Chapter 2
The Ageing Population

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Abstract The process of population ageing that has been occurring in Sweden can be expected to continue during the coming decades, the population pyramid will become increasingly rectangular, and possibly even demonstrate a shrinking base. This will lead to increasing challenges in terms of financing pensions, elderly care and healthcare. These problems will continue for at least the next 30 years with no demographic solution available. Immigration is not likely to offset population ageing to any larger degree, and even dramatic increases in fertility rates would take 25–30 years to have any positive effect. Since increasing tax rates seems unlikely, the most viable solution lies in an expansion of the workforce and the resulting increase of the tax base. If we rely solely on increasing the retirement age to provide the increased hours worked, we would need to raise the minimum retirement age by roughly 5 years until 2050. While this might be possible, it is more likely that the solution lies not in this or any other single measure but in a combination thereof. However, expanding hours worked not only requires incentives but also job opportunities. Thus the policy should aim not only at expanding labour supply side but also labour demand.

2.1 Introduction

Sweden has been undergoing a process of population ageing over a period of more than 100 years, during which time the share of elderly has more than doubled. Given existing problems regarding the organization of elderly care, as well as healthcare in general, the question is how Sweden will cope with the large Baby Boom generation when it leaves the workforce and enters retirement. Since the

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cohorts entering the labour force are smaller, there are also worries concerning how the future financing of the welfare state will be secured. This chapter will primarily examine the questions of why population ageing has occurred, how it is likely to develop in the future and what the potential economic consequences will be. It will also examine possible solutions to the problems associated with an ageing society, such as the viability of immigration as a potential solution.

2.2 Fundamentals of Population Ageing

The share of the Swedish population over the age of 65 increased from 8 to 17% during the twentieth century (see Table 2.1). This impressive increase marked a pronounced change from the stability during the previous period dating back to at least 1750, with a slight increase during the late nineteenth century (Statistics Sweden 1999, p. 21). The population pyramid for Sweden in 1900 (see Fig. 2.1) still has the classic pattern, with a broad base made up of younger people successively tapering off with increasing age to a pointed top, common in all agricultural societies in the past and found in many developing countries today.

The population structure in 2000, however, shows that this traditional pyramid shape was replaced during the preceding 100 years by a more urn-shaped age structure, with a smaller base and wider top than before. The proportion of elderly is expected to continue to increase, making the form more and more rectangular.

Table 2.1 The Swedish population 1750–2000

	1750	1900	2000	2050
Age structure				
0–19 years	42%	42%	24%	22%
20–64 years	52%	50%	59%	54%
65 + years	6%	8%	17%	24%
Average age		29 years	39 years	43 years
Life expectancy at birth:				
Men	35 years	51 years	77 years	83 years
Women	38 years	54 years	82 years	86 years
Life expectancy at age 65:				
Men	10 years	12 years	17 years	21 years
Women	10 years	13 years	20 years	23 years
Average age at first marriage:				
Men	27 years	28 years	33 years	
Women	25 years	26 years	31 years	
Share of 40 year old women who are:				
Unmarried	16%		20%	
Unmarried and not cohabiting	15%		10%	
Total fertility rate	4.8	4.1	1.6	
Total marital fertility rate	5.7		ca. 1.8	

Source: BiSOS; Befolkning (Statistics Sweden)

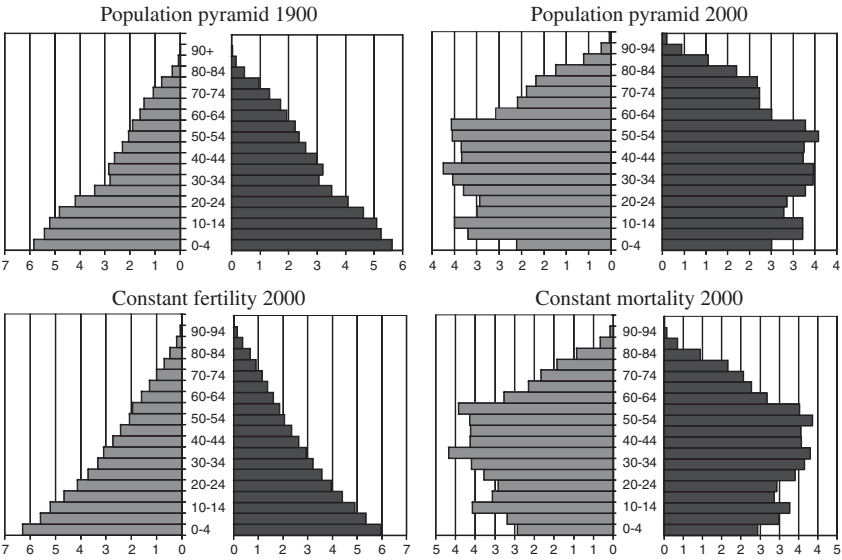

Fig. 2.1 Age structure in Sweden in 2000 compared to how it would have looked if fertility or mortality had remained constant at 1900 levels throughout the twentieth century. Percent of the population in each age interval, right-hand columns females, and left-hand columns males
Source: Own calculations using yearly data on births, deaths and migration in one-year age groups from BiSOS; Befolkning (Statistics Sweden)

