in participation steered Hungary towards the countries with the lowest labour force participation rates in Europe.
Fazekas' (2004) factors are:
1) Weaknesses in labour demand for low-skilled/low-paid jobs.
The large extension of the informal market, the high tax wedge (high amount of taxes and contributions on labour) and the increases in the statutory minimum wage since 2000 have created low labour demand for low-skilled/low-paid jobs. Especially the fixed amount of health care costs for an employer make demand decrease, whereby part-time work is being discouraged by the taxes, resulting in the very low (3,3% of total employment) share of part-time employment in Hungary. The increase in minimum wage heavily affected small domestic enterprises and less developed regions.
2) Generous social transfer systems in terms of their coverage.
A large share of the working age population is covered by social benefits (such as disability benefits, official or quasi-official early retirement schemes) which, unlike unemployment benefits, do not encourage people to return to the labour market.
3) The existence of serious regional backwardness on the labour market.
This is related to the job destruction and creation during and after the transitional crises. The problem is that job destruction was evenly distributed across regions; while job creation was only concentrated in the most developed urban labour markets of the country. Alleviation of regional disparities is also seriously hindered by obstacles of internal migration and commuting, as Hungarians are not moving easily within the country, not even when they are not able to find a job at their homeplace.
4) The presence of a large scale informal economy.
The large extent (40% of employment) of the informal economy causes underestimation of the actual work activity, which makes it difficult to develop well-targeted measures to switch them to the formal economy.

The economically active population
Figure 3.9 shows the development of the economically active population by gender over time. It shows that the declines in both participation (Kamarás, 1999) and population (Fazekas and Molnár, 2011) have had their effect on the active population over time. Recent data (2010) still shows this decline in employment, even though it was moderated by the increase in the size of the public sector workforce. This was a result of the substantial expansion of public work schemes, as stated by the *Pathway to Work*-programme, which is discussed in the policy paragraph. Still, in the private sector, in contrast, there was a decrease in workforce size.

Figure 3.9: The Hungarian economically active population



Source: ILO, 2012

The economically active population is influenced by various socio-demographic characteristics as age, gender, household situation ethnicity and education. The theories and practicalities relating these descriptive statistics to labour force participation and ageing, also have their influence on the workforce, as the economically active population is essentially the combination of the employed and the unemployed.

3.4.2. Labour participation policies and practices
Labour force participation is under influence of a variety of policies of the Hungarian government. Here, a short summary of recently implemented policies is provided, together with an analysis of the contemporary labour market and labour participation situation. As the implementation of previous and future policy will also influence future labour supply (Boeri and Van Ours, 2008), some policy recommendations are also provided.

Basically, the Labour Code (The Hungarian Labour Law) is the policy that determines the labour participation opportunities. Fiscal, social and family policies however, are also of vital importance to determine current and future labour force participation outcomes. For a clear analysis of the variety of policies, this thesis applies a tripartite: first, there are working regulation policies, second, there are family policies and third, there are social security policies.

The working regulation related policies
The most comprehensive change in the Labour Law was the introduction of The New Labour Code. This bill has been accepted in December 2011 and will be effective as of July 1st 2012. Its main purpose is to create a labour law system which is in line with new market conditions, thereby aiming at more flexibility of employment (Bozsonyik and Pók, 2012), improvement of competitiveness (Liganet.hu, 2011) and ensuring increased job security (Politics.hu, 2011).
Giczi (2010) shows the necessity of changes in these regulations, as an analysis of the current labour market by Giczi (2010) shows that the labour market is inflexible and overregulated, with low part-time employment and a high number of hours worked. When looking at the share of part-time employment Hungary scores lowest in Europe, as only 7% of Hungarian women and 4% of Hungarian men work part-time (Eurostat, 2010). Giczi (2010) relates the traditional work schedule standards, the

inflexible labour market, the high extra charges on part-time jobs and limited self-entrepreneurship possibilities to be causing a very low demand for part-time jobs in Hungary. On the supply side, the traditional work schedule standards, low wages, worse career outlooks, low mobility of the workforce, counter-motivating effects of maternal support and the presence of black and grey economies are strongly limiting the number of Hungarians willing to work part-time (Giczi, 2010).

The working regulation related goals and measures

To positively influence labour participation, the future working regulation policies in Hungary should strive to rise the employment rates of groups with low economic activity e.g. mothers with children, young people, students, elderly workers and people with disabilities (Van Nimwegen and De Beer, 2006) and to implement a general advancement in flexible forms of work, especially part-time work, as it should lead to job maintenance in economically worse times and better cope with seasonal effect (Giczi, 2010). These flexible forms of work and increases of the number and availability of part time are expected to drive employment rates up, to increase productivity, and to fight against poverty (Giczi, 2010).

Measures and methods needed to implement these increases in economic activity and part-time work are:

- An increase in education of the economically active population, although the positive influence of improved education on employment is takes a lot of time (Cseres-Gergely and Scharle, 2009; referred to in Bálint et al, 2011).
- An improvement of employers' mentality and attitude towards part-time work (Boeri et al, 2005) and towards elderly workers (Van Dalen and Henkers, 2010). Van Dalen and Henkers (2010) find among Hungarian employers that only 20% of these employers is able to fit in elderly workers, that these employers massively oppose part-time work and that elderly workers (60 and 65+) are generally seen as a labour cost burden, instead of a source of know-how and experience.
- A reduction of the tax wedge on labour income, by reducing social charges. Between 2009 and 2010 the Hungarian government already reduced personal income tax and employer's social contribution; however after 2012 the tax wedge is expected to rise again, especially for low-incomes, as social security contributions are increasing (OECD, 2012). Furthermore, the closely to the social charges related taxation of the 2nd earners within a household can be improved, as these specific taxation measures have been shown to have strong effects on female labour participation (Jaumotte, 2003; referred to in Boeri et al, 2005).
- Finally, an improvement of the product market regulations would increase labour participation, as a high degree of product market regulation hinders the development of the service sector, which is a major employer of women (Jaumotte, 2003; Boeri et al, 2005). Rogerson (referred to in Boeri et al, 2005) provides evidence of a relation between the female labour participation rate and service sector growth, which asks for policies to encourage provision of services in the market. The service sector finds a strong overrepresentation of small- and medium enterprises (SME's), which means that the product market regulation, e.g. through hindrance of the start-up of SME's, directly affects service sector growth and female labour participation (EU Commission, 2011).

The family related policies

Family related policies have witnessed increased attention from the Hungarian government, as the population decrease, population ageing and the very low fertility levels have become a thread for the future sustainability of the economic and social system.

One of the measures to improve this situation was the introduction of a new maternity allowance system, which was introduced on May 1st 2011. It reinstated the right on a three year maternity benefit, as it was only in 2010 that the previous government limited the duration of entitlement to two years (Stolz, 2011). Another measure was the possibility to admit children under the age of three together with older children to public nursery schools in settlements where there are no other suitable day care facilities for under-threes. The last family related policy that has been introduced by the Hungarian

government was the introduction of policies that made it obligatory for employers to offer part-time work to women returning from maternity leave in 2009 (Fazekas and Molnár, 2011).
Still, an analysis of the current day situation proves that there are still problems with the extended parental leave, the willingness to have children, the family support policies and the low amount working mothers with children under three. Despite the rudimentary and rigid network of nurseries and a relatively high expenditure on family benefits, labour participation is still very low.

Family related policy goals and measures

The goals and measures are aimed to increase female labour supply, which is possible as certain criteria are met (accessibility of workplace, day care services of adequate quality), since they reduce the costs of employment for the worker (Fazekas and Molnár, 2011).
Two measures that can be implemented in order to increase the participation of women are:

- An increase in the willingness to have children, whereby flexible forms of work among young women are supported through improvements in family support, nurseries and kindergarten systems. These the child care and support related measures should also stimulate the move from part-time to full-time employment, as is the case in The Netherlands (Boeri et al, 2005). There is however a lot more to gain, as increased child care support can decrease the gap, of about 23 % (2005, European average), between the hours preferred and actually worked by mother with children under 6 (European Foundation for the Improvement of Living and Working Conditions; referred to in Boeri et al, 2005)
- A better early life child care within the family, as breaks in the career curve for mothers and parents result in lower monthly and life wages (Jaumotte, 2003; Giczi, 2010). This is closely related to the part-time job availability policies, as nowadays the choice between working or having children has to be made. As part-time jobs are better available this improves the combination of children and work. When part-time jobs are still very unavailable, the Spanish and Italian system of informal care by family and relatives can allow the combination of working and having children.

Social security related policies

The Hungarian social security and insurance system provides old age pensions, health insurance and disability pensions. The system is financially backed by social security contributions by employers, contributing 44% of the earnings paid to employees, and 10% contribution from the employees, resulting in 54% of the active earnings to go to the social security budget. However, due to the ageing of the population the financing of this pension system will become more problematic over time, which asks for strong reforms of this system.
To improve the social security situation, the attention from Hungarian government to the level of economic activity among the working-age population, both in terms of objectives and in terms of measures (Cseres-Gergely and Scharle, 2009; referred to in Bálint et al, 2011), has been rising gradually. Especially inactivity, pensions and disability allowances have received a great deal of attention.
The largest share of the Hungarian labour market programme budget has been invested in the "*Pathway to work*" programme, which is intended to offer community jobs of various durations to those in long-term unemployment (Cseres-Gergely, 2009). The programme aims to direct people from inactivity to employment; yet, it may also have the effect of increasing the flow from inactivity to unemployment because of the increased risk of being called upon to perform community work and the stricter sanctions that may in some cases be imposed in the event of refusal (Fazekas and Molnár, 2011). The programme has already led to an increase of the employment and participation rates, although only in the public sector.
The Hungarian government also abolished the 13th month pensions as of 2010 and has started to sober up the early retirement as they introduced pension reductions when a worker retires earlier than the statutory retirement age (OECD, 2011).
Furthermore, there was the introduction of a job protection plan, consisting of 10 points including major cuts in social security contributions and new simplified taxes for small businesses (Portfolio.hu,

2012a) and there has been a thorough study on efficiency of subsidy programs and job creation plans by the State Audit Office (Portfolio.Hu, 2012b).

Social security related policy goals and measures

In order to increase the labour participation of former inactive, disabled and elderly people, the social security and the pension system will have to be sobered up, while the public work programme will have to be expanded and improved.

There are three social security related measures that contribute to an increased participation of these groups:

- The first is a reduction of the disincentives that keep older workers from continuing their work. This is based on the tightening of the eligibility for disability benefits, on the phasing out of the early retirement schemes and on the increase of the statutory retirement age (OECD, 2012).
- The second is the reduction of the shadow-economy activity. The OECD (2012) aims at relating health care access to payment of contributions, increasing the sanctions against abuse and a more employment-friendly character of the social benefits. One recent measure introduced by the Hungarian government is the cut in unemployment benefit generosity, as the time a person is eligible to an unemployment benefit was shortened to 3 months (EU Commission, 2011).
- The third is an improvement of the "*Pathway to work"* programme. Empirical evidence from the OECD (2012) shows that this type of public work scheme is the least effective form of active labour market policies. Fleck and Messing (2010; referred to in OECD, 2012) show that various public work schemes in the past have failed to improve employability of participants or to provide a foothold in the labour market. The focus of the programme could better be changed from the public employment, towards training programmes, as these are associated with positive impacts on the labour market situation (Card et al, 2010; referred to in OECD, 2012).

3.5. Concluding remarks

It is clear that the population development of Hungary is not very promising for the future. The lowest-low fertility levels will not be sufficient to stop the ageing of the population, which is strengthened by the increased longevity of the elderly. Migration can only play a minor role in reducing the ageing process, as migration numbers are very low. The recent rise in emigration numbers will even negatively influence the ageing process as (skilled) younger workers are the largest emigrating group.

There is also plenty of room for both participation and employment rates to rise. The policies and practices have shown that the policies are not working out as planned and that if a further rise of the economically active population will occur, a critical look towards the flexibility, social security and family policies is necessary. Implementation of the suggested measures is of great importance for the optimistic assumptions for the workforce scenarios of the future.

Policies however, are not the only factors involved in the future development of the active population (Euwals and Van Vuuren, 2005). Socio-cultural norms and attitudes, demography, the business cycle, child care and education are just a handful of concepts involved in the complex context surrounding a rise in labour participation.

4. Assumptions and scenarios

4.1. Introduction

The theoretical framework and the Hungarian situation provide a firm base for the projections of the labour force over time. This thesis sets five different scenarios, based upon past, contemporary and assumed trends in the demographic and labour situation of Hungary. Each of these scenarios requires changes in the institutional, political, economic and socio-cultural context.

4.2. The scenarios

Scenarios are aimed to describe possible futures and can be based on identification of the main driving forces of changes in fertility, mortality and migration and on assumptions about possible future developments in these driving forces, e.g. economic, social, cultural, technological and political changes (De Beer, 2011).
Following recent European and Hungarian changes in the labour market, combined with the increasing impact of demographical change, these five scenarios are aimed to provide a complete picture of possible routes of the Hungarian participation and labour supply development.

1) The Baseline scenario: Application of current (2011) participation rates to the projected working age population over time.
This scenario uses 2011 participation rates (HCSO, 2012b) and combines these rates with population projection data up to 2050, provided by the Demographic Research Institute (2012), to project the economically active population up to 2050.

2) An increase in labour force participation rates by extrapolating recent trends in participation behaviour.
This scenario uses participation rates data from 1998 till 2011 to calculate and extrapolate the future development of these rates and projects them on the population projection data up to 2050, provided by the Demographic Research Institute (2012).

3) An increase of the labour participation rates for all age- and gender-specific groups to the EU average.
This scenario uses age group- and gender-specific participation rates which are the EU average in 2010, based upon data from the International Labour Organization (ILO) (2012). Hereafter, it uses the population projection data up to 2050, provided by the Demographic Research Institute (2012), to calculate the economically active population in 2050. The 2010 European average age group- and gender-specific data is set as a target to which the Hungarian participation rates will converge in 2050.

4) An increase of the labour participation rates to those levels that they will compensate for the demographic loss in economically active population in 2050.
This scenario combines population and participation rate data from 2011 (DRI, 2012; HCSO, 2012b) to calculate the active population in 2011. Hereafter, with a given working age population, as projected by the DRI (2012), the age- and gender-specific participation rates are calculated. These rates should result in the same economically active population totals as in 2011.

5) The implementation of the planned increase of the statutory retirement age from 62 to 65 between 2014 and 2022 into the labour force participation rates of 2050.
Although the average age of exit from the labour force is usually lower than the statutory retirement age (Pestieau, 2003), increasing the statutory retirement age can contribute to an increased labour force participation among the elderly workers (OECD, 2009). This scenario visualizes recent pension reforms aimed at increasing the labour force participation of the older workers in Hungary.

4.3. The assumptions

When making projections or alternative scenarios, the forecaster will have to make choices about the type of method to be used, the base period, the selection of indicators and explanatory variables. Furthermore, assumptions have to be made about the continuation of the past trends in the future and about future changes in driving forces (De Beer, 2011).

For this thesis there are two sets of assumptions that determine the scenario outcomes: the assumptions related to the development of the working age population and the assumptions related to the participation rates.
For the working age population development this thesis selected data from three institutions that provide population projections until 2050, all using different assumptions on the future development of fertility, mortality and migration. These are the Europop2010 (Eurostat Population Projections 2010-based) convergence scenario, the United Nations (UN) World Population Prospects: 2010 Revision medium fertility variant) and the Hungarian Central Statistical Office Demographic Research Institute (HCSO DRI) 2012 National population data 2050 projection.
The assumptions related to the future development of the participation rates are presented in a scenario-specific way, which requires certain specific changes in participation among gender and age groups to occur. The overall participation rate development in the scenarios, with the exception of the baseline scenario, is rather optimistic. This is justified by assuming certain institutional, political and behavioural changes that are expected to occur in the upcoming years.

The eventual economically active population in 2050 is the result of multiplying these scenario-specific labour participation rates by the working age population. These calculations are further explained in the data and methods chapter.

4.3.1. Population projection assumptions

To allow a better comparison of the Eurostat (2011), UN Population Division (2011) and DRI (2012) projections, table 4.1 presents the underlying assumptions of the future population projections.

Table 4.1: Comparing assumptions from 3 different institutions

		2010	2020	2030	2040	2050
HCSO DRI	Total Fertility Rate	1,256	1,363	1,500	1,500	1,500
	Migration	11519	15000	15000	15000	15000
	Male Life expectancy	70,50	73,37	75,75	78,11	80,43
	Female Life expectancy	78,11	80,77	82,89	84,93	86,90
Eurostat	Total Fertility Rate	1,32	1,36	1,40	1,44	1,47
	Migration	22.542	27.311	22.139	26.660	22.025
	Male Life expectancy	70,4	73,0	75,5	77,8	80,0
	Female Life expectancy	78,4	80,5	82,4	84,2	85,9
UN	Total Fertility Rate	1,43	1,59	1,70*	1,81	1,87*
	Migration	75000	75000	75000	75000	75000
	Male Life expectancy	70,8	72,8	74,3*	75,8	77,0*
	Female Life expectancy	78,5	80	81,4	82,7	83,9

* = UN 2010 revision, only provides estimates of the years 2000, 2005, 2010, 2015, 2020, 2040 and 2060, therefore the average of the two surrounding years is calculated

Source: Eurostat, 2011; UN Population Division, 2011; DRI, 2012

Analysis of the assumptions shows that the Eurostat and the DRI data do not differ that much and that the UN assumptions are further away from the other two. The most important factors for the middle-term population scenario are the fertility and the mortality assumptions, while the migration influences

the population on the short-term. As the range of these projections is set at 2050, the TFR and life expectancy assumptions are the decisive factors here. Thus, the UN 2010 Revision medium fertility variant with its very optimistic TFR and relatively pessimistic life expectancy assumptions is disregarded from now on.
Between the assumptions on life expectancy and fertility there are only slight differences, although all DRI assumptions are a bit more optimistic when compared to the ones from Eurostat. The outcome of the population projections of these two institutions the Hungarian population in 2050 are respectively 9,176,536 (Europop2010 (Eurostat Population Projections 2010-based) convergence scenario) and 8,968,223 (The HCSO DRI 2012 National population data 2050 projection). As the fertility and mortality assumptions from the DRI were slightly more optimistic than the Eurostat assumptions, the larger population in 2050 in the Eurostat projection has to be related to the annual migration numbers.

Assuming the continuation of past trends, whereby international migration has not played a determining role in Hungary (Dobossy et al., 2003), the projection with the lowest future migration numbers is favoured here. This is the HCSO DRI 2012 National population data 2050 projection.

4.3.2. General assumptions for the participation rates

It can be expected that the population ageing will increase the share of older workers, has significant consequences for social security and pension systems and can lead to labour shortages, especially for skilled workers (McDonald and Klippen, 2001; Guerzoni and Zuleeg, 2011).
To justify the optimistic assumptions, whereby, with exception of the first scenario, all scenarios assume a significant increase of participation rates for both males and females in the working age (15-65) or 50+ populations, the following changes in institutions, policies and behaviour are necessary:

The first is a serious change in the rules governing social security systems to support those eligible for benefits and to prevent system misuse (Zuleeg, 2007).
The second is continuous technological progress, creating demand for highly skilled labour, resulting in increasing returns from education.
The third is the continuation and improvement in educational development, as occurred in Hungary over the last decennia. This contributes to increased labour force participation for the society as a whole, as higher educated persons more often have a job than less educated persons (Van Vuuren and Euwals, 2006).
The fourth is a declining influence from fertility on female economic activity. This should, as education leads to higher opportunity costs and future development of institutions facilitate the combining of motherhood with a professional career, result in an increase of female labour force participation (Saczuk, 2004).
The fifth is, despite certain economic predictions of the Euro crisis and the current development of the Hungarian economy, the expectation that the increase in labour force participation will be compensated by a growing labour demand in the market. The country's substantial debts, often presented as an obstacle to boosting the governmental budgets, are also assumed not to harm the economic development due to increased labour force participation.
The sixth is a change in attitude towards (flexible) work by the government, employers and employees, which is required and assumed to happen as it will lead to increased labour force participation. This increased flexibility of employment allows previously non-working groups, as old age workers, student, migrants and especially women to participate in the economy (Guerzoni and Zuleeg, 2011).

Summarizing it can be stated that education, social security, family policy and labour market flexibility are necessary elements for rising labour force participation. As these elements are interrelated, e.g. as education influences fertility and non-activity on the labour market, the implementation of these elements requires mutual adjustments.

These assumed elements of change are partly based on Esping-Andersen (2000), Saczuk (2004) and the 2009 Ageing Report (EU Commission, 2009). Furthermore, Cseres-Gergely and Scharle (2010)

argue that since 1997 there has been a steady increase in the participation rate, driven by a rise in the statutory retirement age, improvements of the education system and changes in the composition of the working-age population towards higher educational attainment (Cseres-Gergely and Scharle, 2010). This trend is expected to continue until the end of the projection period in 2050.
Finally, Medeiros and Minty (2012) expect participation rates to increase among the age band 15-64, whereby the participation of women and older workers (aged 55-64) grows the strongest. To a lesser extent, also the younger workers show an increased labour force attachment (Carone, 2005).

4.3.3. Scenario-specific participation rate assumptions

Scenario 1: No change in current levels: apply current participation rates to the changing working age population.