Population ageing took place in all industrialized countries during the twentieth century, with the difference being that the process was more pronounced in Sweden. Several industrialized countries, however, have gained on, and even passed, Sweden during recent decades. Population ageing has evolved into a global phenomenon, also affecting many newly developed and developing countries. Taken together, the share of the world's population above the age of 65 is currently increasing and is projected to rise from 6.6% in 2000 to 16.4% in 2050 (Bongaarts and Bulatao 2000, p. 23).

The reason why the share of elderly has increased may appear obvious: life expectancy has increased and people are living longer. Average life expectancy in Sweden has indeed risen considerably during the past century (Table 2.1), as in other parts of the world. The world record in average female life expectancy has, on average, increased at an almost constant rate of 3 months per year from 1840 until today, while slightly slower for males (Oeppen and Vaupel 2002). This development means that children live roughly 9 years longer than their parents, and this has continued generation after generation. The records have been held by Norway, Australia, New Zeeland and a few other rather small countries including Sweden. The most recent record holder is Japan. While the improvements in life expectancy did not begin as early in recently developed countries, the development has been much more rapid. This process will almost certainly slow at some point, but there is yet no indication that we have reached that point.

While these developments have been impressive, they have had a limited impact on population ageing so far. In fact, the improvements in life expectancy initially rejuvenated the population, since the early increases in life expectancy were driven by a decline in infant and child mortality. Consequently, most of the actual years gained through these increases were below the age of 65. For Western countries, it was not until life expectancy at birth passed ~72 years that the increase in life expectancy was driven by a reduction in mortality among the elderly, thus contributing to population ageing (Lee 1994).

The primary cause of population ageing has historically been declining fertility. The overarching importance of fertility decline on age structure was highlighted by the American demographer Ansley Coale in 1957, with the help of Swedish data (Coale 1957). Coale showed that, had fertility rates remained unchanged, the age structure would largely have been the same in 1950 as in 1860, despite substantial increases in life expectancy during this period. When Coale held mortality constant at 1860 levels and allowed fertility to develop at historical rates, however, he found that the projected age structure was strikingly similar to the actual age structure in 1950. Coale's work therefore shows that the population ageing that occurred throughout the first half of the twentieth century was almost exclusively the result of fertility decline.

In order to identify the causes of the continued population ageing through the remainder of the century, we repeated Coale's calculations using data for the entire twentieth century. Figure 2.1 shows the actual age structures in 1900 and in 2000 as well as the calculated age structure for the year 2000 under two counter-factual regimes: one where fertility is held constant at the 1900 level and mortality is allowed to change at historical rates, and one where mortality is held constant at the 1900 level and fertility is allowed to change at historical rates. The results are similar to those found by Coale; population ageing in Sweden was primarily driven by the decline in fertility throughout the twentieth century.

Repeating the calculations for each year from 1900 to 2000, we estimated the effect of each component of population ageing, shown in Fig. 2.2. When mortality was held constant, the share of people over the age of 65 was 3 percentage points lower than the 17% observed in 2000. When fertility was held constant, the share of those over the age of 65 in the counter-factual was 8.4%, exactly the same percentage as in 1900. This approximate level would occur regardless of whether mortality was held at the 1900 level or was allowed to develop along historical paths. Through this exercise, we show that the share of elderly in 2000 was ~10 percentage points higher than it would have been if family sizes had not declined during the twentieth century. This implies that fertility retained its dominant position as the main determinant of age structure throughout the entire twentieth century. If fertility levels stabilize over a longer period, however, other factors, such as mortality change, will increase in importance. Over the last decades of the twentieth century, we have started to see mortality beginning to exert an influence on the age structure, indicating that this process has already begun, as shown in Fig. 2.2 (see also Preston et al. 2001).