This specific scenario uses the most recent data on labour force participation as given by the Hungarian Central Statistical Office, which is from the year 2011. These data are presented in table 4.2, which shows the very low participation of the young age groups, the low participation of the older age groups and a relatively high participation, especially among male workers, of the middle age groups. The analysis of recent trends in labour force participation in the second scenario, visualized by figure 4.1 and figure 4.2, also show the 2011 participation rates. The total participation rates of the economically active population, from which the definitions are based upon a variety of research institutes, can be presented using the 15-64 age groups. These "final" rates are dependent on the varying age- and gender-specific participation rates, of which, using the population in each age and gender group as weights, the "final" participation rate is calculated as weighted average (Toossi, 2005). These rates are currently among the lowest in Europe (Saczuk, 2004; HCSO, 2012b).

Table 4.2: The 2011 working age population labour force participation rates (%)

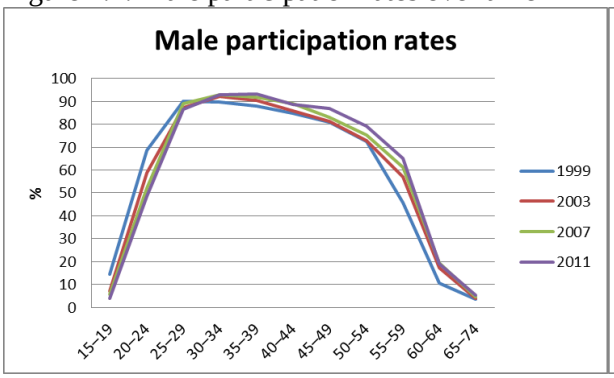
	15–19	**20–24**	**25–29**	**30–34**	**35–39**	**40–44**	**45–49**	**50–54**	**55–59**	**60–64**	**15–64**
Total	3,4	44,0	77,1	79,8	83,1	85,6	84,9	77,5	59,7	15,0	62,7
Male	4,0	48,4	86,5	92,9	93,2	88,6	86,8	79,1	65,0	18,9	68,8
Female	2,7	39,5	67,5	65,7	73,1	82,5	83,2	76,0	55,2	11,8	56,8

Source: HCSO, 2012b

Scenario 2: An increase of the labour force participation rates by the calculated trends in participation development from 1998 till 2011.

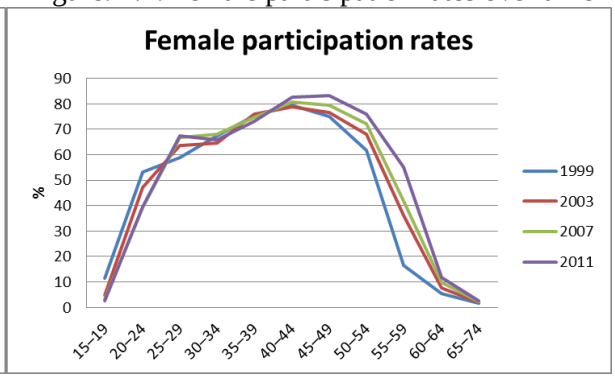
Age group- and gender-specific data from the HCSO (2012b) on labour force participation go back until the year 1998. A visualization of these trends in labour force participation is given by figure 4.1 and figure 4.2. It is clearly visible that the younger age groups show a decreasing participation rate over time for both sexes. The middle age group shows changing male participation over time, as it shows a very small increase over the years. The female participation rates show a more difficult pattern, as the 25-29 age category shows an increasing rate over time, while the 30-39 age category shows lower rates of participation in 2011 than in the previous years. The 44 and older female age groups show improving participation rates over time, which shows that the European trend of increasing female labour participation, especially in the older age categories (Saczuk, 2004; Medeiros and Minty, 2012) has also reached Hungary.

Figure 4.1: Male participation rates over time



Source: HCSO, 2012b

Figure: 4.2: Female participation rates over time



Source: HCSO, 2012b

The gender-specific total participation rates are extrapolated in table 4.3, by using a linear extrapolation function on the 1998 – 2011 participation data. These total participation rates are the weighted average of the varying participation rates of the different gender and age groups, whereby the populations of each age group is used as the weight (Toossi, 2005).
As the 5-year age group populations are available from the population projection data of the DRI (2012), the age group specific participation rates per gender are still unknown. These will be estimated by the author, based upon the past trends in the age group specific participation rates, as presented in the figure 4.1 and 4.2 and literature on the future development of the participation rates and labour supply (Genre and Gómez-Salvador, 2002; Saczuk, 2004; Carone, 2005; Medeiros and Minty, 2012).

Table 4.3: The contemporary and scenario 2 specific (*) male and female labour force participation rates (15-64) (%)

	1998	2000	2005	2010	2011	2015*	2020*	2025*	2030*	2035*	2040*	2045*	2050*
Male	65,9	67,5	67,9	68,3	68,8	69,5	70,4	71,2	72,0	72,9	73,7	74,5	75,4
Female	50,8	52,6	55,1	56,7	56,8	58,5	60,6	62,7	64,7	66,8	68,9	71,0	73,0

Source: HCSO, 2012b

Scenario 3: An increase of the labour participation rates for all age- and gender-specific groups to the EU average in 2010.

As current labour force participation rates in all age groups are low compared to the European average (HCSO, 2012b), thereby acting as a drag on the overall EU aggregate (Medeiros and Minty, 2012), this scenario sets current European participation rates as goals for the Hungarian rates in 2050. The necessary age group- and gender-specific participation rates, as presented in table 4.4, are based on the ILO (2012).

Table 4.4: The scenario 3 specific European labour force participation rates of 2010 (%)

	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
Male	23,7	66,4	88,6	93,0	93,0	93,2	91,8	86,8	74,5	39,9
Female	19,5	55,7	76,0	78,7	80,9	82,9	82,9	75,8	53,1	24,2
Total	21,6	61,1	82,4	85,9	87,0	88,0	87,3	81,1	63,2	31,5

Source: ILO, 2012

These participation rates are set to be reached in 2050, applying an identical annual growth rate in the 2010-2050 period. For the economically active population projections, the population projection data up to 2050 (DRI, 2012) are used to calculate the 2050s labour supply, given the earlier stated participation rates (ILO, 2012). Comparing the participation levels in table 4.1 and 4.3 already shows that Hungary is far away from these European rates in almost all age groups. The only group remaining rather stable until 2050, under the assumption that the European participation rates will be reached, is the male 25-39 age group. All other age groups are assumed to show a rise in participation rates over time.

Scenario 4: An increase of the labour participation rates to those levels that they will compensate for the demographic loss in economically active population in 2050.

Based on the DRI (2012) population projection the estimated demographic effect on the future labour supply can be determined, as the current (2010) participation rates and population will produce the nowadays active population. The demographic effects on the working age population in 2050 will be compensated for by the change in labour force participation rates. Hereby the age group- and gender-specific participation rates in 2050 will be dependent on the change that has occurred in the working age population between 2010 and 2050. As the demographic projection (DRI, 2012) shows a decrease in population among most age groups, the age group specific participation rates are expected have risen in 2050.

Scenario 5: The implementation of the planned increase of the statutory retirement age from 62 to 65 between 2014 and 2022 into the labour force participation rates of 2050.

This scenario visualizes recent and future policy changes aimed at the increasing labour force participation of the elderly in Hungary, of which the planned increase in statutory retirement age is the main contributor. Table 4.5 shows the annual statutory retirement age between 2014 and 2022, thereby assuming a similar annual growth of the retirement age. This process of increased statutory retirement age is closely related to the Lisbon strategy to increase labour market participation and labour supply especially amongst women, young and older workers (Eurostat, 2010).

Table 4.5: Statutory retirement age development

2014	2015	2016	2017	2018	2019	2020	2021	2022
62	62,375	62,75	63,125	63,5	63,875	64,25	64,625	65

Source: OECD, 2009

The OECD (2009) data show that an increase in the statutory retirement age contributes to increased labour force participation among the elderly workers. For Hungary, the average effective age of retirement rose for both men and women between 2002 and 2007, regarding that for women this period was characterized by a rise in statutory retirement age (OECD, 2009). In 1997 the average effective age of retirement was 57,8 for males and 56,0 for females, with a statutory retirement age of 62, respectively 58. In 2007 the average effective age of retirement was 59,7 for males and 58,2 for females, with a statutory retirement age of 62, respectively 60.
Despite this recent growth, Hungary still has one of the lowest average effective retirement ages among OECD-countries (OECD, 2009). Together with the fact that the average age of exit from the labour force is usually lower than the statutory retirement age (Pestieau, 2003), this leads to a withdrawal from the labour force of a lot of potential workers, making them move into retirement in their late 50s.

Another factor influencing the labour force participation of the elderly is the pensionable age, which is the age at which people can first draw full benefits (OECD, 2009). This is closely related to the development of the statutory retirement age, as OECD (2009) assumes the gap between pensionable

age and statutory age to close between 2014 and 2022. As table 4.6 shows, in 2009 the pensionable age was 60 for men and 59 for women. This age is assumed to rise to age 65, both for men and women. Hereby the same assumption of a similar annual growth is assumed as is implied with the increase in statutory retirement age.

Table 4.6: Pensionable age development, assuming convergence in 2022

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Men	60,0	60,4	60,7	61,1	61,5	61,9	62,3	62,6	63,0	63,4	63,8	64,2	64,6	65,0
Women	59,0	59,4	59,9	60,3	60,8	61,2	61,7	62,2	62,6	63,1	63,6	64,0	64,5	65,0

Source: OECD, 2009

These two developments are the underlying assumptions for the creation of the participation rates that include these effects. Genre and Gómez-Salvador (2002) however, state that a continuation of labour market policies will be needed to encourage participation if the increased participation rates are to be met. It therefore is assumed unrealistic to expect that, without reform, increasing the retirement age will result in high employment rates among the older workers. As these are already far too low among 60-64-year-olds, any change in the retirement age must be accompanied by assumed pro-active policies geared towards addressing the specific needs of older workers (e.g. flexible working arrangements and the possibility of changing careers) to boost participation rates in these age groups (Zuleeg, 2007).

For these reasons, the planned increase in the statutory retirement age from 62 to 65 between 2014 and 2022 is assumed to increase the 50-65 year old participation rates in 2050, as a result of the impact from the increased statutory retirement age, the rise in pensionable age and assuming the statutory retirement age-policy is accompanied by the pro-active policies as stated by Zuleeg (2007).

These assumptions lead to the creation of table 4.7, where the rise in statutory retirement age and the pensionable age are quantified into the participation rates of the 50-64 year old age groups. The exact calculations can be found in the data and methods chapter.

Table 4.7: Scenario 5 specific assumptions on the labour force participation rates (%)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023-2050
Men 50-54	79,1	79,6	80,1	80,6	81,6	82,6	83,5	84,5	85,5	86,5	87,5	88,5	88,5
Women 50-54	76,0	76,6	77,2	77,7	78,8	79,8	80,9	81,9	83,0	84,1	85,1	86,2	86,2
Men 55-59	65,0	65,4	65,8	66,2	67,0	67,8	68,6	69,5	70,3	71,1	71,9	72,7	72,7
Women 55-59	55,2	55,6	56,1	56,5	57,2	58,0	58,8	59,5	60,3	61,1	61,8	62,6	62,6
Men 60-64	18,9	19,0	19,1	19,2	19,5	19,7	19,9	20,2	20,4	20,6	20,9	21,1	21,1
Women 60-64	11,8	11,9	12,0	12,0	12,2	12,4	12,5	12,7	12,9	13,0	13,2	13,4	13,4

Two important assumptions still have to be stated here. The first is that, although the rise in statutory retirement is usually calculated in line with gains in life expectancy, increased life expectancy of the average Hungarian male or female in the future (as projected by the data used from the DRI, 2012) will not lead to a further rise in statutory retirement age. The second is that, as this scenario is probably and possibly combined with one of the other scenarios, the effects of increased participation rates among older workers is the only effect estimated here. Hereby the assumption is made that the 15-49 age group participation rates are remaining on the 2011 level, as in the baseline scenario.

5. Data, methods and definitions

5.1. Introduction

Because the accuracy of population forecasts can only be evaluated ex post, the choice of methodology should be based on internal validity of the projection, together with the incorporation of as many relevant facts and relationships as possible (Preston et al, 2000). Therefore, the data and methodology chapter can be considered as a key element in this thesis.
Here, the source, criteria and description of the used data, the study area, the selection of the subjects and a reflection on the quality of the data and your methods is provided. Furthermore, the methods used to create the future economically active population and their underlying scenarios, the definition of concepts and the working definitions are given.

5.2. Data criteria, availability and selection

Analysing the recent trends in labour participation and employment (rates) asks for specific information, which based upon aggregated data would have not been possible (Saczuk, 2004). When looking at aggregated data only, the economically active population developments in, for example Ireland, would have simply shown an increase from 25 to 37 % between 1981 and 2001 (ILO, 2004; referred to in Saczuk, 2004). The truth is that the rise in female employment caused 80% of this change, whereby especially the middle- and older age groups of the female active population saw the greatest increase. Demographers, policy makers and data analysts therefore need to look at the relevant level of change.

This thesis requires age- and gender-specific participation and population data. Hereby, the participation and resulting economically active population are calculated by 5 year age groups for both sexes, which is the standard in UN, Eurostat and HCSO DRI publications. Disjointedly analysing the participation age groups will allow a better consideration of the factors that play a significant role in determining the levels of the rates and more precise forecasting of their future course (Saczuk, 2004). The population data is required to have a 1-year age interval, still being gender-specific, as one of the scenarios calculates the increase in statutory retirement age, which is planned to occur in Hungary between 2014 and 2022 (European Commission, 2012).

There are various population projections available, as a variety of institutions produce reports and statistics on the labour market and participation. For this thesis the selected institutions are the Eurostat, United Nations Population Division and Demographic Research Institute population projections.

The population data from the HCSO DRI (2012) provides a projection of the Hungarian population per 1 year age group- and gender-specific, by 1-year interval, while the Europop2010 (Eurostat, 2011) projections provides the population by gender and 5-year age group, by 5-year time interval and the UN 2010 Revision provides the population by gender and 5-year age group, with a varying time interval in the long term.
As the 1-year interval is a necessity for the 5th scenario, the DRI (2012) national projection is the only suitable projection for this thesis. Furthermore, the DRI projections are the most recent and they are acquired directly from the national statistical office. The total age group specific population data from the DRI (2012) is presented in table 5.1.

Table 5.1: Age group specific participation rates and population numbers in 2011												
	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	15–64	Total
Participation rate (%)	3,4	44,0	77,1	79,8	83,1	85,6	84,9	77,5	59,7	15,0	62,7	55,8
Population (thousands)	589	643	685	822	789	698	594	670	751	617	6857	9985

Source: DRI, 2012; HCSO, 2012b

The participation data is available in the necessary formats from two sources: a series of Hungarian Labour market reviews and analysis of the Institute of Economics, Hungarian Academy of Sciences (Bálint, 2011) and the HCSO (2012b). Bálint (2011) provides the latest labour market developments from 1990 to 2009, while the HCSO (2012b) provides an overview of the Hungarian labour market between 1998 and 2011.
Although both sources provide the participation data in the right formats, the choice to use the HSCO (2012b) data is based upon the fact that the population projections are also calculated by the HCSO DRI (2012), which increases the compatibility of the data. This compatibility is also one of the reasons the data from Bálint (2011) is not used, as the statistical data on labour participation is reweighted for the years after the 2001 Population census. The 2011 total age group participation rates of the HCSO (2012b) are presented in table 5.1. These rates are used as starting point in all of the scenarios.

5.3. Methods

5.3.1. Study Design

This thesis pursues an explorative character, as it explores the possible consequences for the workforce when a higher labour force participation rate is achieved among the future Hungarian population. The projections and scenarios are making this thesis quantitative and at the same time a longitudinal study, as longitudinal studies are often the best way to study changes over time (Babbie, 2007).
The specific type of longitudinal study is the trend study, as it "*monitors a specific characteristic of the population over time* (Babbie, 2007: p. 103)," namely the labour force participation. This thesis uses these trends as input for the assumptions about the future behaviour of the labour force participation.
Furthermore, this thesis studies the labour force participation at a macro-level (Hungarian) scale and uses secondary data analysis techniques, as data from statistical agencies are used to derive the future demographic data from and are analysed to make assumptions of future labour force participation rates.

5.3.2. Scenario calculations

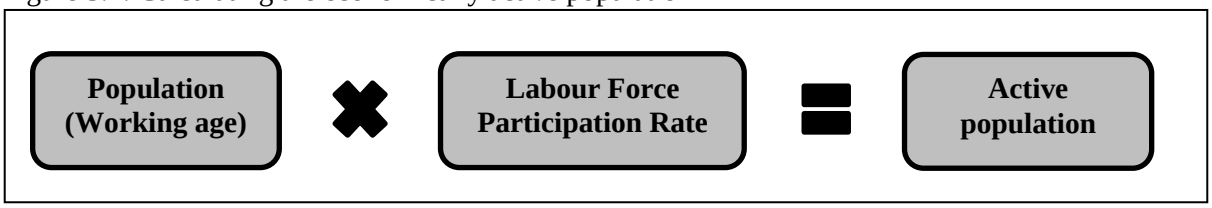
The conceptual model provides an overview of the factors and processes involved in this thesis. It shows how these factors are related to the economically active population, which is the goal of the scenarios and projections of this thesis. To allow the analysis and calculations of these relations, the indicators of the theoretical concepts (the factors) and the relations between the factors are operationalized here.

To get to the desired results for each scenario, three steps prove necessary:

1) The population is calculated in the necessary format, age-and gender specific (in number of people). This part can be labelled as the potential labour force or working age population and applies to all the scenarios.

2) The age group- and gender-specific participation rates, depending on the scenario, are stated and/or calculated (in percentages).
3) The economically active population is calculated as the product of labour force participation rates (in percentages) and the demography situation (in numbers), which should result in economically active population in numbers. This process is visualized by figure 5.1.

Figure 5.1: Calculating the economically active population



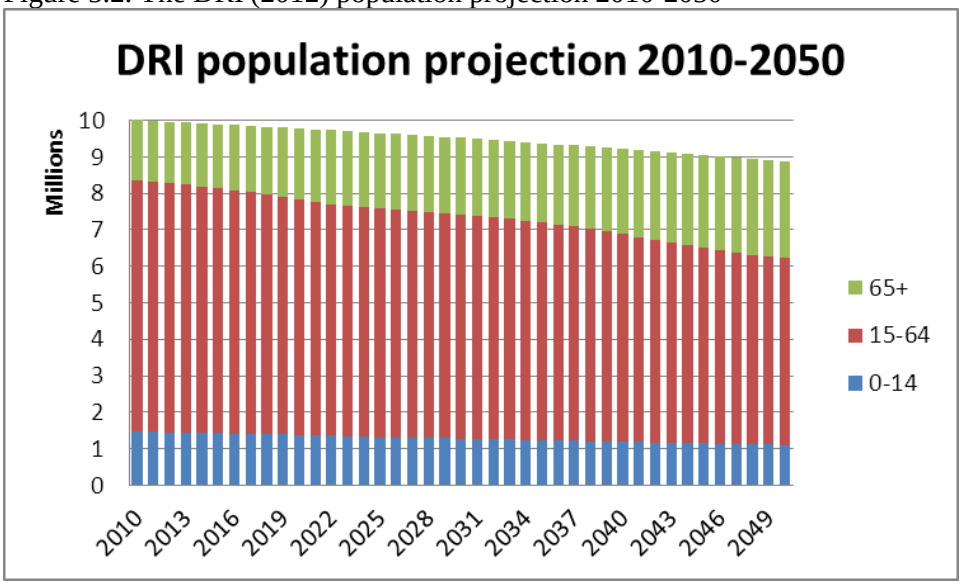
Step 1: The population projection

The population data is derived from the Demographic Research Institute (2012)'s Population Projection of Hungary 2010-2050, medium variant. The population data contains gender-specific population per 1-year age group over 1-year intervals, which is calculated using the Cohort Component Model.

This model is nearly the only method used for population projections and its approach is the segmentation of the population into different subgroups that are differentially exposed to the "risks" of fertility, mortality and migration, thereby separately computing the changes over time in each age group (Preston et al., 2000).

The resulting Hungarian population development is presented below in figure 5.2, which shows a clear decline of the working age population over time.

Figure 5.2: The DRI (2012) population projection 2010-2050



Source: DRI, 2012

To operationalize the population, the age, age group and gender the following terms are used:

The total working age population in a certain year (t), is the sum (∑) of all age (i) and gender (s) specific (sub) populations between ages 15 and 64

$$P^{t}_{working\ age} = \sum_{i=14}^{64} \sum_{s=m,f} P^{t}_{is}$$

As the participation rates are age group- and gender-specific, the total 15-19 year old population in 2011 is given by:

$$P_{15-19}^{2011} = \sum_{i=14}^{19} \sum_{s=m,f} P^{2011}$$

Step 2: The labour force participation rates

The age group- and gender-specific participation rates from the HCSO (2012b) are the rates involved in all five scenarios, whereafter the scenario-specific assumptions on the participation rate development are projected on these 2011 rates. To operationalize these labour force participation rates, the following terms are used:

The overall participation rate (referred to age group 15 to 64 years old) is calculated as a weighted average of age (i) and gender (s) specific participation rates ($PR^t{}_{is}$) (Carone, 2005):

$$PR^t = \frac{\sum_{i=14}^{64} \sum_{s=m,f} PR_{is}^t * P_{is}^t}{\sum_{i=14}^{64} \sum_{s=m,f} P_{is}^t}$$

The age-specific participation rate for males in the age group 15-19 in 2011 is given by:

$$P_{15-19,m}^{2011} = \frac{\sum_{i=14}^{19} \sum_{s=m} PR^{2011} * P_{15-19,m}^{2011}}{\sum_{i=14}^{19} \sum_{s=m} P_{15-19,m}^{2011}}$$

Step 3: The economically active population

The economically active population (also labelled as labour supply) will be obtained by multiplying the participation rates projections with the projections of the working-age population.

The potential active population for each age-gender cohort *i* (EA_{is}^t) is calculated by:

$$EA_{is}^t = PR_{is}^t * P_{is}^t$$

The overall economically active population in each year *t*, is a weighted average of all age- and gender- specific active populations:

$$EA^t{}_{is} = PR^t * P^t{}_{working\ age}$$

5.3.3. Scenario-specific participation calculations

For scenario 1 there are no complex participation calculations involved, as both the working age population and the participation rates are directly available in the right formats from respectively the DRI (2012) and the HCSO (2012b). Following the scenario calculations, the future economically active population can be calculated, whereafter the total 15-64 gender-specific participation rates can be determined.

For scenario 2, there are some calculations involved, before table 4.2 could be generated. The demographic data is not involved in these participation calculations, yet still available in the right format from 2010 to 2050 (DRI, 2012). As stated in the assumptions, this scenario focuses on the 5 year age group- and gender specific participation rates, as from these rates, using the 5-year age group population in 2050 as weight, the total 15-64 year participation rate can be calculated.

The gender specific total participation rates extrapolated in table 4.2, are acquired using a linear extrapolation function on the 1998 – 2011 participation data of the HCSO (2012b). This linear

extrapolation calculates future trends assuming that the variation in the participation rates is proportional to the variation in time (Carone, 2005). There are three reasons for using these extrapolations: the first, the years of previously known participation rates that are used as input data, the second, the choice for linear extrapolation, and third, the projection of the gender-specific 15-64 year old participation rates and not the age group- and gender- specific rates.
Firstly, the choice for using 1998-2011 participation data was based upon the data availability by the HCSO (2012b), which dates back to 1998. Trends have been calculated by the author using quarterly data from 1998-2011, annual data on 2002-2011 and 1998-2007 as reference period. The outcomes of the linear regression from the quarterly data were far too high, as both male and female (15-64) participation approached 80% in 2050, a rate that is barely realised in Sweden (Carone, 2005). The 1998-2007 base period, as used in Medeiros and Minty (2012), also resulted in a bit too optimistic participation rates, while the 2002-2011 base period resulted in rather participation resulted in the largest gap between female and male participation rates in 2050. Thus, the choice for the 1998-2011 base period was made, as the gap between female and male participation is nearly closed, the scenario is using the most of the available data and its resulting rates were in the middle of the other variants. Another reason for taking the longest possible period of data is that the influence of the business cycle, which significantly impacts the participation rates, will be covered as best as possible, resulting in the projected participation rates as averages over the 'normal' business cycle (Medeiros and Minty, 2012).

Secondly, a variety of extrapolation methods was tested to see how the future participation rates would develop. The most likely extrapolation methods: exponential (rates grow with a constant proportion per unit time; e^0) and logarithmic (the inverse of the exponential function; Ln(x)) method, have resulted in unwanted and unrealistic results. The exponential growth extrapolation resulted in a higher participation of women than for men in 2050 and is therefore disregarded, as a variety of scholars (e.g. Carone, 2005) still project and expect male participation rates to dominate the female ones. The logarithmic functions resulted in a very low growth of the participation rates for both males and females, as was expected. With logarithmic functions on the longer time the growth declines as each unit increase on the logarithmic scale represents an exponential increase. The linear regressions also produced the highest R squares (the ability to predict the trend in participation).
Thirdly, the projection of the gender-specific 15-64 year old participation rates and not the age group- and gender- specific rates was based upon the results of the extrapolation (using a variety of extrapolation methods) of the age group specific participation rates. These resulted in participation developments whereby the slopes were very steep, resulting in under 0% or above 100% participation rates, which would require a large amount of modifications per gender and age group, e.g. by accelerating or decelerating the trends.
The total labour participation rates (15-64) for males are calculated using: the formula $y = 0{,}1668x + 66{,}533$ ($R^2 = 0{,}7001$). For females the formula $y = 0{,}4146x + 51{,}052$ ($R^2 = 0, 9274$) was used as input for the participation projections until 2050. Hereby x, the year, was set to 1 in the year 1998, resulting in a value of 53 in 2050. The eventual results are presented along with the introduction of the second assumptions in table 4.2.

For scenario 3, the ILO (2012) provides age group- and gender-specific participation rates aggregated on a European level, which includes: Belarus, Bulgaria, Czech Republic, Hungary, Moldova, Poland, Romania, Russian Federation, Slovakia, Ukraine, Channel Islands, Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, United Kingdom, Albania, Bosnia and Herzegovina, Croatia, Greece, Italy, Macedonia, The former Yugoslav Republic, Malta, Montenegro, Portugal, Serbia, Slovenia, Spain, Austria, Belgium, France, Germany, Luxembourg, Netherlands and Switzerland.
These European age group- and gender-specific participation rates are set as a target to which the Hungarian age group- and gender-specific participation rates of 2011 will converge to in 2050. Assuming a constant annual growth of the participation rates allows the following calculation of this average annual growth rate of each age group- and gender- specific participation rate:

$$average\ annual\ participation\ growth\ rate = \left(\frac{part\ rate\ 2050}{part\ rate\ 2011}\right)^{1/39}$$

Whereby 39 is the number of periods wherein the convergence of the age group- and gender-specific participation rate has to take place and the fraction represents the difference in participation rates between 2011 and 2050.

The age group- and gender-specific participation rates of the years following the base year 2011 are calculated using the formula:

$$participation\ rate\ year\ x = participation\ rate\ 2011 * annual\ participation\ growth\ rate^{(year\ x - 2011)}$$

Hereafter, using the formulas of step 2 and step 3, the working age population participation rate and the economically active population can be calculated in each of the years between 2011 and 2050.

For scenario 4 age group- and gender-specific data on the population is available in 2010 and 2050 (DRI, 2012). The age group- and gender-specific data on the participation rates is only available in 2010 (HCSO, 2012b). In 2010 the economically active population, age group- and gender-specific, is calculated using the population and participation data. These age group economically active populations are then used to recalculate the participation rates, using the 2050 population numbers. The change in total economically active population, based on the projected demographic changes (DRI, 2012), will also require an increased total participation rate, which is calculated from the age group- and gender-specific participation rates and population. As figure 5,2 shows a strong decline of the working age population over time, the participation rates may theoretically have to rise above 100% to compensate for the demographic loss. To control for these impossible participation rates, the recalculated age group- and gender-specific participation rates are limited at 100%.

For scenario 5, an important calculation has been underlying table 4.6, the assumptions on participation rate increase.
The given participation rates are calculated from OECD (2009) data on statutory retirement age development and pensionable age development and HCSO (2012b) data on labour force participation rates of the age groups 50 - 65.
First, the statutory retirement age growth from 62 in 2014, to 65 in 2022 is calculated using the simple calculation of the difference in years of statutory retirement, divided by the time is takes to implement these changes. So, (65-62)/ 8 = 0,375, resulting in an annual increase in statutory retirement age of 0,375 years, as given in table 4.4.
Secondly, the calculation of the annual increase in pensionable age is more complex. The main calculation is that to acquire the pensionable age in 2022, assuming a constant growth of the pensionable age from 2009 (the last year with available data), the number of periods and both pensionable ages are required. The number of periods is 13, as pensionable age in 2009 is last known, the pensionable age was 60 for men and 59 for women and both will reach 65 in 2022, under the assumption used in this thesis, as given by the OECD (2009), that the pensionable age will converge to the statutory retirement age in 2022.

The average annual pensionable growth is calculated by:

$$average\ annual\ pensionable\ agegrowth = \left(\frac{pens\ age\ 2022}{pens\ age\ 2009}\right)^{1/15}$$

The results of applying these growth rates can be found in table 4.5.

As now both pensionable age and statutory age are now known, their effect on the participation rate is estimated by calculating the growth rates for both the rise in pensionable age and the rise in statutory age in any given year, compared to the 2011 levels.

The formula to acquire the pensionable age growth rate in 2015 is given by the formula:

$$\frac{pensionable\ age\ 2015 - pensionable\ age\ 2011}{pensionable\ age\ 2011}$$

The statutory retirement age growth rate between 2011 and 2015 can be calculated using the formula:

$$\frac{statutory\ retirement\ age\ 2015 - statutory\ retirement\ age\ 2011}{statutory\ retirement\ age\ 2011}$$

Hereafter, these growth rates are applied to the participation rates in 2011, resulting in a growth of the participation rates over the years 2012-2022. The combined effect from these growth rates is calculated by adding up the growth in participation rates caused by the rise in statutory retirement age and the growth in participation rates caused by the rise in pensionable age and adding them to the 2011 participation rate of the age group 50-54, 55-59 and 60-64. This results in table 4.6.

5.4. Definition of concepts

There are numerous terms that are involved in this thesis; therefore their definitions are presented below. The working definition in this thesis, describing the employed and unemployed persons is the (economically) active population or labour supply.

Rate:
'Number of Occurrences' divided by 'Person-years of Exposure to the Risk of Occurrence'. Demographic rates thus contain in the numerator a count of the number of events occurring within some defined time period, and in the denominator an estimate of the number of 'person-years' lived in the population during that time period (Preston et al., 2000).

Labour market definitions

Unemployed:
Unemployed persons are persons who: - were without work, i.e. were neither having a job nor being at work (for one hour or more) in paid employment or self-employment during the reference week - had actively looked for work at any time in the last four weeks, - were available for work within two weeks following the reference week or were waiting to start a new job within 30 days.

Employed:
Employed are persons who during the reference week (the week running from Monday to Sunday) worked one hour or more for pay, profit or payment in kind in a job or business (including farm); or worked one hour or more without payment in a family business or on a farm (i.e. unpaid family workers); or had a job from which they were temporarily absent during the survey week. Persons being on child-care leave have been determined by their activity done during the reference week. Conscripts are excluded from the survey corresponding to Eurostat recommendations, as they are institutional population.

Economically active population (Labour supply and active population are all interchangeable concepts):
The economically active population is empirically quantified as the sum of persons actually working (employed) plus the people who would like jobs but are not working at the time of the observation (unemployed).

Economically inactive:
Those who had no job on the reference week or regular work for pay; who had not been looking for a job, or even if they had, would not have been able to start the job.

Unemployment rate:
The ratio of unemployed persons to the economically active population of corresponding age.

Employment rate:
The ratio of employed persons to the population aged 15–64.

Participation rate:
The ratio of economically active persons to the population of the same age-group (all the above definitions are based upon Hungarian Central Statistical Office (2009; 2011).

Economic Activity rate:
The economically active working age population divided by the total population

Pensionable age:
Age from which the individual is eligible for pension benefits (OECD Working Party on Private Pensions, 2005).

Dependency ratios
Dependency ratios are important demographic indicators that set the young and old populations (those generally economically inactive) in relation to the population of working age. This thesis uses two types of dependency ratios, the normal dependency ratios, whereby only population data is used and a labour market adjusted dependency ratio, whereby the economically active population is involved. The idea of a labour market adjusted dependency ratio is based on Guerzoni and Zuleeg (2011).

Young-age dependency ratio:
The population aged up to and including 14 years divided by the population aged between 15 and 64 years

Old-age dependency ratio:
The population aged 65 years or older divided by the population aged between 15 and 64 years

Total dependency ratio:
The population aged up to and including 14 years and aged 65 years or older divided by the population aged between 15 and 64 years (all the above definitions are based upon Guerzoni and Zuleeg, 2011).

Labour market adjusted young-age dependency ratio:
The population aged up to and including 14 years divided by the economically active working age population

Labour market adjusted old-age dependency ratio:
The population aged 65 years or older divided by the economically active working age population

Labour market adjusted total dependency ratio:
The population aged up to and including 14 years and aged 65 years or older divided by the economically active working age population

Total inactive population dependency ratio:
The inactive working age population, the population aged up to and including 14 years and the population aged 65 years or older divided by the economically active working age population

Projections and scenarios
Forecast:
Forecasts are based upon assumptions about the most likely future developments, resulting in a forecast

Projection:
A projection is an outcome of any set of assumptions about future trends without a statement that this is expected to be the most likely future development

Baseline or reference scenario:
A projection that usually is based upon continuing trends, which when regarded the most likely scenario, can also be called a forecast (Hilderink, 2000).

5.5. Working definitions

Before the calculations start it is necessary to define the ways in which a concept is calculated. Employed, unemployed and the population are the concepts which form the basis of the others. Their definitions can be found in the definition of concepts.

$$Economically\ active\ population = Employed + Unemployed$$

$$Economically\ inactive\ population = (Population\ aged\ 15-64) - Economically\ active\ population$$

$$Participation\ rate = \frac{Economically\ active\ population}{Population\ aged\ 15-64} \times 100\%$$

$$Unemployment\ rate = \frac{Unemployed}{Economically\ active\ population} \times 100\%$$

$$Employment\ rate = \frac{Employed}{Population\ aged\ 15-64} \times 100\%$$

$$Lab.\ market\ adjusted\ young\ age\ dep.ratio = \frac{Total\ 0-14\ population}{Total\ 15-64\ economic\ active\ population}$$

$$Lab.\ market\ adjusted\ old\ age\ dep.ratio = \frac{Total\ 65+\ population}{Total\ 15-64\ economic\ active\ population}$$

$$Lab\ market\ adjusted\ total\ dependency\ ratio = \frac{Total\ 0-14\ and\ 65+\ population}{Total\ 15-64\ economic\ active\ population}$$

$$Total\ inactive\ population\ dependency\ ratio = \frac{Total\ inactive\ working\ pop + Total\ 0-14\ and\ 65+\ population}{Total\ 15-64\ economic\ active\ population}$$

$$Economic\ activity\ rate = \frac{economically\ active\ working\ age\ pop}{Total\ population} \times 100\%$$

6. Results

6.1. Introduction

This chapter presents the economically active population development, given the different scenarios and underlying assumptions on the labour force participation and the development of the future Hungarian population. Furthermore, a critical review and analysis of each of the particular scenarios will estimate the feasibility of the scenarios.

6.2. The working age population developments until 2050

The development of the working age population until 2050 represent the basis of each of the labour supply scenarios, as the participation rates are multiplied by the population.
Analysis of the population development focuses especially on the 15-64 year age group, as these represent the working age population. The number of elderly (65+) and number of younger people (0-14) are used in the calculation of the dependency ratios, which apply the definition of concepts of the previous chapter.
The female and male economically active population development over time is presented by table 6.1, thereby separately presenting the main age groups 0-14, 15-64 and 65+.

Table 6.1: The Hungarian population development from 2010 to 2050

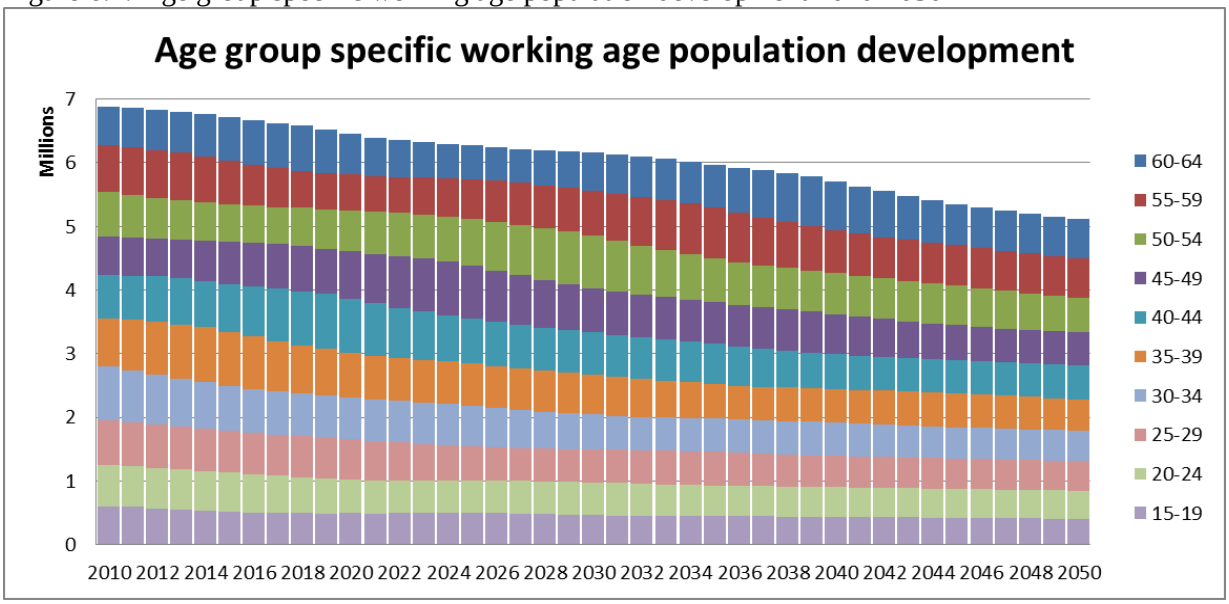
	2010	2015	2020	2025	2030	2035	2040	2045	2050
Male 0-14	757690	731050	709699	676566	657160	635443	612221	589397	568153
Male 15-64	3390875	3325504	3217889	3144932	3095497	3009056	2885156	2715941	2602967
Male 65+	608335	651318	734123	790597	804208	849635	928955	1050941	1114280
Male Total	4756900	4707872	4661711	4612095	4556865	4494134	4426332	4356279	4285400
Female 0-14	719166	692341	670355	637107	618168	597743	575883	554422	534456
Female 15-64	3483110	3389537	3238546	3127061	3059370	2960524	2823557	2637866	2512608
Female 65+	1055148	1105144	1207604	1280552	1290736	1324114	1388727	1497544	1548549
Female Total	5257424	5187022	5116505	5044720	4968274	4882381	4788167	4689832	4595613

Source: DRI, 2012

It is clearly visible that the Hungarian population is expected to decline, with a drop from about 10 million to 8,9 million inhabitants between 2010 and 2050, a steady decrease of working age population and a rising amount (absolute and relative) of elderly.
Both male and females in the age groups 0-14 show a decline in population numbers, as this age group shrinks from 1,5 to 1,1 million younger Hungarians. Also, the amount of young males stays above the amount of younger females over time.
For the 15-64 year olds both sexes show a decline in numbers, as the female working age population drops from about 3,5 million in 2010 to 2,5 million in 2050 and the male working age population declines from 3,4 to 2,6 million. This results in a total decline of the economically active population from 6,9 million in 2010, to 5,1 million in 2050, which represents a loss of about 25%.
The elderly population undergoes a steady growth between 2010 and 2050, as the total 65+ year old population grows from 1,6 to 2,7 million elderly, whereby the elderly women are overrepresented with 58%.

Looking at each of the age groups in the working age population some more developments are visible, as there are a large number of age groups that despite the downward trend show some years of revival. Figure 6.1 provides a better look at these developments, as all the age group developments are visible. The working age population declines from around 7 million workers in 2010, to around 5 million workers in 2050. In 2050 the elder working age groups (50-64) are relatively large compared to the rest of the age groups, while the young age groups (15-29) are the smallest.

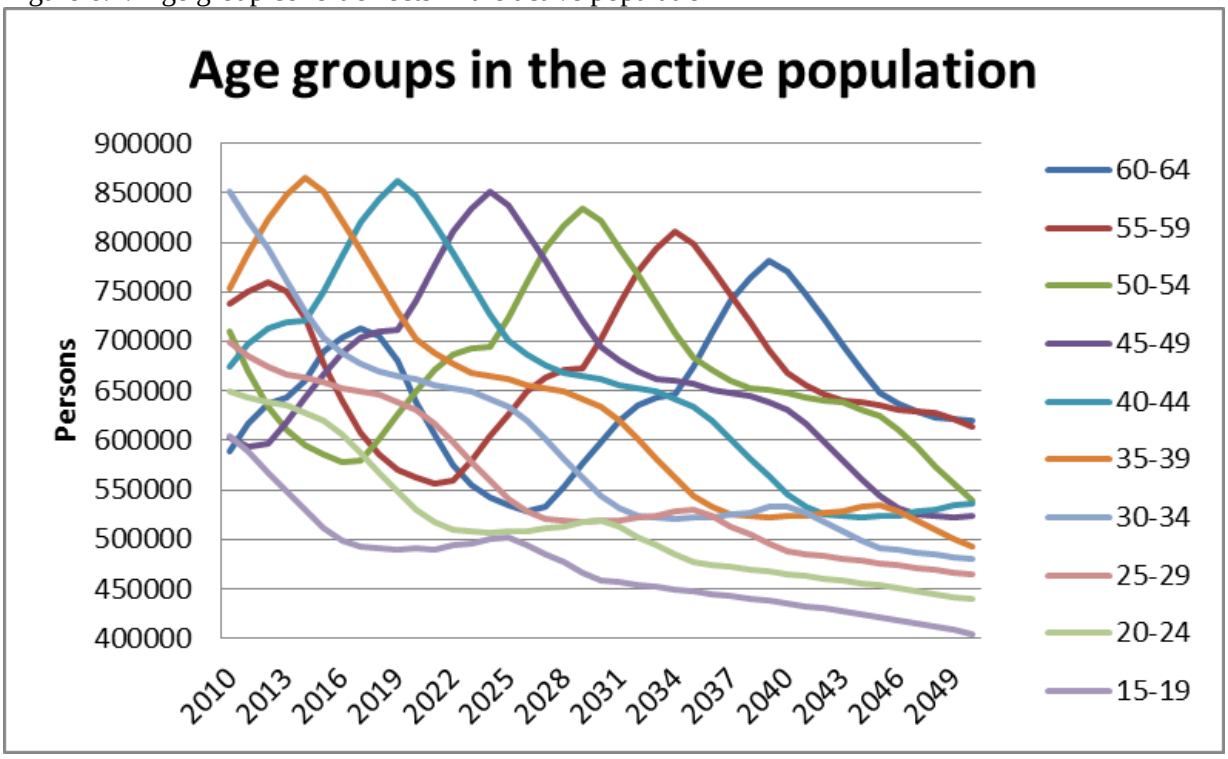
Figure 6.1: Age group specific working age population development 2010-2050



Source: DRI, 2012

As these data from the projections are calculated annually, the cohort effects are not shown in these graphs. As the cohort effects form an important background to the development of the population, figure 6.2 shows the development of each of the age groups in the economically active population. The 5-year age groups are clearly visible over time and when moving from left to right through the lines per age group, the older the birth cohort.

Figure 6.2: Age group cohort effects in the active population

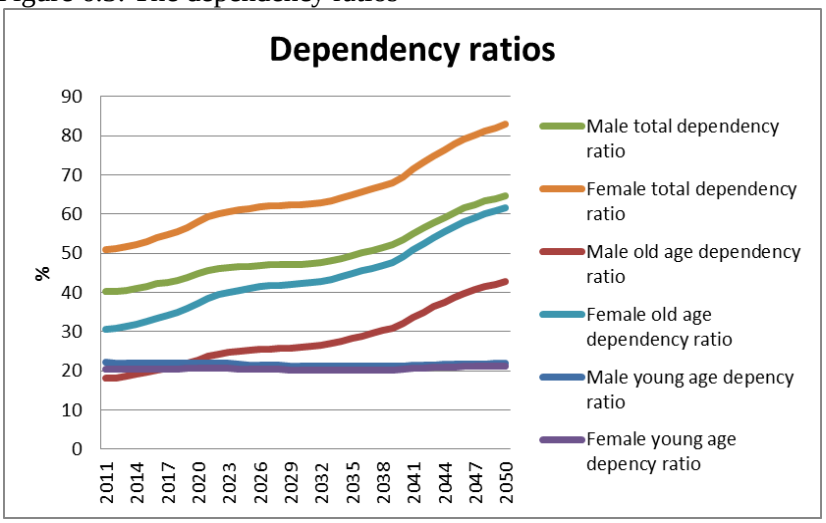


Source: DRI, 2012

Explanations of these cohort effects are the 'baby booms' that occurred in Hungary in the 20th century. Looking at the age structure of the Hungarian population the 1953-1955 and the 1974-1975 baby booms affect the working age population. Beets and Miltényi (2000) pay special attention to the last period, as it is the one with the highest Total Fertility Rates since the Second World War. The TFR rose by 22% between 1973 and 1975, after which it strongly declined again. Hablicsek et al (2000) also characterize the mid-1970s as a special period, thereby referring to the peak in number of births. There is a strong relation with the introduction of specific population policy measures by the Hungarian government, which increased the number of births in these years.

One last point of view towards the population developments is provided by the dependency ratios, as given by figure 6.3. There is a strong increase in population in the old age, as the old and total dependency ratios witness a great increase over time. As females have a higher life expectancy, they are overrepresented among the elder part of the population, which is clearly visible when the male and female old age populations are compared. The younger age dependency ratio shows hardly any change, but does decline over time. Without any changes in the participation, the population will face a strong impact of the elderly, as the pensions, care and social security system are largely financed by the working age population. Both in relative and absolute numbers this increase of elderly population and decrease of working age population until 2050 is visible.

Figure 6.3: The dependency ratios



Source: DRI, 2012

6.3. The labour force participation scenarios

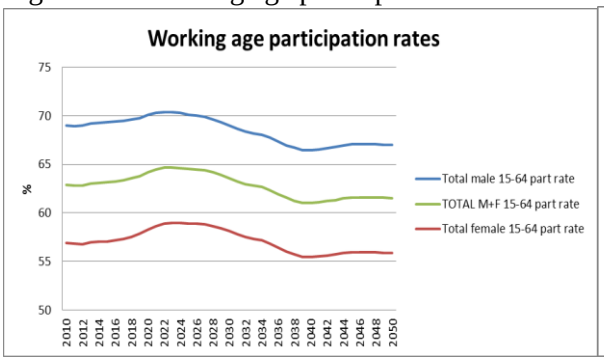
The resulting effects from each of the participation scenarios, combined with the demographic developments of chapter 6.2, produce different economically active populations.

6.3.1. Scenario 1: No change in current labour force participation rates

The assumption of no change in the age group- and gender-specific participation rates will be the baseline scenario of this thesis. Hereby the assumption is made, that there is no effect from current and future policies, economic and socio-cultural change, resulting in no improvement in the participation rates.

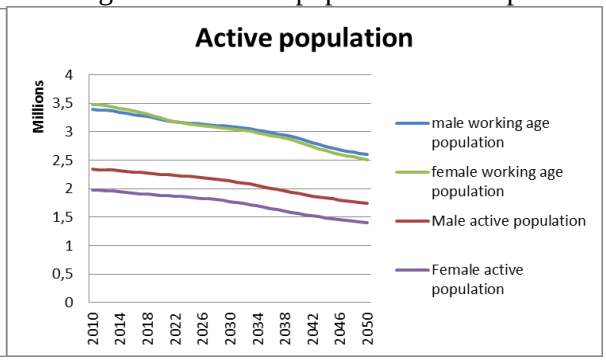
As the labour force participation rate of the total working age population (15-64) is also influenced by the distribution of the working age population over the ages, there is still some variation in this rate. Figure 6.4 and 6.5 show the development of the participation rates and show the development of the economically active population during the projected period. As the age group- and gender-specific participation rates were held constant over time, there is no visual representation provided here.

Figure 6.4: Working age participation rates



Source: DRI, 2012; HCSO, 2012b

Figure 6.5: Active population development

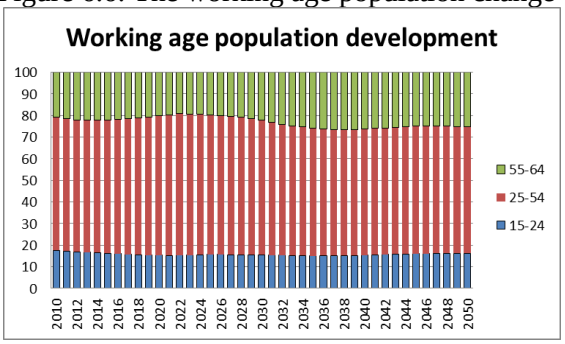


Source: DRI, 2012; HCSO, 2012b

As the age group- and gender-specific participation rates over time are held constant, this scenario provides most insight into the impact of the demographic change on the working age population and therefore the economically active population.

Figure 6.4 shows that between 2019 and 2024 the working age participation rate shows an upward movement, whereafter it starts to decline again up to about 2040. From around 2040 a slight increase of the participation is visible again. As the trends in participation rates are directly linked with the population age groups, the working age population is given by figure 6.6.

Figure 6.6: The working age population change



Source: DRI, 2012

The growth of the participation rates is clearly related to the growth of the 25-54 age groups, as this age groups shows an increase around the 2019-2024 period, whereafter it decreases again until 2040,

whereafter a slight increase is visible again. This is explained by the high participation rates that these age groups possess. Furthermore, when the 40-49 year old population data is analysed, the participation rate increases correspond to 2019 and 2040, where respectively age group 40-44 and age group 45-49 reach their largest age group size. This confirms once more that the increased number of births in the mid-1970s 'baby boom' strongly influences the current working age population, as both cohorts' birth years are in this period.

Concluding, the participation rates are strongly influenced by the working age population numbers and structure over time, which means that for all the other scenarios, these effects will also play a role in the participation rate development over time. Saczuk (2004) finds that especially the labour participation rates for men are strongly related to the working age population structure.
Finally, Table 6.2 also presents the working age participation rates over time, which enhances the comparability with the other scenarios. It shows that if there is no change in the participation rates in the upcoming years, the working age participation rates will slightly decrease. This is caused by the increasing share of older workers in the economically active population, who put a downward pressure on the overall participation rate. Combining these participation rates with the demographic developments to calculate the economically active population in 2050 shows an enormous decrease of the labour supply, that is devastating for Hungary's financial sustainability. The gender gap, between male and female participation rates, is rather stable over time and does not show any big converging or diverging trends.

Table 6.2: Scenario 1 working age participation rate

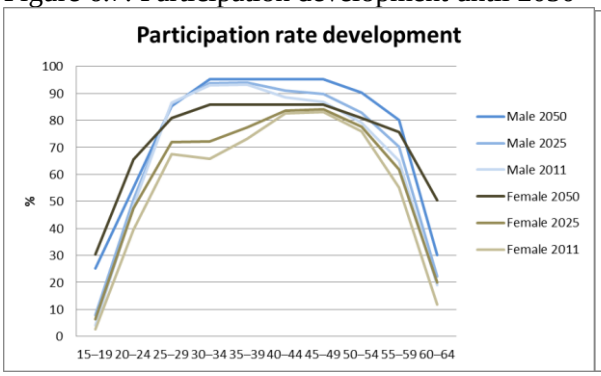
	2011	2015	2020	2025	2030	2035	2040	2045	2050
Male	68,93	69,32	70,08	70,12	69,02	67,73	66,48	67,05	67,00
Female	56,82	57,08	58,28	58,89	58,12	56,81	55,47	55,97	55,89
Total	62,80	63,14	64,16	64,52	63,60	62,32	61,03	61,59	61,54

Source: author's calculation on DRI (2012) and HCSO (2012b) data

6.3.2. Scenario 2: Increased participation by the calculated trends in participation development

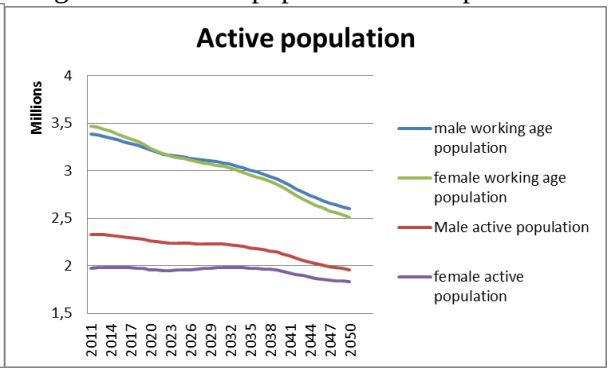
The working age population participation trends over the period 1998-2011 are assumed to continue until 2050. There assumptions result in the age group- and gender-specific participation rates that are presented by figure 6.7 and in the economically active population that is presented by figure 6.8. Furthermore, table 6.3 presents the working age participation rates over time.

Figure 6.7: Participation development until 2050



Source: DRI, 2012; HCSO, 2012b

Figure 6.8: Active population development



Source: DRI, 2012; HCSO, 2012b

Table 6.3: Scenario 2 working age participation rate

	2011	2015	2020	2025	2030	2035	2040	2045	2050
Male	68,93	69,54	70,37	71,20	72,04	72,87	73,71	74,54	75,37
Female	56,82	58,51	60,59	62,66	64,73	66,81	68,88	70,95	73,03
Total	62,80	63,97	65,46	66,94	68,41	69,86	71,32	72,77	74,22

Source: author's calculation on DRI (2012) and HCSO (2012b) data

Based upon the trends in the working age population participation rates the male participation will undergo a continuous increase of the labour participation until 2050, with an increase of about 6,5% in the participation rate. Hereby the male participation develops an improved U-shape in the age group specific participation rates, which is the ideal scenario. The annual growth data shows the population to have its impact in the same periods that were found in scenario 1, resulting in a steady decrease of the economically active male population.

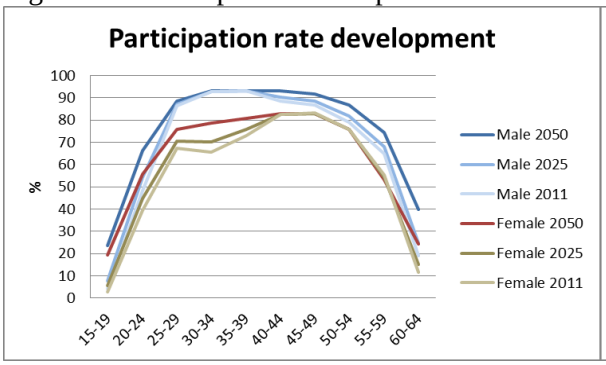
The female participation rates show a great improvement over time, thereby reflecting the positive past developments in female labour participation. Over time, the female working age participation rate grows from 56,9% to 73%, which comes down to very large annual growths that reach up to 12,3%. Over time, as figure 6.7 shows, the female participation rates develop towards the ideal U-shape scenario. The female population developments slow down the increase of the participation, resulting in a small decrease of the female economically active population in 2050. But comparing this development to scenario 1, where the active female population drops 25%, this is a very positive development.

Finally, when overlooking the annual growth rates of the active population over time, the years after 2038 show a great decrease in the rates. The same process is taking place in the annual active population growth rates of scenario 1. This is related to the baby boom of the mid-1970s, which according to Beets and Miltényi (2000) is pinpointed at the years 1973-1975. This sharp decrease of the economically active population is strongly related to the baby boom generation reaching the retirement age. As this is also occurring in the remaining scenarios, the increasing slope of the declining active population after 2038 is therefore not regarded to in the remaining analyses.
The gender gap, between male and female participation rates, shows a tremendous converging trend, as the female participation level approaches the male level over time.

6.3.3. Scenario 3: Increase the labour participation rates to EU average

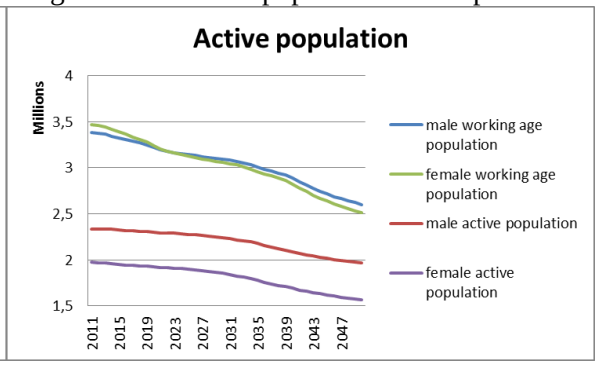
Increasing the labour force participation rates to the EU (2010) average results in the participation rate development as visualized by figure 6.9 and in the active population development of figure 6.10. Furthermore, table 6.4 presents the working age participation rates over time.

Figure 6.9: Participation development until 2050



Source: DRI, 2012; HCSO, 2012b

Figure 6.10: Active population development



Source: DRI, 2012; HCSO, 2012b

Table 6.4: Scenario 3 working age participation rate

	2011	2015	2020	2025	2030	2035	2040	2045	2050
Male	68,93	69,95	71,51	72,44	72,45	72,37	72,48	74,26	75,66
Female	56,82	57,62	59,48	60,71	60,63	60,12	59,93	61,45	62,56
Total	62,80	63,73	65,48	66,59	66,57	66,29	66,27	67,95	69,22

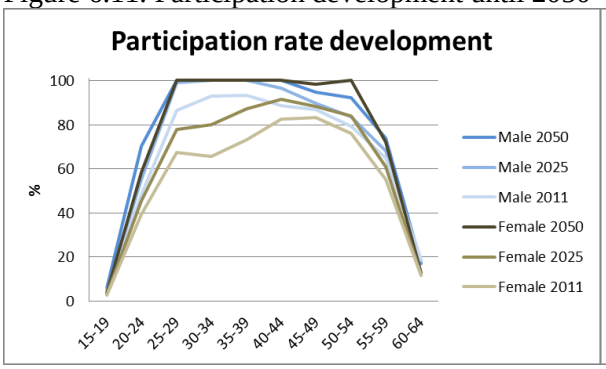
Source: author's calculation on DRI (2012) and HCSO (2012b) data

The development of the male labour participation rates shows an increase in the participation of the younger and elderly workers, which together with a steady group of prime-age workers, results in an increase of the working age population of about 7% between 2011 and 2050. The female participation rates show an increased participation in the childrearing years and an increase in the young workers category. This results in a 6% rise of the working age participation rate between 2011 and 2050.
The economically active population developments are for both sexes heavily impacted by the projected demographic development, resulting in rather large declines in active population. Especially the women show a higher negative annual growth rates over time, as for all the years, the female rates are below those from the males. The active population decline between 2011 and 2050 is therefore also larger for females, resulting in a drop in both male and female active populations, whereby a convergence between the lines is visible. The gender gap, between male and female participation rates, is rather stable over time, but shows a slight converging trend over time.

6.3.4. Scenario 4: Increase participation to compensate for the demographic loss

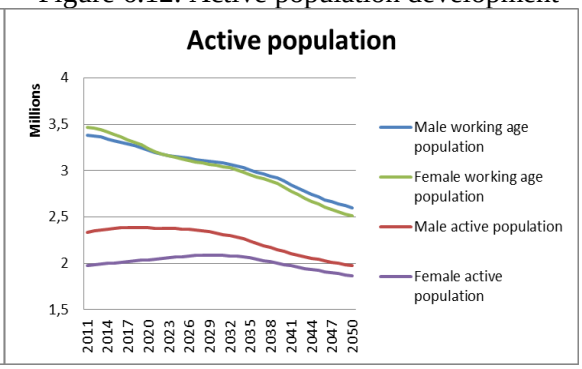
Increasing the labour force participation rates to the levels required to compensate for the demographic loss between 2011 and 2050 has resulted in the participation rate development as visualized by figure 6.11 and in the active population development of figure 6.12. Furthermore, table 6.5 presents the working age participation rates over time.

Figure 6.11: Participation development until 2050



Source: DRI, 2012; HCSO, 2012b

Figure 6.12: Active population development



Source: DRI, 2012; HCSO, 2012b

Table 6.5: Scenario 4 working age participation rate									
	2011	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Male	68,93	71,49	74,05	75,34	75,24	74,52	73,73	75,18	75,84
Female	56,82	59,13	62,99	66,35	68,31	69,62	70,43	72,91	74,27
Total	62,80	65,25	68,50	70,86	71,80	72,09	72,10	74,06	75,07

Source: author's calculation on DRI (2012) and HCSO (2012b) data

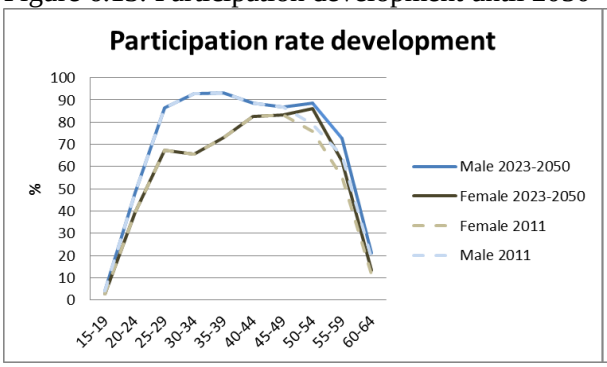
The theoretical aim of this scenario has resulted in age group- and gender-specific participation rates that increase up and over 100%. These rates were therefore limited at the 100% level, a rate that is nearly impossible to achieve, even in an extreme worker friendly environment.
Hereafter, the working age participation rates were recalculated, resulting in the values presented by figure 6.11 and table 6.5. The recalculation of the age group- and gender-specific participation rates with a 100% limit has also had its effect on the active population, which is presented by 6.12. In the theoretical example that would allow for the participation rates to increase above 100%, the 2050 active population would be equal to the 2011 active population. Still the demographic effects are pushing the active population development downwards, as over time more age groups have reached the 100% participation levels.

Simply comparing the 2050 working age population and the 2011 active population would result in a male 25-49 participation rate of 95%, and a 85% participation rate for the other working age groups. The female 25-49 age group would require a 85% participation rate and a 73% participation rate for the other working age groups.
Still, the figures and calculation do provide insights into the participation levels that are needed to keep the economically active population on a 2011 level. The first conclusion that can be drawn from this theoretical exercise is the impossibility to stop the negative demographic developments for the working age population, not even with unusually high participation rates, which would realistically have never been possible. The second conclusion is that even in this theoretical exercise the female participation in the childbearing years still very much hampers the U-shape participation scenario to develop. The years in which the theoretical 100% participation level was reached only occurred after 2030 and only for the 35-44 and 50-54 age category. When compared to the male participation levels, the 25-39 age groups already reached 100% target levels before 2023, whereafter age group 40-44 reached these levels in 2037.

6.3.5. Scenario 5: Increase of the statutory retirement age from 62 to 65 between 2014 and 2022

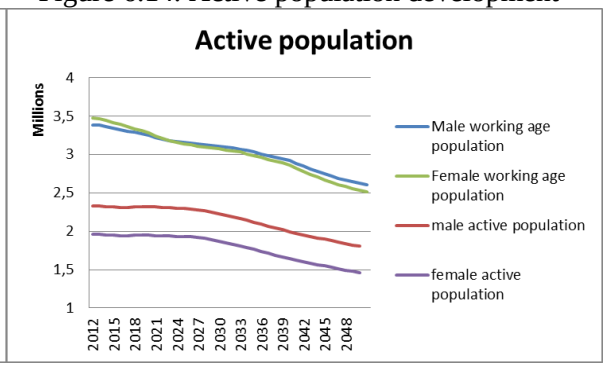
The implementation of the planned increase of the statutory retirement age from 62 to 65 between 2014 and 2022 into the labour force participation rates of 2050 results in a participation development provided by figure 6.13, an active population development provided by figure 6.14 and a working age participation rates as presented by table 6.6.

Figure 6.13: Participation development until 2050



Source: DRI, 2012; HCSO, 2012b

Figure 6.14: Active population development



Source: DRI, 2012; HCSO, 2012b

Table 6.6: Scenario 5 working age participation rate									
	2011	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Male	68,93	69,66	72,07	73,09	72,03	70,38	69,22	69,80	69,33
Female	56,82	57,47	60,11	61,86	61,19	59,62	58,20	58,66	58,22
Total	62,80	63,51	66,07	67,49	66,64	65,04	63,77	64,31	63,87

Source: author's calculation on DRI (2012) and HCSO (2012b) data

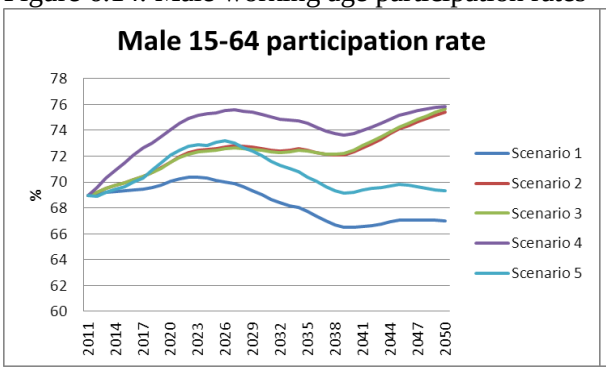
The figures show that the increase in the participation rate of the 50-64 year age groups only marginally affect the working age participation rate and the active population. Still, an increase in the participation of the 50-64 year olds is visible in figure 6.13, as the male participation rate witnesses a growth of 11,8% compared to the 2011 level and the female participation rate grows by 13,3% compared to the 2011 level.
The projected demographic developments until 2050 are for this scenario relatively positive, as the decrease of elderly workers is not as large as that of other working age population groups. Together with the rise of the statutory retirement age, this results only in a slight decrease of the economically active population until about 2022. Hereafter a stronger decrease in the active population is visible, which is strengthened by the baby boom generation reaching their retirement age around 2038. In 2050 this leads to marginally higher active population numbers than the baseline scenario results.

6.4. Comparing the scenario outcomes

The underlying assumptions for each of the scenarios have resulted in different participation rates for each scenario, thereby also altering the development of the economically active population over time.

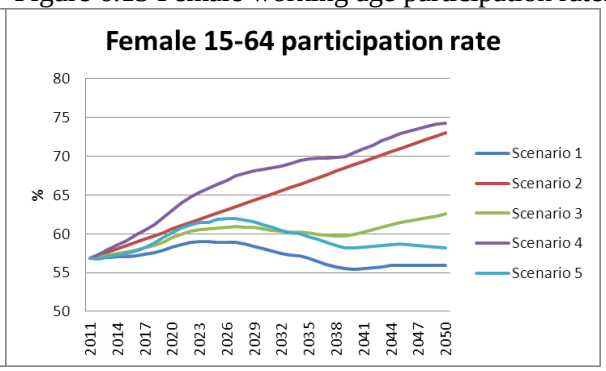
As the participation rates were calculated in a age group- and gender- specific way, the different developments in participation rate between male and female population over time are visualized by figures 6.14 and 6.15. These figures show that the baseline scenario results in the lowest participation rates both for males and females. This was expected as the participation rates were held constant over time. Together with a shifting age structure towards the elderly age groups in the working age population, those with lower participation rates, the drop in the total working age participation rate is explained. The drop in both rates, although hard to compare due to the scale of the figures, is similar.

Figure 6.14: Male working age participation rates



Source: DRI, 2012; HCSO, 2012b

Figure 6.15 Female working age participation rates



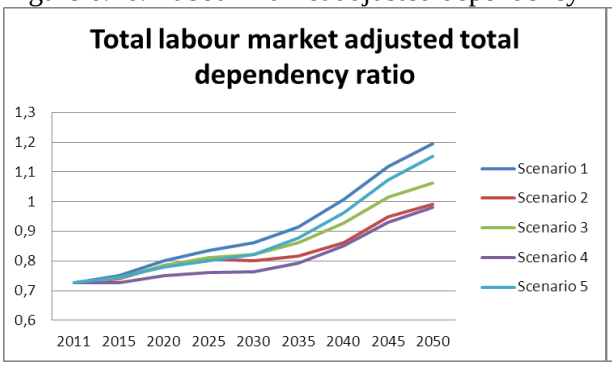
Source: DRI, 2012; HCSO, 2012b

The male participation rates have shown rather similar outcomes for scenarios 2,3 and 4, which shows that the trends of the male participation between 1998 and 2011 (scenario 2), when extrapolated linearly, will more or less result in the average EU level of male working age participation in 2010. Although linearly extrapolating the participation rates, the shift in the working age population structure has its effects on the trend line development. The 4th scenario, which attempted to reach participation rates to the levels where they compensated for the demographic loss in working age population, has over time shown the highest participation rates. This was strongly related to the rise of the already high participation levels of the 25-44 year old population. Over time however, the 25-44 age groups reached their 100% maximum participation levels, whereafter the demographic developments pushed the working age participation levels down to those similar to the 2nd and 3rd scenario in 2050. The fifth scenario resulted in only slightly higher male participation rates than the baseline scenario, as the impact of the rise in 50-64 year old participation levels on the total working age population participation rates were marginal.

The female participation rates of scenario 2 and 4 stand out, as the 2050 participation rates are very high, thereby almost approaching the male participation levels. For scenario 2 this means that the 1998-2011 development of the female labour participation rates has been very positive, which if extrapolated over time, would result in the high participation levels as given by figure 6.15. For scenario 4 the same argument holds as for the male participation, namely the large increase of the working age groups with the already high levels of labour participation. For women however, given the lower starting levels of participation, the 100% participation rate limit was only reached for the 35-44 and 50-54 age category, and in a later stage. Therefore the participation rate could grow strongly over time. The largest difference between the male and female participation levels is found in the comparison of scenario 2 and 3, which for males was comparable, but for women differs strongly. This difference is can be caused by two factors, the first is the incredible growth of female labour force participation over the last 13 years, which is therefore resulting in overly positive female participation rates for Hungarian women in 2050. The second is that the difference in relative distance between EU and Hungarian levels for males was larger, while for women the EU and Hungarian level differed less.

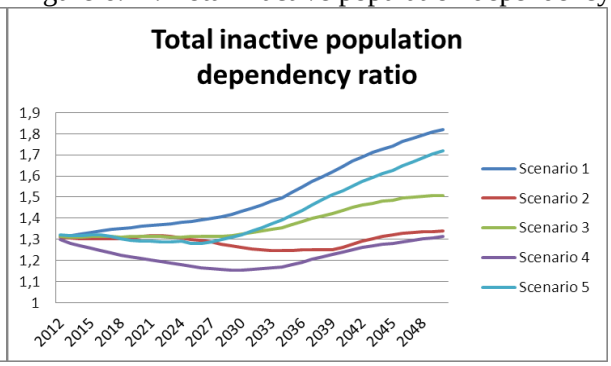
To estimate the economic effects of the demographic and participation development, two ratios were created. The first ratio, the labour market adjusted dependency ratio, shows the 0-14 and 65+ populations divided by the economically active working age population. It shows how many non-working age population members, aged 0-14 and 65+, have to be supported by one economically active person of working age. The 0-14 and 65+ year old population are usually stated as inactive. The second ratio, the total inactive dependency ratio, adds the inactive persons in the working age population to the numerator, which combined with the population aged 0-14 and 65+, sums up the total inactive part of the population. This ratio shows the number of inactive people that one economically active person of working age has to support.

Figure 6.16: Labour market adjusted dependency



Source: DRI, 2012; HCSO, 2012b

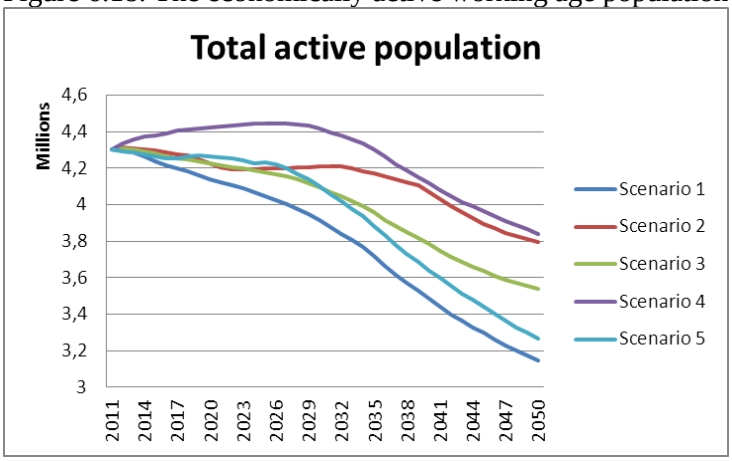
Figure 6.17: Total inactive population dependency



Source: DRI, 2012; HCSO, 2012b

Similar results as for the participation comparison can be found in figure 6.16 and 6.17, although now lower ratios are better for the Hungarian economic situation. There is however the effect of the inactive working age population on the ratios, which in all scenarios worsens the situation. The inactive population dependency ratio however, grows relatively faster for the scenarios that already showed a higher labour market adjusted total dependency ratio. This is explained by the fact that when an inactive person becomes active, given a stable working age, 0-14 and 65+ aged population, both ratios improve, as a person can only be inactive or active. So the more economically active persons, the better the labour market adjusted total dependency ratio as the active persons is the denominator of the ratio. For the inactive population dependency ratio this means an even stronger improvement as both the numerator, partly consisting of the inactive working age population, and the denominator, the economically active working age population change.
Finally, the combined effect of the demographic developments and the scenario-specific participation rate development in terms of absolute numbers is best visualized by the total economically active population, as given by figure 6.18.

Figure 6.18: The economically active working age population



Source: DRI, 2012; HCSO, 2012b

As expected, the baseline scenario showed the strongest decline in economically active population. Given constant participation rates, the demographic developments of the working age population resulted in a decline from 4,3 million to 3,1 million economically active persons.
Under the assumption that female participation rates would grow explosively and male rates would grow steadily until 2050, the number of economically active persons will reach 3,8 million.
The EU scenario, with moderate growth of both male and female participation, resulted in a sizeable growth compared to the baseline scenario, projecting 3,5 million economically active persons in 2050.
The more theoretical scenario, whereby participation rates grow towards levels where they compensated for the demographic loss, showed the impossibility of maintaining an equally sized workforce over time, as participation rates reached levels over 100% to compensate for the working age population loss. In 2050 this scenario resulted in 3,8 million economically active persons.
The last scenario, aiming to estimate the impact of a rise in the statutory retirement age, showed great improvements for the older workers, but a marginal improvement of the working age population participation rates. This scenario resulted in 3,3 million economically active persons in 2050.

6.5. A critical view to the scenario outcomes

The first four scenarios are using different labour force participation rates that influence the entire economically active population, while the fifth scenario increases the participation of the elderly workers. This last scenario is used to give an overview of the consequences related to the recently occurring rises of the retirement ages as e.g. in Italy and in the Scandinavian countries (Pignal, 2012), which is also intended to be implemented in Hungary between 2014 and 2022.

In the first scenario the average annual growth of the female and male labour force participation rates remain more or less the same over the whole period. This however, seems unlikely as recent trends in the female labour participation saw a rather big increase over the last couple of years (Genre and Gómez-Salvador, 2002). The other way around, the assumed static male participation rates until 2050 should, according to Genre and Gómez-Salvador (2002), Saczuk (2004) and Carone (2005) be expected to decline in the future. For Hungary however, the levels of male participation are still expected to grow, as they are relatively low in European comparison.
The second and third scenarios give a good comparison of the recent trends in Hungary and the current EU levels. It shows that the male participation levels are on course to develop to current European levels, while for female participation there seems a big difference between recent Hungarian participation developments and their European counterparts. It can be expected that the female participation levels therefore are overly optimistic in the second scenario, as in 40 years the Scandinavian levels of female labour participation are reached from very low current participation levels. Genre and Gómez-Salvador (2002) find it is "*not very likely*" that such a convergence scenario, with high annual growth rates, will become reality.
The fourth scenario can be classified as a more theoretical scenario, as participation rates are assumed to develop at unusually high growth rates. The rise in participation rates in 2050 in order to acquire a similar economically active population as in 2011 would theoretically require participation rates between 112 and 157 % from the 25-44 year old working age population. By limiting the participation rates to 100%, which is practically almost impossible to reach, the rates could be somehow compared to the other scenarios. One strong conclusion of this scenario still holds however, which is the great effort from the government, unions, employers and employees that will be required to maintain the current economically active population levels, let alone to raise it.
The fifth scenario provides insight into the possible effect of the rise of the statutory retirement age, which is planned to be implemented in Hungary between 2014 and 2022. Although these effects are difficult to project onto participation rates an attempt hereto has been made. Results show a positive development of the participation of the 50-64 year old workers, but a marginal effect on the total working age population participation rate.

6.6. Concluding remarks

It is clear that the demographic developments that are projected to occur in Hungary until 2050 will strongly hamper the financial sustainability of the Hungarian economy and government. Scenario 1 shows the full impact of the demographic development, as the age group participation rates are held constant. Scenario 2, based upon past trends in the participation rates, projects that male participation rates show a normal increase over time. The female participation however, is projected to rise explosively, thereby almost surpassing the male participation rates in 2050. The combined effect of these participation rates is still not sufficient to improve the economically active population, as the projection still shows a decrease in active population in 2050. Scenario 3 projects both male and female participation rates to converge to the contemporary European level, which results in a steady growth of both male and female participation rates until 2050. As a result the economically active population in 2050 still undergoes a large decrease, caused by the demographic development. Scenario 4, using the more theoretical assumption that the working age population decrease can be compensated by any rise in labour force participation has shown that it is almost impossible the avoid the shrinking of the economically active population. Even with 100% age group- and gender-specific participation rates of the 25-44 year old population, the core of the labour force, the active population will shrink over time. Scenario 5 aims to estimate the effect of an increase of labour participation by older workers by increasing the statutory retirement age. Participation rates of the older workers did witness a large increase as a consequence of the introduced measures; however the working age participation rate improvements were very small.

7. Conclusion

7.1. Introduction

The conclusion of this thesis will answer the research questions, after which the limitation and the recommendations are stated. To recapitulate the key chapters of this thesis, the research goal, the research questions and the scenarios are presented here.

The research goal is "*to develop economically active population projections, whereby scenarios, combining demographic developments with different labour force participation rates by age and gender, will result in different future economically active populations of Hungary*."

The main research question is:
How does increased labour force participation affect the projected economically active population of Hungary in 2050?

Sub questions:
Which factors are related to the decline of the current (working age) population of Hungary?
What are the demographic effects on the economically active population of Hungary in 2050?
Which groups within the Hungarian population can contribute to increasing the labour force participation?
What will be the effect of the planned increase in the statutory retirement age of 62 until 2014, to 65 in 2022 on the projections of the economically active population?

The five scenarios created in this thesis are:
1) The Baseline scenario: Application of current (2011) participation rates to the projected working age population over time.
2) An increase in labour force participation rates by extrapolating recent trends in participation behaviour.
3) An increase of the labour participation rates for all age- and gender-specific groups to the EU (2010) average.
4) An increase of the labour participation rates to those levels that they will compensate for the demographic loss in economically active population in 2050.
5) The implementation of the planned increase of the statutory retirement age from 62 to 65 between 2014 and 2022 into the labour force participation rates of 2050.

7.2. Conclusion

A continuous low fertility, an increase in life expectancy and longevity and an insignificant role of migration, shortly stated as the determinants of population change, have led to an unstable development of the Hungarian population in the last decennia. The nowadays 'lowest-low fertility,' resulted in a decrease in population numbers and a structural shift towards the elderly ages. Based upon the DRI (2012) projection, these demographic developments are expected to continue until 2050, thereby seriously affecting both the entire and the working age population numbers and structures.

This decrease in working age population will significantly affect the development of the economically active population, which, against the background of an increasing elderly population, makes the maintenance of the public finances problematic. Therefore, an increase in the labour force participation rates, especially among young people, men older than 40 and women aged 25–40, and a reform of the social security and retirement agreements are necessary to re-increase the labour supply.

The projected demographic developments lead to a decrease in working age population by such numbers that increased participation from a variety of gender and age groups in the working age

population, depending on the scenario-specific assumptions; has not resulted in labour supply growth. The constant participation rate scenario showed the strongest decline in economically active population, as a decline from 4,3 million to 3,1 million was visible. Under the scenario 2 assumption that female participation rates will grow explosively and male rates grow normally until 2050, the optimal and reachable levels of 3,8 million economically active Hungarians is reached. The EU scenarios, with moderate growth of both male and female participation, results in a sizeable growth compared to the baseline scenario, reaching 3,5 million economically active people in 2050. The more theoretical scenario, whereby participation rates grow towards levels where they compensates the demographic loss, shows the impossibility of maintaining an equally sized workforce over time, as participation rates reach 100% + levels to compensate for the working age population loss. In 2050 this scenario results in an economically active population of 3,8 million. The last scenario, aiming to estimate the impact of a rise in the statutory retirement age, shows great improvements for the older workers, but a marginal improvement of the working age population participation rates. This scenario results in 3,3 million economically active Hungarians in 2050.

Summarizing, there is no solution for the decline of the economically active population, given any realistically achievable set of participation rates. There is however a great potential of labour force available in the currently large number of inactive Hungarians. To activate these people, a significant amount of attention and effort needs to be paid to the provision of part-time and flexible work within a family and worker friendly environment and a tightening of the social security and pension system. This increase of labour force participation will result in better sustainable government finances and even in higher fertility levels, as incompatibility of female labour participation and childbearing due to inflexible labour markets and insufficient childcare provision has been one of the major causes of the lowest-low fertility situation in Hungary.

7.3. Limitations

Any projection of the future is, of course, uncertain. All active population projections presented in this thesis are based on assumptions about both future demographic developments and future participation patterns. Although this set of assumptions has been developed using the best available information from the DRI (2012) and the HCSO (2012b), the resulting estimates should be interpreted with care.

Still, there are a number of factors that would have led to a better, more detailed or more complex projection of the economically active population, but which, as limited by time and money, were not implemented in this thesis.

- The current economically active projections have only differed in participation rates, while the demographic developments could have also been implemented into one or more scenarios. Especially when regarding the feedback from female labour force participation on fertility and the current European positive correlation between participation and fertility (Boeri et al., 2005), this could have been implemented in one of the scenarios.
- The current level of analysis of the labour force participation and the economically active population is aimed at the individual. There could have been more attention to the household level, as labour force participation decision making is often strongly related to the household situation. In some of the theories in the thesis the household situation does plays a role, e.g. as it is involved in the second earner taxation and in the New Home Economics.
- The extrapolation of the trends in labour force participation is a rather simple, yet effective measure, but could have been modified by accelerating or decelerating the trends. Especially the female labour force participation projections of scenario 2 would have been more realistic.
- There could have been a scenario whereby the male and female participation are related, e.g. as in Van Nimwegen and De Beer (2006), where a halving of the current gap between male and female participation rates is presented as a possible scenario.
- There is still inconsistency in migration data for Hungary, which will impact the development of the working age population on the short and long term.
- The importance of healthy and active ageing as an answer to the early retirements caused by illness could have been implemented into elderly participation rates. Firstly, as there is a strong relation between health, education and employment (Spijker, 2004) and secondly, as the statutory retirement age is dependent on the life expectancy
- This thesis uses the participation rate as indicator of the economically active, where it could have also used the employment and unemployment rates as in Carone (2005). Genre and Gómez-Salvador (2002), using unemployment rate as one of the factors determining the labour force participation, find that a declining unemployment rate increases the rate of participation and vice versa.
- The relatively high increases of the labour force participation rates of younger and elderly workers may realise only partly, as it is dependent upon the development of retirement regulations, part-time work arrangements and the educational system regulations. Hungary will lower the age of compulsory education from 18 to 16 in September 2012, which as educational attainment increases employment prospects, can lead to a mismatch between education and the labour market in the future (OECD, 2012).
- The discussion of a change in the working age population definition (Medeiros and Minty, 2012) from age group 15-64 to 20-64, 15-74 or even 20-74 has been disregarded in this thesis.
- With additional information on the number of children, the timing of children and years after the last childbirth, the estimates of female labour force participation could be improved severely.
- The level of analysis is the Hungarian national level, which therefore does not show the strong regional disparities in employment and low labour mobility, thereby shaping a variety of local labour market within Hungary (Fazekas, 2004). An increase in labour mobility is one of key solutions towards a more flexible labour market (Genre and Gómez-Salvador, 2002).
- The rise of labour force participation rates of groups that currently are underrepresented in the economically active population could have included the Roma, the disabled and a variation on

educational level. Especially education could have provided better insights, as it is related to health and income level, which is dependent on having a job. Education, as stated by the Human Capital Theory, also strongly influences the opportunity costs of having children.
- A scenario could have been created where the infamous double-dip recession would occur, which would seriously impact the employment situation of Hungary.
- Finally, two assumptions are related to the projections. The first is that there is no change in labour demand and the second is that there is no change in full and part-time average hours worked, percentage part-time workers and unemployment rates. As the part-time work option is basically the best solution for an increase of the labour force participation, this will definitely have an impact on the working hours.

7.4. Recommendations

The current day European situation shows a positive correlation between high female labour participation and high fertility in most countries, which is a promising and ideal outlook for Hungary, as a rise in the labour participation would therefore also result in a positive development of the fertility levels. To improve the chances of this positive correlation to develop in Hungary, the context surrounding their developments needs to be monitored closely. This asks for a simultaneous approach towards fertility and participation decision research.
A similar conclusion can be drawn for the measures that are expected to influence the participation development of the future: education, social security, family policy and labour market flexibility. As these elements are interrelated, e.g. as education influences fertility and non-activity on the labour market, the implementation of these elements requires mutual adjustments and joint research.

Furthermore, there is discussion on the way the Hungarian government is currently tackling the participation problem, as a lot of attention is put into the Public Work programme. According to Fleck and Messing, (2010; referred to in OECD, 2012) these public work schemes have in the past failed to improve employability of participants or to provide a foothold in the labour market. The focus of the programme could therefore better be changed from the public employment, towards training programmes, as these are associated with positive impacts on the labour market situation (Card et al, 2010; referred to in OECD, 2012).
Portfolio.hu (2012c) shows that the government recently increased the amount of money in the programme and more than doubled the amount of people in the programme between 2011 and 2012. Although participation rates rose, as the people in public work schemes are seen as actives, the private sector did not see a rise in participation levels. As getting out of the public work programme does not necessarily mean that the people are more employable, and even when a person is well-equipped he or she still faces the struggling capacity of the labour market, the effects of the programme are questionable. Furthermore, these public work programmes cause an inconsistency in the participation rates, as the programme increases the amount of economically active people, thereby structurally increasing the participation rate. Calculations on the Portfolio.hu's (2012c) data show that the public work scheme is responsible for about 3% of the total economically active population.

Finally, it is clear that all of the participation groups that currently struggle with low participation levels will benefit strongly from the creation of part-time jobs. The first group consists of the elderly workers, as they can decrease the number of hours worked over time, thereby being able to lessen work stress and satisfy their leisure time demand, while remaining economically active, instead of choosing for an early retirement option or an exit of the labour market through the social security system (Van Dalen and Henkens, 2010). The second group, the young people in the age group 15-24 years old, will be able to combine study with work, resulting in increased participation levels, as contemporary student choice to study full-time, as part-time jobs are unavailable, underpaid and undervalued.

The third group consists of women in their childbearing age, as a part-time job will allow a combination of work and child care, thereby allowing women to realise their career and fertility goals.

This however, will require a strong adjustment of government policy, as implemented policies will have to shape an environment fit for part-time friendly work, with attention for social security and the taxation system. But also family policies, introducing a more generous parental leave and greater availability of child care can improve the chances and willingness to work part-time, especially for women. The employers, who are sticking to the traditional working schedules and still massively oppose part-time work, will also have to be more open to part-timers. Finally, the majority of the employees also prefer the traditional schedules, both at work and within the household, resulting in low willingness for part-time jobs and the hindrance of possible working careers and intentions for women in the household.

There is also the wage element. As part-time jobs provide low earnings, this is the main factor that prevents the spread of these working arrangements in Hungary (Giczi, 2010). Together with the high social security costs and the relatively high cash benefits as family allowance, maternal benefits and employment benefits, this creates a strong disincentive to work part-time. Finally, the double earner model is indispensable for the financial security of the family, which makes the second earner prefer full-time over part-time jobs (Pongrácz, 2010).

To succeed in shaping the institutional setting towards part-time work, the huge increase of part-time labour in The Netherlands may serve as an example. Here, the government, the labour unions and the employers reached an agreement to lift barriers to part-time work, by creating laws that made part-time work more attractive, like neutral taxes, pro rata social security benefits (Boeri and Ours, 2008).

Eventually, more part-time workers will generates more taxes, thereby improving the financial situation of the government, especially regarding the fact that these part-time workers were inactive before. The fertility outlook related to the part-time work, under the assumption that the current European positive correlation between participation and fertility will develop in Hungary, is therefore also positive.
This makes the implementation of part-time work in Hungary the solution for the short-run challenge of raising female labour participation rates, while simultaneously dealing with the long-run challenge of raising the fertility rates.

8. References

- Ahn, N. and P. Mira, (2002), A note on the changing relationship between fertility and female employment rates in developed countries. *Journal of Population Economics 15*, pp. 667-682
- Andersson, G. (2000), The Impact of Labour-Force Participation on Childbearing Behaviour: Pro-Cyclical Fertility in Sweden during the 1980s and the 1990s. *European Journal of Population* 16 (4), pp. 293-333
- Babbie, E. (2007), *The practice of social research*. 11th edition. Belmont: Wadsworth
- Bálint, M. (2011), Statistical Data. In: Fazekas, K. and Molnár, G. (2011), *The Hungarian Labour market Review and Analysis 2011*. Budapest: Institute of Economics, HAS
- Bálint, M., Cseres-Gergely, Z. and Scharle, A. (2011), The Hungarian labour market in 2009–2010. In: Fazekas, K. and Molnár, G. (2011), *The Hungarian Labour market Review and Analysis 2011*. Budapest: Institute of Economics, HAS
- Beets, G. and Miltényi, K. (2000), *Population ageing in Hungary and the Netherlands: a European perspective*. Amsterdam: Thela Thesis Publishers
- Blöndal, S. and Scarpetta, S. (1999), The Retirement Decision in OECD Countries, *OECD Economics Department Working Papers, No. 202*, OECD Publishing. Retrieved on 06-04-2012, from http://dx.doi.org/10.1787/565174210530
- Boeri, T. and van Ours, J. (2008), *The Economics of Imperfect Labor Markets*. Princeton University Press.
- Boeri, T., Del Boca, D. and Pissarides, C. (2005), *Women at Work: An Economic Perspective*. Oxford University Press: Oxford
- Bozsonyik, H. and Pók, L. (2012), *The New Labor Code "A Practical and Essential Guide for Employers."* Presentation at the joint seminar of the Netherlands-Hungarian Chamber of Commerce and Szecskay Attorneys at Law, January 17, 2012. Retrieved on 24-02-2012, from http://dutcham.hu/post/events/67-17-01-2012-the-new-labor-code
- Buddelmeyer H., Mourre, G. and Ward, M. (2005), Part-time work in EU countries: labour market mobility, entry and exit, *ECB Working Paper, No.460*. Frankfurt am Main: European Central Bank
- Carone, G. (2005), Long-term labour force projections for the 25 EU Member States: A set of data for assessing the economic impact of ageing. *Economic Paper Number 235*, 2005. Brussels: European Commission Directorate-General for Economic and Financial Affairs publications. Retrieved on 18-05-2012, from http://ec.europa.eu/economy_finance/publications/publication576_en.pdf
- Casselli, G., Mesle, F. and Vallin, J. (2002), Epidemiologic transition theory exceptions. *Journal of Population Sciences 9*, pp. 9–51
- CIA World Factbook (2012), *Definitions and Notes*. Retrieved on 12-03-2012, from www.cia.gov
- Corman, D. (2002), Family policies, work arrangements and the third child in France and Sweden. In: Klijzing Erik and Corijn Martine (eds.), *Dynamics of fertility and partnership in Europe: insights and lessons from comparative research. 2*, New York and Geneva, United Nations: pp. 59-71
- Council of Europe (COE) (2001), Recent demographic developments in Europe. Council of Europe Publishing: Strasbourg
- Cseh-Szombathy, L. (2003), Changes in demographic processes in Hungary. *Demográfia, 2003. Vol. 46*, 2003, *English Edition*, pp. 243-258
- Cseres-Gergely, Z. (2009), The Employment Dimension of Economy Greening. *European Employment Observatory Review 2009: National Report: Hungary*. Retrieved on 20-07-12, from http://www.eu-employment-observatory.net/resources/reviews/Hungary-AR09.pdf
- Cseres-Gergely, Z. and Scharle, A. (2010), The Hungarian Labour Market in 2008-2009. In Fazekas, K. Lovász, A. and Telegdy, Á. (eds.) (2010), *The Hungarian Labour Market: Review and Analysis*, Budapest: Institute of Economics, Hungarian Academy of Sciences and National Employment Foundation
- Daniel, K. and Heywood, J. S. (2007),The determinants of hiring older workers: UK evidence. *Labour Economics, Elsevier, vol. 14(1), pages 35-51*, January 2007

- De Beer, J. A. A. (2011), Transparency in population forecasting: Methods for fitting and projecting fertility, mortality and migration. *Doctoral Dissertation University of Groningen*. Amsterdam: Amsterdam University Press
- De Beer, J. and Van Wissen, L.J.G. (1999), One Europe: How many different worlds in the 21st Century? In: J. de Beer and L.J.G. van Wissen (eds.), *Europe: One continent, different worlds. Population scenarios for the 21st century.* Kluwer Academic Publishers, Dordrecht, pp. 149-162
- Demographic Research Institute (2012), *Population Projection of Hungary 2010-2050, medium variant. Population data*. Budapest: HCSO DRI, 2012.
- Dobossy, I., Molnár, E. S. and Virágh, E. (2003), The role of retirement, family relations and health in everyday activities of 60-75 year olds. *Demográfia, 2003. Vol. 46, 2003, English Edition*, pp. 137-167
- Ekamper, P., Fóti, J., K. Henkens and Miltényi, K. (2000), Ageing and the labour force, social security, and retirement. In: G. Beets & K. Miltényi (eds.), *Population ageing in Hungary and the Netherlands: a European perspective*. Amsterdam: Thela Thesis Publishers, pp. 201-223
- Ermisch, J. (1979), The Relevance of the 'Easterlin Hypothesis' and the 'New Home Economics' to Fertility Movements in Great Britain. *Journal of Population Studies 33*: pp. 39-58
- Esping-Andersen, G. (2000), *A Welfare State for the 21st Century*. Report to the Portuguese Presidency of the European Union, Lisbon. Retrieved on 06-04-2012, from www.nnn.se/seminar/pdf/report.pdf
- European Commission (2009), 2009 Ageing Report: Economic and budgetary projections for the EU-27 Member States (2008-2060). *European Economy 2*, 2009, Luxembourg: Office for Official Publications of the European Communities, 2009. Retrieved on 18-05-2012, from http://ec.europa.eu/economy_finance/publications/publication14992_en.pdf
- European Commission (2011), European Economic Forecast- Autumn 2011, *European Economy, 6*. November 2011. Retrieved on 7-7-2012, from http://dx.doi.org/10.2765/15525
- European Commission (2012), An Agenda for Adequate, Safe and Sustainable Pensions. *White Paper, 16-02-2012 COM(2012) 55 final*, Brussels: EUCOM. Retrieved on 06-04-2012, from http://ec.europa.eu/social/BlobServlet?docId=7341&langId=en
- Eurostat (2010), EUROPOP2010 - Convergence scenario, national level (proj_10c). Retrieved on 7-7-2012, from http://epp.eurostat.ec.europa.eu/portal/page/portal/population/data/database
- Eurostat (2011), *Europop2010 convergence scenario: Assumptions (proj_10c2150a)*. Retrieved on 7-7-2012, from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_10c2150p&lang=en
- Eurostat (2012), Emigration [tps00177]. Retrieved on 6-7-2012, from http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?p_product_code=TPS00177
- Euwals, R. and Van Vuuren (2005), Arbeidsaanbod tot 2050: een beleidsneutraal scenario [Labour supply up to 2050: a policy-neutral scenario]. *CPB Memorandum Number 134, Decembre 2005*. Retrieved on 03-02-2012, from http://www.cpb.nl/publicatie/arbeidsaanbod-tot-2050-een-beleidsneutraal-scenario
- Euwals, R., Van Vuuren, D., Den Ouden, A. and Rijn, J. (2006), *Arbeidsaanbod naar sociaaldemografische kenmerken [Socio-demographic characteristics of the labour supply*]. CPB Memorandum 171, December 2006. Retrieved on 03-02-2012, from http://www.cpb.nl/publicatie/arbeidsaanbod-naar-sociaaldemografische-kenmerken
- Fazekas, K. (2004), The current situation on the labour market and labour market policy in Hungary. In: Fazekas, K., Koltay, J. and Cseres-Gergely, Z. (2004), *The Hungarian Labour market Review and Analysis 2004*. Budapest: Institute of Economics, HAS
- Fazekas, K. and Molnár, G. (2011), *The Hungarian Labour Market: Review and Analysis. Effects of the crisis*. Institute of Economics, IE HAS: Budapest. Retrieved on 06-04-2012, from http://econ.core.hu/file/download/HLM2011/TheHungarianLabourMarket_2011_onefile.pdf
- Genre,V. and Gómez-Salvador, R. (2002), Labour Force Developments in the Euro Area Since the 1980s. *ECB Occasional Paper No. 4*. July 2002. Retrieved on 18-07-2012, from http://ssrn.com/abstract=748967

- Giczi, J. (2010), Working time flexibility, work-family conflict and social cohesion. Work care Synergies project report, 2010. Retrieved on 7-7-2012, from http://workcaresynergies.eu/wp-content/uploads/2010/05/WCS_TARKI_DM1_EN.pdf
- Gördi, I. (2009), International Migration. In: *Demographic portrait of Hungary 2009: report on the conditions of the Hungarian Population*. Budapest: DRI and HCSO
- Guerzoni, B. and Zuleeg, F. (2011), Working away at the cost of ageing: the labour market adjusted dependency ratio. *European Population Centre Issue Paper, No.64*. Retrieved on 18-05-2012, from http://www.epc.eu/documents/uploads/pub_1265_working_away_at_the_cost_of_ageing.pdf
- Hablicsek, L., De Beer, J. and Van Hoorn, W. (2000), Future population and household trends: projections and scenarios. In: Beers, G. and Miltényi, K. (eds): *Population ageing in Hungary and the Netherlands: A European perspective*. Amsterdam, Thela-Thesis. pp. 141–180
- Hilderink, H. B. M. (2000), *World population in transition: an integrated regional modelling framework*. Dissertation University of Groningen.
- Hollmann, F.W., Mulder, T.J. and Kallan, J.E. (2000), Methodology and Assumptions for the Population Projections of the United States: 1999 to 2100. *Working Paper 38*, U.S. Bureau of Census Population Division
- Hungarian Central Statistical Office (2009), *Hungarian Labour Force Survey* (2009). Budapest: HCSO. Retrieved on 22-05-2012, from http://www.ksh.hu/docs/eng/modsz/modsz21.html
- HCSO (2011), *Methodological Description.* Retrieved on 22-05-2012, from http://www.ksh.hu/docs/eng/xftp/stattukor/munkerohelyz/emunkerohelyz11m.pdf
- HCSO (2012a), *Decrease in births, lower level of deaths; vital events, January–December 2011*. Retrieved on 22-05-2012, from http://www.ksh.hu/vital_events_tn
- HCSO (2012b), *Labour market in Hungary 1998-2011*. Retrieved on 22-05-2012, from http://www.ksh.hu/docs/eng/xstadat/xstadat_annual/i_qlf002.html
- HCSO Demographic Research Institute (DRI) (2010), *Demographic portrait of Hungary 2009: Report on the conditions of the Hungarian population*. Budapest: DRI, HCSO. Retrieved on 25-02-2012, from http://www.demografia.hu/english/index.php/publications-in-english/demographic-portrait/2009
- Hungarian Ministry of Human Resources (2012), *Indoor smoking fined after 1 April 2012.* Retrieved on 26-04-2012, from http://www.kormany.hu/en/ministry-of-human-resources/news/indoor-smoking-fined-after-1-april-2012
- Hungarian Ministry of National Economics (2011), *Update on Hungary's structural reform programme (HSRP)*. Retrieved on 26-04-2012, from http://www.kormany.hu/download/3/b0/40000/Update%20on%20HSRP%20-%20labour.pdf
- International Labour Organization (ILO) (2012), *Data for world and regional aggregates - by 5 years age groups and total (0+ and 15+)*. ILO Department of Statistics: Geneva. Retrieved on 07-07-2012, from http://laborsta.ilo.org/applv8/data/EAPEP/v6/EAPEP-WORLD-REGIONS%201990-2020.xls
- Jaumotte, F. (2003), Female labour force participation: past trends and main determinants in OECD countries, *OECD Economics Department Working Papers, No. 376.* Paris: OECD Publishing
- Józan, P. (1991), Changes in Hungarian mortality and the role of the National Health Promotion Program. In: Lutz, W. and Winsborough, H. H. (1991), *Future Demographic Trends in Europe and North America. What Can We Assume Today?* London: Academic Press
- Józan, P. (2008), Main Features of Epidemiological Development in Hungary after the Second World War. *Hungarian Statistical Review, Special Number 12*. Retrieved on 7-7-2012, from http://www.ksh.hu/statszemle_archive/2008/2008_K12/2008_K12_139.pdf
- Kamarás, F. (1999), Fertility and Family Surveys in Countries of the ECE Region Standard Country Report, Hungary, *Economic Studies No. 10j*. New York and Geneva: United Nations
- Kirk, D (1996), The Demographic Transition. *Population Studies 50*: pp. 361-388
- Kögel, T. (2004), Did the association between fertility and female employment in OECD countries really change its sign? *Journal of Population Economics 17(1)*, pp. 45-65

- Kohler, H-P., Ortega, J. A. and Billari, F. C. (2001), Towards a theory of lowest-low fertility, *MPIDR Working Papers WP-2001-032*, Max Planck Institute for Demographic Research, Rostock, Germany
- Lesthaeghe, R. and D. van de Kaa, (1986), Twee demografische transities?, in: R. Lesthaeghe and D. Van de Kaa (eds.), *Bevolking: Groei en Krimp*. Deventer: Van Loghum Slaterus, pp. 9-24
- Lesthaeghe, R. And Surkyn, J. (2002), New Forms of Household Formation in Central and Eastern Europe- Are they Related to Newly Emerging Value Orientations? *Economic Survey of Europe 1*: pp. 197-216
- Liganet.hu (2011) , *Some provisions from the new draft Labour Code*. Retrieved on 24-02-2012, from http://www.liganet.hu/page/206/art/6159/akt/1/html/some-provisions-from-the-new-draft-labour-code.html
- Macura, M. and Beets, G. (2002), *Dynamics of Fertility and Partnership in Europe: Insights and Lessons from Comparative Research*, Vol. I. New York and Geneva: United Nations
- Macura, M., Mochizuki-Sternberg, Y. and Garcia, J.L. (2002), Eastern and Western Europe's fertility and partnership patterns: Selected developments from 1987 to 1999. In: Macura M., Beets G., *Dynamics of fertility and partnership in Europe: Insights and lessons from comparative research. Volume I*, New York/Geneva: United Nations: pp. 27-55
- McDonald, P and Kippen, R. (2001), Labor Supply Prospects in 16 Developed Countries, 2000-2050. *Population and Development Review*, Vol. 27, No. 1 (Mar., 2001), pp. 1-32. Retrieved on 2-1-2012, from http://www.jstor.org/stable/2695153
- McDonald, P. and Temple, J. (2008), *Demographic and Labour Supply Futures for Australia*. Canberra: ANU Department of Immigration and Citizenship
- Medeiros, J. and Minty, P. (2012), Analytical support in the setting of EU employment rate targets for 2020. *Working paper 1/2012*, May 2012, Brussels: EU Commission Directorate-General for Employment, Social Affairs & Inclusion Unit A2
- Mellens, M. (1999), Determinants of Demographic Behaviour. In: de Beer, J. and van Wissen, L. (eds.). *Europe: One continent, Different Worlds. Population scenarios for the 21st century*. Dordrecht: Kluwer Academic Publishers
- Nimwegen, N. van & J.A.A. de Beer (2006), Media: bevolkingsgroei is eindig! Maar is er iets nieuws onder de zon? *Demos, bulletin over bevolking en samenleving 22*, volume 4: pp. 32-35
- OECD (2009), Age of labour force exit, in: *OECD, Society at a Glance 2009: OECD Social Indicators*, OECD Publishing. Retrieved on 07-07-12, from doi: 10.1787/soc_glance-2008-14-en
- OECD (2012), *OECD Economic Surveys: Hungary 2012*. OECD Publishing. Retrieved on 08-07-2012, from http://dx.doi.org/10.1787/9789264127272-en
- OECD Working Party on Private Pensions (2005), *Private Pensions: OECD Classification and Glossary, 2005 edition*, OECD: Paris
- O'Hara, P. (1999), *New Home Economics*. Entry for the Encyclopedia of Political Economy, London: Routledge. Retrieved on 29-04-2012, from http://www-rohan.sdsu.edu/faculty/sgs/documents/NHE_1999.pdf
- Ohlsson-Wijk, S. (2011), Sweden's marriage revival: An analysis of the new-millennium switch from long-term decline to increasing popularity. *Population Studies 65(2)*, pp. 183-20
- Omran, A.R. (1998), The Epidemiologic Transition Theory Revisited Thirty Years Later. *World Health Statistics Quarterly, 51*: pp. 99-119
- Omran, A.R. (2005), The Epidemiologic Transition: A Theory of the Epidemiology of Population Change. *The Milbank Quarterly 83*, No. 4, 2005, pp. 731–57
- Pestieau, P. (2003), Ageing, retirement and pension reforms. *World Economy, 26*: pp. 1447–1457. Retrieved on 24-04-2012, from doi:10.1111/j.1467-9701.2003.00581.x
- Philipov, D. and Dorbritz, J. (2003), Demographic consequences of economic transition in countries of central and eastern Europe. *Population Studies 39*: pp. 1-189
- Pignal, S. (2012), *Europe's retirement ages in the spotlight*. The Financial Times, February 16, 2012. Retrieved on 7-7-2012, from http://www.ft.com/intl/cms/s/0/22c416b8-57ec-11e1-ae89-00144feabdc0.html

- Politics.hu (2011), *Parliament passes new labor law; PM says final draft not reflective of government's original plans*, December 14th, 2011. Retrieved on 24-02-2012, from http://www.politics.hu/20111214/parliament-passes-new-labor-law-pm-says-final-draft-not-reflective-of-governments-original-plans
- Pongrácz, M. (2010), *Changing gender roles*. Retrieved on 24-02-2012, from http://www.demografia.hu/english/index.php/publications-in-english/research-highlights
- Portfolio.hu (2012a), *PM Orbán presents Hungary's new job growth plan (2).* July 2nd 2012, retrieved on 07-07-2012, from http://www.portfolio.hu/en/economy/pm_orban_presents_hungarys_new_job_growth_plan_2.24475.html
- Portfolio.hu (2012b), *Former Hungarian govt's job creation programs a huge flop*. July 11th 2012, retrieved on 14-07-2012, from http://www.portfolio.hu/en/economy/former_hungarian_govts_job_creation_programs_a_huge_flop.24534.html
- Portfolio.hu (2012c), *Ten-year record on Hungary's labour market*. June 28th 2012, retrieved on 14-07-2012, from http://www.portfolio.hu/en/economy/ten-year_record_on_hungarys_labour_market.24456.html
- Preston S. H., Heuveline, P. and Guillot, M. (2000), *Demography: measuring and modeling population processes*. Malden: Blackwell Publishers
- Roodenburg, H. and Van Vuuren,D. (2004), Arbeidsaanbod in de lange-termijnscenario's voor Nederland [Long term labour supply scenarios for The Netherlands]. *CPB Document No 71*, November 2004. Retrieved on 03-02-2012, from http://www.cpb.nl/publicatie/arbeidsaanbod-de-lange-termijnscenarios-voor-nederland
- Saczuk, K. (2004), Labour force participation scenarios for 27 European countries: 2002-2052. *Working Paper 5*, 2004, Central European Forum for Migration Research, Warsaw
- Sobotka, T. (2002), Ten years of rapid fertility changes in the European post-communist countries: evidence and interpretation. *Population Research Centre Working Paper Series 02-1*, July 2002
- Sobotka, T. (2004) *Postponement of childbearing and low fertility in Europe*. Doctoral thesis, University of Groningen. Dutch University Press, Amsterdam
- Spéder, Z. (2002), Fertility and Structural Change in Hungary: Labour Market Status and Education Level of Childbearing Mothers at the time of Declining Fertility Rates in the 1990s. *Working Papers on Population, Family and Welfare No. 4*. Budapest: Demographic Research Institute. Retrieved on 07-07-2012, from http://www.demografia.hu/WorkingP/wp4.pdf
- Spéder, Z. (2007), The diversity of family structure in Europe. A survey on partnership, parenting and childhood across Europe around the millennium. *Demográfia, 2007. Vol. 50. No. 5. English Edition*, pp. 105–134
- Spéder, Z. (2011), *The realisation of fertility intentions in Europe.* Retrieved on 24-02-2012, from http://www.demografia.hu/english/index.php/publications-in-english/research-highlights
- Spéder, Z. and Kamarás, F. (2008), Hungary: Secular fertility decline with distinct period fluctuations. *Demographic research 19*, p. 599-664. Retrieved on 01-03-2012, from http://www.demographic-research.org/Volumes/Vol19/18/
- Spijker, J.J.A. (2004), *Socioeconomic determinants of regional mortality differences in Europe*. PhD Thesis. Amsterdam: Dutch University Press
- Stolz, J. (2011), *Hungarian government sends women home to make babies*. Guardian Weekly, 11 January 2011. Retrieved on 7-7-2012, from http://www.guardian.co.uk/world/2011/jan/11/hungary-birth-rate-women-stolz
- Surkyn, J. and R. Lesthaeghe (2004), Value orientations and the second demographic transition (SDT) in northern, western and southern Europe: an update. *Demographic Research Special Collection 3*, pp. 45-86
- Temple, J. and McDonald, P. (2008), Is Demography Destiny? The Role of Structural and Demographic Factors in Australia's Past and Future Labour Supply. *Journal of Population Research 25*, no. 1, pp. 29-49.

- Toossi (2005), Labor force projections to 2014: retiring boomers. In: *Monthly Labor Review, November 2005*, Bureau of Labor Statistics. Retrieved on 07-07-2012, from http://www.cse.sc.edu/~buell/References/BureauLaborStatistics/art3full2014.pdf
- UN Population Division (2011), *World Population Prospects: The 2010 Revision*. United Nations: New York. Retrieved in 07-07-2012, from http://esa.un.org/unpd/wpp/index.htm
- Valkonen, T. (1991), Assumptions about Mortality Trends in Industrialized Countries: A Survey. In: Lutz, W. and Winsborough, H. H. (1991), *Future Demographic Trends in Europe and North America. What Can We Assume Today?* London: Academic Press
- Van Dalen, H.P. and Henkens, C.J.I.M (2010), Do employers support later retirement? A view from European employers. In: *Demos* (2010) volume 26, pp. 1-4
- Van de Kaa, D. (2002), *The Idea of a Second Demographic Transition in Industrialized Countries*. Paper presented at the Sixth Welfare Policy Seminar of the National Institute of Population and Social Security, Tokyo, Japan, 29 January 2002
- Van Peer, C. (2002), Desired and achieved fertility. In: Klijzing Erik and Corijn Martine (eds.). *Dynamics of fertility and partnership in Europe: insights and lessons from comparative research. 2*, New York and Geneva, United Nations: pp. 117-141
- Van Solinge, H., Van Dalen, H., Dykstra, P., Van Imhoff, E., Moors, H. and Van Wissen, L. (1998), Population, labour and social protection in the European Union: Dilemmas and prospects. *NIDI report nr. 52*, Den Haag: NIDI
- Van Vuuren, D. and Euwals, R. (2006), De structurele groei van het arbeidsaanbod op middellange termijn [Structural growth of the labour supply in the middle term]. *CPB Memorandum, number 155*, June 2006. Retrieved on 03-02-2012, from http://www.cpb.nl/publicatie/de-structurele-groei-van-het-arbeidsaanbod-op-middellange-termijn
- Varga, J. (2007), Labour market trends in Hungary. In: Fazekas, K. and Kézdi, G. (2007), *The Hungarian Labour market Review and Analysis 2007*. Budapest: Institute of Economics, HAS
- Willis, R.J., (1973), A new approach to the economic theory of fertility behaviour. *Journal of political economy 81(2)*, pp. 14-64
- Zuleeg, F. (2007), How to grow old without going bust: the need for efficient EU labour markets. European Policy Centre Policy Brief, November 2007. Retrieved on 18-05-2012, from http://www.isn.ethz.ch/isn/Digital-Library/Publications/Detail/?id=45588&lng=en

9. Appendices

Appendix A: Economically active population per scenario

Comparing economically active population		2011	2012	2013	2014	2015	2016
	Male	2333192	2331565	2327057	2317899	2305301	2293750
	Female	1972978	1966158	1958775	1947600	1934719	1923253
Scenario 1	Total	4306169	4297723	4285832	4265499	4240019	4217004
	Male	2333192	2331996	2327171	2320328	2312403	2303774
	Female	1972978	1982312	1984280	1984418	1983381	1981469
Scenario 2	Total	4306169	4314308	4311451	4304746	4295783	4285243
	Male	2333192	2336742	2337414	2333443	2326118	2319820
	Female	1972978	1970805	1968035	1961476	1953179	1946173
Scenario 3	Total	4306169	4307547	4305450	4294919	4279297	4265993
	Male	2333192	2349862	2363620	2372553	2377554	2383315
	Female	1972978	1983800	1994003	2000232	2004345	2009633
Scenario 4	Total	4306169	4333662	4357623	4372784	4381899	4392948
	Male	2333192	2326487	2327173	2322965	2316536	2313124
	Female	1972978	1964978	1961370	1955485	1947945	1942777
Scenario 5	Total	4306169	4291465	4288543	4278450	4264482	4255901

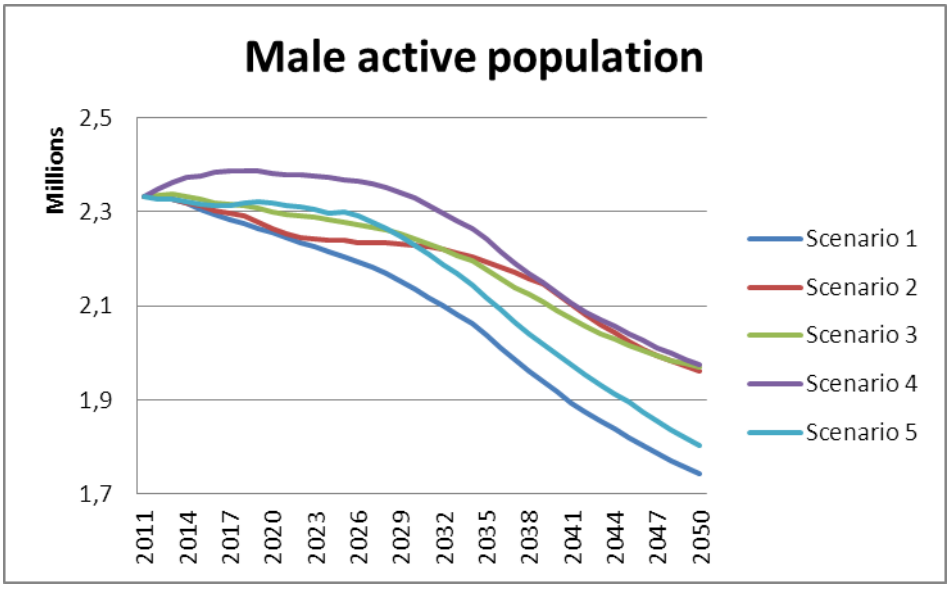
2017	2018	2019	2020	2021	2022	2023	2024	2025
2284167	2276196	2265876	2255013	2244716	2235532	2226939	2216615	2205165
1913303	1905763	1896751	1887522	1878913	1870634	1862203	1852207	1841605
4197470	4181960	4162626	4142536	4123628	4106166	4089142	4068822	4046770
2297207	2290687	2279405	2264409	2252974	2245177	2241805	2240118	2239299
1979789	1978546	1972244	1962164	1954616	1951096	1952450	1955521	1959441
4276997	4269233	4251649	4226573	4207591	4196272	4194254	4195639	4198740
2315484	2312710	2307404	2301266	2295816	2291638	2288415	2283695	2278225
1940571	1937160	1932025	1926324	1921238	1916481	1911695	1905382	1898519
4256055	4249870	4239429	4227590	4217053	4208119	4200110	4189077	4176744
2388405	2388448	2386102	2382896	2380068	2378235	2376911	2373643	2369346
2016349	2025478	2033070	2040073	2047608	2055451	2063154	2069112	2074790
4404754	4413926	4419172	4422969	4427676	4433686	4440065	4442755	4444135
2312287	2319349	2321035	2319146	2314659	2311086	2305326	2296456	2298625
1941790	1947890	1949108	1946652	1945091	1943787	1939563	1931510	1934354
4254077	4267239	4270143	4265798	4259750	4254873	4244889	4227966	4232978

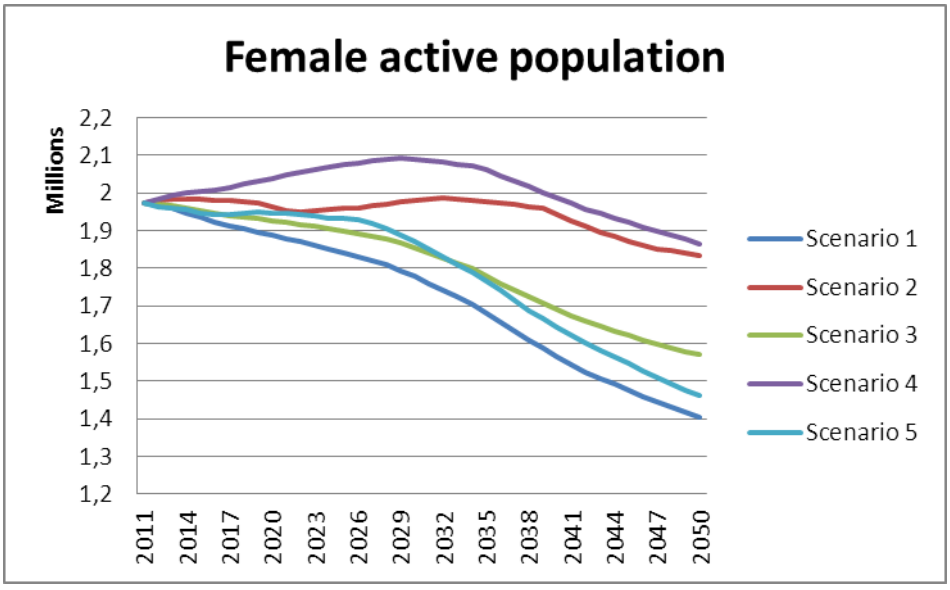
2026	2027	2028	2029	2030	2031	2032	2033	2034
2193651	2182545	2168863	2153824	2136402	2117440	2099824	2081013	2062450
1831507	1821895	1809080	1794836	1777955	1759508	1742559	1724098	1705801
4025158	4004440	3977943	3948661	3914357	3876948	3842382	3805111	3768251
2235703	2233658	2233393	2231916	2229916	2226754	2222179	2213798	2203381

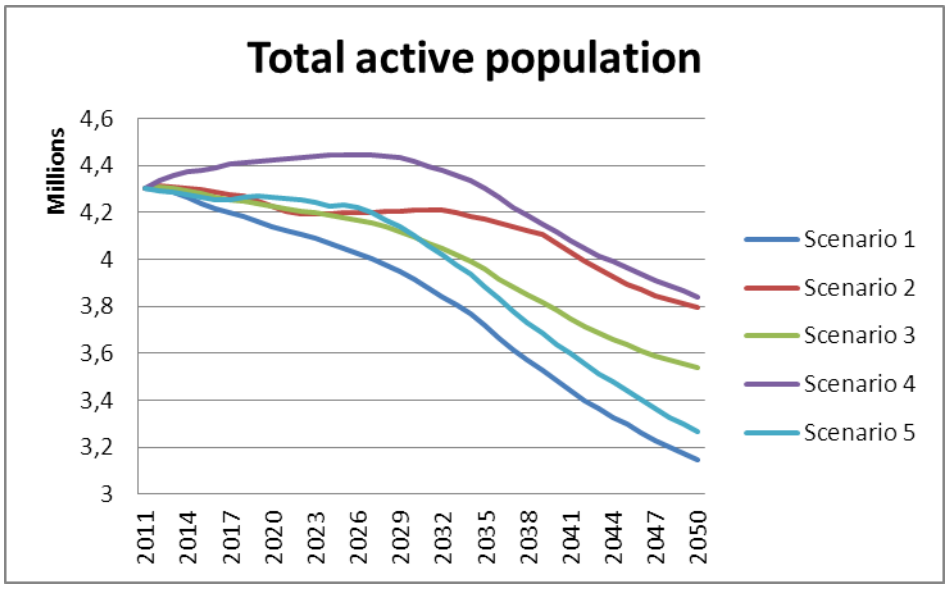
1961628	1965376	1971037	1975859	1980446	1984238	1986680	1985090	1981334
4197331	4199035	4204430	4207775	4210362	4210992	4208859	4198888	4184716
2272717	2267909	2260971	2252889	2242601	2230687	2219907	2207579	2195125
1891920	1886022	1877381	1867536	1854875	1840544	1827524	1813038	1798645
4164637	4153931	4138352	4120426	4097476	4071231	4047431	4020617	3993770
2365378	2359506	2351055	2341471	2329196	2313461	2298344	2281890	2265518
2081024	2087672	2090720	2091953	2089825	2085317	2082263	2077491	2072754
4446402	4447178	4441775	4433424	4419021	4398778	4380607	4359381	4338272
2291890	2279390	2263283	2247367	2229722	2208747	2189198	2167727	2145833
1928480	1918005	1905679	1890068	1871936	1851606	1832002	1810340	1789878
4220369	4197394	4168962	4137436	4101658	4060352	4021200	3978067	3935711

2035	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**
2038042	2011015	1986053	1962929	1941130	1917984	1894813	1873548	1854744
1681908	1656087	1631959	1609273	1587900	1566103	1544672	1525137	1508117
3719950	3667102	3618012	3572202	3529030	3484087	3439485	3398685	3362862
2192741	2181346	2171014	2159326	2147179	2126516	2103091	2081210	2061209
1977831	1973490	1970066	1965158	1959515	1944860	1927313	1911496	1896702
4170573	4154836	4141080	4124485	4106694	4071376	4030404	3992706	3957911
2177588	2157891	2140331	2124193	2109207	2091227	2072599	2055887	2041615
1779901	1759713	1741511	1724748	1709240	1692137	1674541	1658764	1645301
3957489	3917604	3881842	3848941	3818447	3783364	3747141	3714650	3686915
2242428	2216261	2192011	2169842	2149125	2127321	2105980	2086899	2070546
2061108	2046819	2031549	2016545	2002790	1988682	1973603	1958149	1945773
4303536	4263081	4223560	4186387	4151915	4116002	4079583	4045048	4016319
2117909	2092875	2065528	2040860	2018429	1997030	1975721	1954083	1932851
1764923	1740634	1714730	1688715	1666421	1643288	1622173	1601839	1582314
3882833	3833509	3780258	3729576	3684850	3640318	3597894	3555922	3515166

2044	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
1837735	1821061	1803279	1786734	1771892	1757848	1743906
1492102	1476443	1459503	1443757	1430148	1417087	1404200
3329837	3297504	3262782	3230491	3202040	3174935	3148106
2042285	2024446	2008722	1994598	1982558	1972299	1961945
1883503	1871640	1861424	1852759	1846395	1840721	1834852
3925788	3896086	3870146	3847357	3828952	3813020	3796797
2028985	2016857	2004442	1993512	1984573	1976941	1969399
1632904	1621057	1608514	1597192	1588175	1579853	1571836
3661889	3637914	3612957	3590704	3572748	3556795	3541235
2056099	2041949	2026209	2011631	1998678	1986486	1974218
1934404	1923314	1910187	1897974	1888158	1878743	1866195
3990503	3965263	3936396	3909605	3886836	3865230	3840414
1913647	1895708	1875218	1855315	1836941	1820270	1804586
1564305	1547271	1528600	1509258	1492337	1477734	1462959
3477951	3442979	3403818	3364573	3329279	3298005	3267545


Male active population
Millions
2,5
2,3
2,1
1,9
1,7
2011
2014
2017
2020
2023
2026
2029
2032
2035
2038
2041
2044
2047
2050
Scenario 1
Scenario 2
Scenario 3
Scenario 4
Scenario 5


Female active population
Millions
2,2
2,1
2
1,9
1,8
1,7
1,6
1,5
1,4
1,3
1,2
2011
2014
2017
2020
2023
2026
2029
2032
2035
2038
2041
2044
2047
2050
Scenario 1
Scenario 2
Scenario 3
Scenario 4
Scenario 5


Total active population
Millions
4,6
4,4
4,2
4
3,8
3,6
3,4
3,2
3
2011
2014
2017
2020
2023
2026
2029
2032
2035
2038
2041
2044
2047
2050
Scenario 1
Scenario 2
Scenario 3
Scenario 4
Scenario 5

Appendix B: Participation rates per scenario

Comparing participation rates		2011	2012	2013	2014	2015	2016
	Male	68,93	69,02	69,20	69,30	69,32	69,40
	Female	56,82	56,80	56,94	57,02	57,08	57,20
Scenario 1	Total	62,80	62,84	63,00	63,10	63,14	63,25
	Male	68,93	69,18	69,51	69,77	69,96	70,19
	Female	56,83	57,27	57,69	58,10	58,51	58,93
Scenario 2	Total	62,74	63,08	63,38	63,68	63,97	64,27
	Male	68,93	69,18	69,51	69,76	69,95	70,19
	Female	56,82	56,94	57,21	57,43	57,62	57,88
Scenario 3	Total	62,80	62,98	63,29	63,53	63,73	63,98
	Male	68,93	69,56	70,29	70,93	71,49	72,11
	Female	56,82	57,31	57,97	58,56	59,13	59,77
Scenario 4	Total	62,80	63,36	64,06	64,68	65,25	65,88
	Male	68,93	68,87	69,20	69,45	69,66	69,99
	Female	56,82	56,77	57,02	57,25	57,47	57,78
Scenario 5	Total	62,80	62,75	63,04	63,29	63,51	63,83

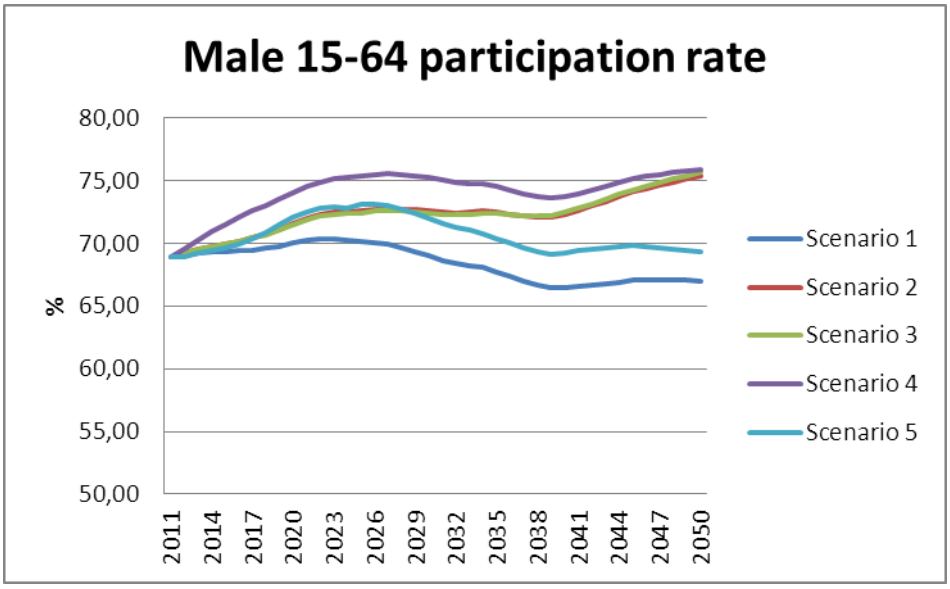
2017	2018	2019	2020	2021	2022	2023	2024	2025
69,47	69,59	69,79	70,08	70,28	70,40	70,40	70,29	70,12
57,35	57,56	57,87	58,28	58,64	58,88	58,97	58,96	58,89
63,37	63,54	63,80	64,16	64,45	64,64	64,69	64,64	64,52
70,43	70,72	71,09	71,56	71,94	72,25	72,45	72,54	72,58
59,34	59,76	60,17	60,59	61,00	61,42	61,83	62,25	62,66
64,57	64,87	65,16	65,46	65,76	66,06	66,35	66,65	66,94
70,42	70,71	71,06	71,51	71,88	72,17	72,34	72,42	72,44
58,17	58,51	58,95	59,48	59,96	60,33	60,54	60,65	60,71
64,25	64,57	64,98	65,48	65,91	66,25	66,45	66,55	66,59
72,64	73,02	73,49	74,05	74,52	74,89	75,14	75,27	75,34
60,44	61,18	62,03	62,99	63,90	64,70	65,34	65,86	66,35
66,50	67,06	67,73	68,50	69,20	69,80	70,24	70,58	70,86
70,33	70,91	71,48	72,07	72,47	72,78	72,88	72,82	73,09
58,20	58,83	59,47	60,11	60,71	61,19	61,42	61,48	61,86
64,22	64,84	65,45	66,07	66,58	66,98	67,16	67,16	67,49

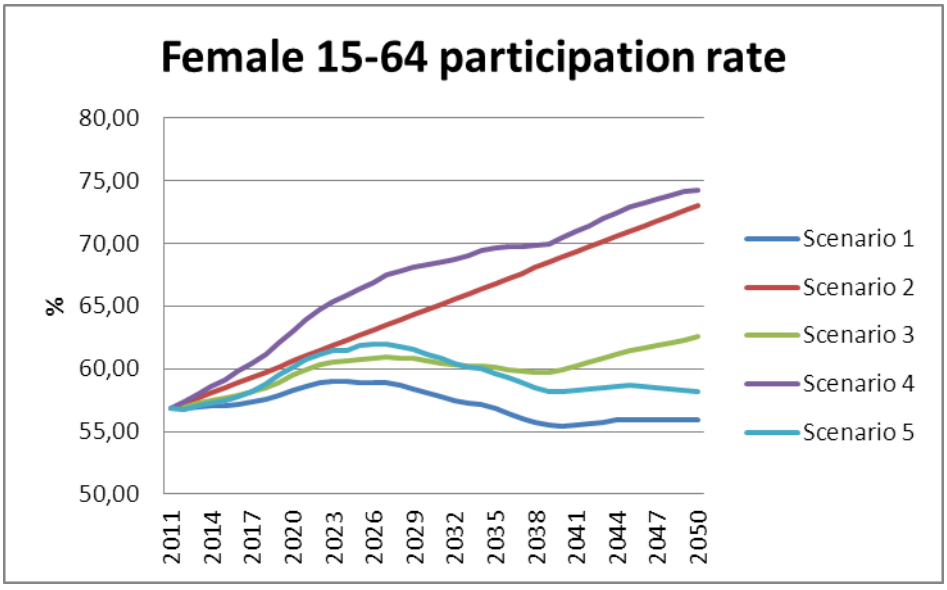
2026	2027	2028	2029	2030	2031	2032	2033	2034
70,03	69,90	69,63	69,36	69,02	68,66	68,39	68,19	68,05
58,89	58,85	58,65	58,43	58,12	57,77	57,51	57,30	57,16
64,48	64,40	64,17	63,92	63,60	63,25	62,98	62,78	62,65
72,71	72,80	72,75	72,69	72,58	72,46	72,42	72,46	72,55
63,08	63,49	63,90	64,32	64,73	65,15	65,56	65,98	66,39
67,24	67,53	67,82	68,12	68,41	68,70	68,99	69,28	69,57

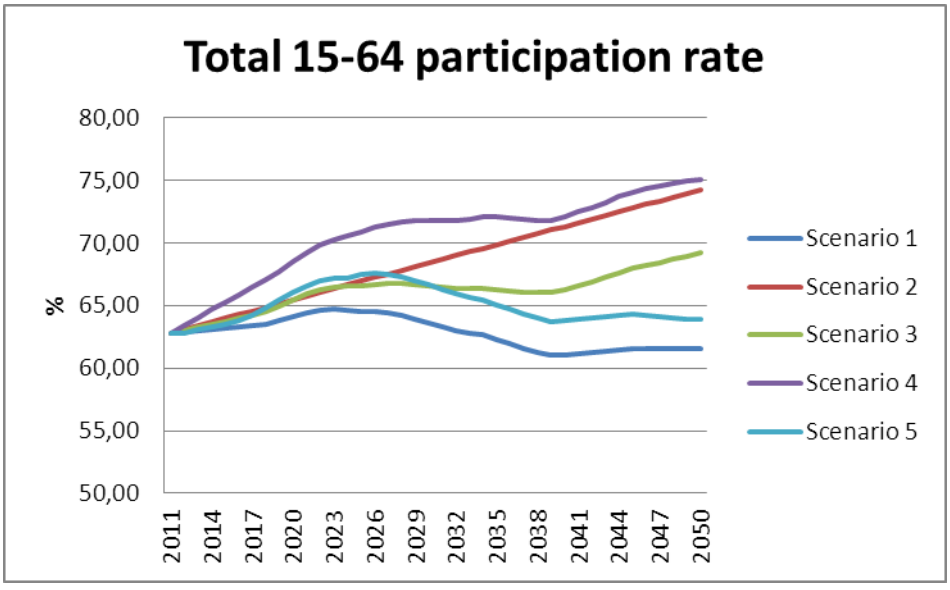
72,55	72,63	72,59	72,55	72,45	72,33	72,30	72,33	72,43
60,83	60,93	60,87	60,79	60,63	60,43	60,31	60,26	60,27
66,71	66,81	66,76	66,70	66,57	66,42	66,34	66,34	66,40
75,51	75,57	75,48	75,40	75,24	75,02	74,85	74,77	74,75
66,91	67,44	67,78	68,10	68,31	68,47	68,72	69,05	69,46
71,23	71,52	71,65	71,77	71,80	71,76	71,80	71,93	72,13
73,16	73,00	72,66	72,37	72,03	71,62	71,30	71,03	70,81
62,01	61,96	61,79	61,53	61,19	60,79	60,46	60,17	59,98
67,61	67,50	67,25	66,98	66,64	66,24	65,91	65,64	65,43

2035	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**
67,73	67,33	66,97	66,70	66,48	66,48	66,56	66,65	66,77
56,81	56,41	56,03	55,73	55,48	55,47	55,54	55,62	55,76
62,32	61,92	61,55	61,26	61,04	61,03	61,11	61,20	61,34
72,45	72,29	72,15	72,11	72,12	72,34	72,64	72,97	73,33
66,81	67,22	67,64	68,05	68,47	68,88	69,29	69,71	70,12
69,86	70,15	70,45	70,74	71,03	71,32	71,61	71,90	72,19
72,37	72,25	72,17	72,18	72,24	72,48	72,80	73,14	73,50
60,12	59,94	59,79	59,73	59,72	59,93	60,21	60,49	60,83
66,29	66,15	66,04	66,01	66,04	66,27	66,58	66,89	67,25
74,52	74,21	73,91	73,73	73,61	73,73	73,97	74,24	74,54
69,62	69,72	69,75	69,83	69,98	70,43	70,96	71,41	71,94
72,09	71,98	71,85	71,80	71,81	72,10	72,48	72,84	73,26
70,38	70,08	69,65	69,35	69,13	69,22	69,40	69,52	69,58
59,62	59,29	58,87	58,48	58,22	58,20	58,32	58,42	58,50
65,04	64,73	64,31	63,96	63,73	63,77	63,93	64,04	64,12

2044	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
66,92	67,05	67,07	67,07	67,07	67,03	67,00
55,88	55,97	55,96	55,94	55,92	55,90	55,89
61,48	61,59	61,60	61,59	61,58	61,56	61,54
73,73	74,10	74,37	74,64	74,90	75,13	75,37
70,54	70,95	71,37	71,78	72,20	72,61	73,03
72,48	72,77	73,06	73,35	73,64	73,93	74,22
73,89	74,26	74,55	74,83	75,12	75,38	75,66
61,15	61,45	61,67	61,88	62,10	62,32	62,56
67,61	67,95	68,21	68,46	68,71	68,96	69,22
74,88	75,18	75,36	75,51	75,65	75,75	75,84
72,44	72,91	73,24	73,53	73,83	74,11	74,27
73,68	74,06	74,31	74,54	74,75	74,94	75,07
69,69	69,80	69,74	69,64	69,53	69,41	69,33
58,58	58,66	58,61	58,47	58,35	58,29	58,22
64,21	64,31	64,26	64,15	64,03	63,95	63,87


Male 15-64 participation rate
80,00
75,00
70,00
65,00
60,00
55,00
50,00
%
2011
2014
2017
2020
2023
2026
2029
2032
2035
2038
2041
2044
2047
2050
Scenario 1
Scenario 2
Scenario 3
Scenario 4
Scenario 5


Female 15-64 participation rate
80,00
75,00
70,00
65,00
60,00
55,00
50,00
%
2011
2014
2017
2020
2023
2026
2029
2032
2035
2038
2041
2044
2047
2050
Scenario 1
Scenario 2
Scenario 3
Scenario 4
Scenario 5


Total 15-64 participation rate
80,00
75,00
70,00
65,00
60,00
55,00
50,00
%
2011
2014
2017
2020
2023
2026
2029
2032
2035
2038
2041
2044
2047
2050
Scenario 1
Scenario 2
Scenario 3
Scenario 4
Scenario 5

Appendix C: Economic activity rates

	Economic Activity rate (x 100%)	2011
Scenario 1	Male 15-64 Economically active/ Total Male Population rate	49,18
	Female 15-64 Economically active/ Total Female Population rate	37,64
	Total 15-64 Economically active/ Total Population rate	43,12
Scenario 2	Male 15-64 Economically active/ Total Male Population rate	49,10
	Female 15-64 Economically active/ Total Female Population rate	37,65
	Total 15-64 Economically active/ Total Population rate	43,09
Scenario 3	Male 15-64 Economically active/ Total Male Population rate	49,18
	Female 15-64 Economically active/ Total Female Population rate	37,64
	Total 15-64 Economically active/ Total Population rate	43,12
Scenario 4	Male 15-64 Economically active/ Total Male Population rate	49,18
	Female 15-64 Economically active/ Total Female Population rate	37,64
	Total 15-64 Economically active/ Total Population rate	43,12
Scenario 5	Male 15-64 Economically active/ Total Male Population rate	49,18
	Female 15-64 Economically active/ Total Female Population rate	37,64
	Total 15-64 Economically active/ Total Population rate	43,12

2015	2020	2025	2030	2035	2040	2045	2050
48,97	48,37	47,81	46,88	45,35	43,33	41,80	40,69
37,30	36,89	36,51	35,79	34,45	32,71	31,48	30,56
42,85	42,36	41,91	41,10	39,67	37,81	36,45	35,45
49,12	48,57	48,55	48,94	48,79	48,04	46,47	45,78
38,24	38,35	38,84	39,86	40,51	40,62	39,91	39,93
43,41	43,22	43,48	44,20	44,48	44,18	43,07	42,75
49,41	49,37	49,40	49,21	48,45	47,25	46,30	45,96
37,66	37,65	37,63	37,33	36,46	35,34	34,57	34,20
43,25	43,23	43,25	43,02	42,21	41,06	40,22	39,87
50,50	51,12	51,37	51,11	49,90	48,06	46,87	46,07
38,64	39,87	41,13	42,06	42,22	41,53	41,01	40,61
44,28	45,23	46,02	46,39	45,90	44,67	43,83	43,24
49,21	49,75	49,84	48,93	47,13	45,12	43,52	42,11
37,55	38,05	38,34	37,68	36,15	34,32	32,99	31,83
43,10	43,63	43,83	43,06	41,41	39,51	38,06	36,79

Appendix D: Labour market adjusted old-age dependency ratios

	Labour market adjusted old-age dependency ratio	2011
Scenario 1	Male 65+ population/Male 15-64 economically active population	0,26
	Female 65+ population/Female 15-64 economically active population	0,54
	Total 65+ population/Total 15-64 economically active population	0,39
Scenario 2	Male 65+ population/Male 15-64 economically active population	0,26
	Female 65+ population/Female 15-64 economically active population	0,54
	Total 65+ population/Total 15-64 economically active population	0,39
Scenario 3	Male 65+ population/Male 15-64 economically active population	0,26
	Female 65+ population/Female 15-64 economically active population	0,54
	Total 65+ population/Total 15-64 economically active population	0,39
Scenario 4	Male 65+ population/Male 15-64 economically active population	0,26
	Female 65+ population/Female 15-64 economically active population	0,54
	Total 65+ population/Total 15-64 economically active population	0,39
Scenario 5	Male 65+ population/Male 15-64 economically active population	0,26
	Female 65+ population/Female 15-64 economically active population	0,54
	Total 65+ population/Total 15-64 economically active population	0,39

2015	2020	2025	2030	2035	2040	2045	2050
0,28	0,33	0,36	0,38	0,42	0,48	0,58	0,64
0,57	0,64	0,70	0,73	0,79	0,89	1,01	1,10
0,41	0,47	0,51	0,54	0,58	0,67	0,77	0,85
0,28	0,32	0,35	0,36	0,39	0,44	0,52	0,57
0,56	0,62	0,65	0,65	0,67	0,71	0,80	0,84
0,41	0,46	0,49	0,50	0,52	0,57	0,65	0,70
0,28	0,32	0,35	0,36	0,39	0,44	0,52	0,57
0,57	0,63	0,67	0,70	0,74	0,82	0,92	0,99
0,41	0,46	0,50	0,51	0,55	0,61	0,70	0,75
0,27	0,31	0,33	0,35	0,38	0,44	0,51	0,56
0,55	0,59	0,62	0,62	0,64	0,70	0,78	0,83
0,40	0,44	0,47	0,47	0,51	0,56	0,64	0,69
0,28	0,32	0,34	0,36	0,40	0,47	0,55	0,62
0,57	0,62	0,66	0,69	0,75	0,85	0,97	1,06
0,41	0,46	0,49	0,51	0,56	0,64	0,74	0,81

Appendix E: Labour market adjusted young-age dependency ratios

	Labour market adjusted young-age dependency ratio	2011
Scenario 1	Male 0-14 population/Male 15-64 economically active population	0,32
	Female 0-14 population/Female 15-64 economically active population	0,36
	Total 0-14 population/Total 15-64 economically active population	0,34
Scenario 2	Male 0-14 population/Male 15-64 economically active population	0,30
	Female 0-14 population/Female 15-64 economically active population	0,36
	Total 0-14 population/Total 15-64 economically active population	0,34
Scenario 3	Male 0-14 population/Male 15-64 economically active population	0,32
	Female 0-14 population/Female 15-64 economically active population	0,36
	Total 0-14 population/Total 15-64 economically active population	0,34
Scenario 4	Male 0-14 population/Male 15-64 economically active population	0,32
	Female 0-14 population/Female 15-64 economically active population	0,36
	Total 0-14 population/Total 15-64 economically active population	0,34
Scenario 5	Male 0-14 population/Male 15-64 economically active population	0,32
	Female 0-14 population/Female 15-64 economically active population	0,36
	Total 0-14 population/Total 15-64 economically active population	0,34

2015	2020	2025	2030	2035	2040	2045	2050
0,32	0,31	0,31	0,31	0,31	0,32	0,32	0,33
0,36	0,36	0,35	0,35	0,36	0,37	0,38	0,38
0,34	0,33	0,32	0,33	0,33	0,34	0,35	0,35
0,30	0,30	0,28	0,28	0,27	0,27	0,27	0,27
0,35	0,34	0,33	0,31	0,30	0,30	0,30	0,29
0,33	0,33	0,31	0,30	0,30	0,29	0,29	0,29
0,31	0,31	0,30	0,29	0,29	0,29	0,29	0,29
0,35	0,35	0,34	0,33	0,34	0,34	0,34	0,34
0,33	0,33	0,31	0,31	0,31	0,31	0,31	0,31
0,31	0,30	0,29	0,28	0,28	0,29	0,29	0,29
0,35	0,33	0,31	0,30	0,29	0,29	0,29	0,29
0,32	0,31	0,30	0,29	0,29	0,29	0,29	0,29
0,32	0,31	0,29	0,29	0,30	0,31	0,31	0,31
0,36	0,34	0,33	0,33	0,34	0,35	0,36	0,37
0,33	0,32	0,31	0,31	0,32	0,33	0,33	0,34

Appendix F: Labour market adjusted total dependency ratios

	Labour market adjusted total dependency ratio	2011
Scenario 1	Male 0-14 and 65+ population/Male 15-64 economic active population	0,58
	Female 0-14 and 65+ population/Female 15-64 economic active population	0,90
	Total 0-14 and 65+ population/Total 15-64 economic active population	0,73
Scenario 2	Male 0-14 and 65+ population/Male 15-64 economic active population	0,58
	Female 0-14 and 65+ population/Female 15-64 economic active population	0,90
	Total 0-14 and 65+ population/Total 15-64 economic active population	0,73
Scenario 3	Male 0-14 and 65+ population/Male 15-64 economic active population	0,58
	Female 0-14 and 65+ population/Female 15-64 economic active population	0,90
	Total 0-14 and 65+ population/Total 15-64 economic active population	0,73
Scenario 4	Male 0-14 and 65+ population/Male 15-64 economic active population	0,58
	Female 0-14 and 65+ population/Female 15-64 economic active population	0,90
	Total 0-14 and 65+ population/Total 15-64 economic active population	0,73
Scenario 5	Male 0-14 and 65+ population/Male 15-64 economic active population	0,58
	Female 0-14 and 65+ population/Female 15-64 economic active population	0,90
	Total 0-14 and 65+ population/Total 15-64 economic active population	0,73

2015	2020	2025	2030	2035	2040	2045	2050
0,60	0,64	0,67	0,68	0,73	0,80	0,90	0,96
0,93	0,99	1,04	1,07	1,14	1,25	1,39	1,48
0,75	0,80	0,84	0,86	0,92	1,01	1,12	1,20
0,60	0,64	0,66	0,66	0,68	0,72	0,81	0,86
0,91	0,96	0,98	0,96	0,97	1,01	1,10	1,14
0,74	0,79	0,81	0,80	0,82	0,86	0,95	0,99
0,59	0,63	0,64	0,65	0,68	0,74	0,81	0,85
0,92	0,97	1,01	1,03	1,08	1,16	1,27	1,33
0,74	0,79	0,81	0,82	0,86	0,93	1,01	1,06
0,58	0,61	0,62	0,63	0,66	0,72	0,80	0,85
0,90	0,92	0,92	0,91	0,93	0,99	1,07	1,12
0,73	0,75	0,76	0,76	0,79	0,85	0,93	0,98
0,60	0,62	0,64	0,66	0,70	0,77	0,87	0,93
0,92	0,96	0,99	1,02	1,09	1,20	1,33	1,42
0,75	0,78	0,80	0,82	0,88	0,96	1,07	1,15

Appendix G: Total inactive population dependency ratios

	Total inactive population dependency ratio	2012
Scenario 1	Male inactive population/15-64 economically active population	1,03
	Female inactive population/15-64 economically active population	1,66
	Total inactive population/15-64 economically active population	1,32
Scenario 2	Male inactive population/15-64 economically active population	1,03
	Female inactive population/15-64 economically active population	1,64
	Total inactive population/15-64 economically active population	1,31
Scenario 3	Male inactive population/15-64 economically active population	1,03
	Female inactive population/15-64 economically active population	1,42
	Total inactive population/15-64 economically active population	1,31
Scenario 4	Male inactive population/15-64 economically active population	1,01
	Female inactive population/15-64 economically active population	1,64
	Total inactive population/15-64 economically active population	1,30
Scenario 5	Male inactive population/15-64 economically active population	1,03
	Female inactive population/15-64 economically active population	1,66
	Total inactive population/15-64 economically active population	1,32

2015	2020	2025	2030	2035	2040	2045	2050
1,04	1,07	1,09	1,13	1,21	1,31	1,39	1,46
1,68	1,71	1,74	1,79	1,90	2,06	2,18	2,27
1,33	1,36	1,39	1,43	1,52	1,64	1,74	1,82
1,04	1,06	1,06	1,04	1,05	1,08	1,15	1,18
1,62	1,61	1,57	1,51	1,47	1,46	1,51	1,50
1,30	1,31	1,30	1,26	1,25	1,26	1,32	1,34
1,02	1,03	1,02	1,03	1,06	1,12	1,16	1,18
1,43	1,45	1,47	1,49	1,55	1,63	1,70	1,73
1,31	1,31	1,31	1,32	1,37	1,44	1,49	1,51
0,98	0,96	0,95	0,96	1,00	1,08	1,13	1,17
1,59	1,51	1,43	1,38	1,37	1,41	1,44	1,46
1,26	1,21	1,17	1,16	1,18	1,24	1,28	1,31
1,03	1,01	1,01	1,04	1,12	1,22	1,30	1,37
1,66	1,63	1,61	1,65	1,77	1,91	2,03	2,14
1,32	1,29	1,28	1,32	1,41	1,53	1,63	1,72