Observations regarding how changes in mortality and fertility affect the age structure led in the 1920s to the development of 'stable population theory'

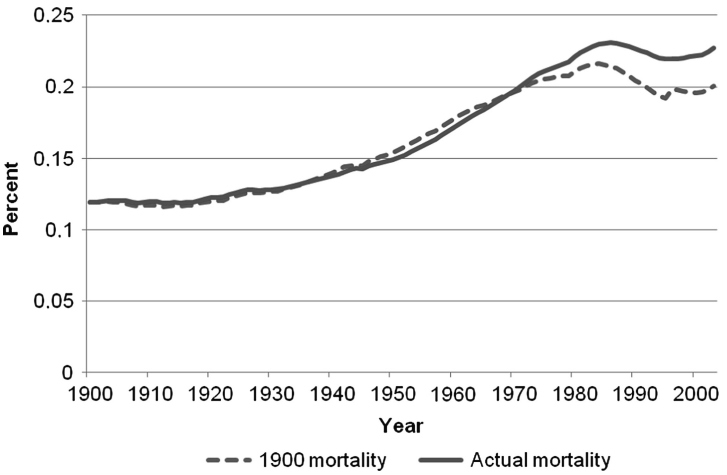

Fig. 2.2 Share of the population over the age of 60, 1900–2000. Actual development and the development as it would have been with mortality held constant at 1900 levels
Source: Own calculations using yearly data on births, deaths and migration in one-year age groups from BiSOS; Befolkning (Statistics Sweden)

(Lotka 1922; Dublin and Lotka 1925; Keyfitz 1968). This theory concerns the amount of time needed for a population to achieve equilibrium – with a stable age structure – after fertility and mortality either stabilize or continue to change at a more-or-less constant rate. This theory predicts a more stable, but less advantageous, population pyramid for Sweden in coming years, with fewer individuals of working age and more people in the older age groups. One major drawback of this theory, however, is that immigration is not accounted for – a point to which we will return below.

The fact that fertility, and not mortality, has been the driving force in population ageing may seem counter-intuitive. It is easy to confuse population ageing with individual ageing, especially in light of the dramatic increase in life expectancy experienced in industrialized countries. It is nevertheless important to make this distinction, between the fact that life expectancy increases and the fact that the share of elderly in the population increases. In the same vein, we must distinguish between the share of the population surviving until the age of 65 and the share of the population over the age of 65.

It may appear contradictory that the share of the population in 1900 that survived until the age of 65 was between 58 and 65%, depending on gender (Statistics Sweden 1999, pp. 123–124), while only 8% of the population at that time was over 65 years of age (see Table 2.1). The explanation lies in the fact that fertility rates were high, leading to future generations always being larger than those that came before. This phenomenon is known as *positive population momentum* (Preston et al. 2001). On the other hand, if a new generation is smaller than their parents' generation, we can expect the population to experience *negative population momentum* and the population can thus be expected to decline.

Yet another factor influencing population growth is the spacing between generations. Generational spacing is measured by the mother's age at the birth of her middle child. For Sweden, the generational span was roughly constant at 31 years from 1750 until the 1870s. It has since declined more-or-less continuously, a state that has had a positive effect on population growth. The shortest span of time between generations was in the 1960s, with a generational spacing of only 26 years. Since then the spacing has increased to today's level of roughly 30 years. Given a constant fertility rate, population growth can therefore vary based on generational spacing, with less spacing being more conducive to population growth.

2.3 Consequences of an Ageing Population

Initially, population ageing was not a problem for society. The factor that caused population ageing, the decline in fertility, was also its solution. First, it had positive effects on economic growth. Population growth implies capital dilution, unless additional capital is augmented, which means that per capita consumption is held back. Consequently, the larger the decline in population growth rates, the less output needs to be allocated to investment in order to keep each worker with a given amount of capital. The deceleration of population growth therefore had positive effects on the economy. Second, the reduction in fertility during the early decades of the twentieth century was so rapid that it more than compensated for the increased share of elderly. The dependency ratio – the number of people of the population either too young or too old to work divided by the number of workers – declined (Statistics Sweden 1999, p. 21). In the longer run, however, when fertility rates stabilised at a lower level and mortality went from rejuvenating to ageing the population, the share of elderly in the population not only continued to increase, but the dependency ratio increased too.

In an influential article from 1958, the American economist Paul Samuelson discussed how consumption might be maintained throughout the life cycle (Samuelson 1958).[1] His *overlapping-generations* model divides an individual's life cycle into two periods: one as a productive worker and one as an unproductive retiree. Samuelson assumes that the fruits of a worker's labour cannot be saved, but must be consumed immediately, implying that a worker is incapable of saving for his/her own retirement. This leads to a situation where all retirees are dependent upon workers to support them. Samuelson argues that the market cannot solve this problem and provides three examples of how to solve it: (1) a family system with transfers from working children to their retired parents, (2) the creation of 'fiat money'[2] as a store of value that can be saved by the workers, or (3) a social security system in which pensions are paid for by a

[1]This section is based on the excellent overview in Willis (1994).

[2]Fiat currency, or fiat money, is money backed by an authority, usually a government, for use in exchange of goods and services or to pay a debt.

tax on workers. A system of transfers from worker to retired through any of these institutions will lead to an improvement in welfare for all persons in current and future generations. Since each person has an incentive to renege on a tax-based system, it needs to be supported by a "social compact".

Samuelson (1975) later used this model to explore the impact of population growth on economic welfare. He points out that population growth has a positive influence on average economic welfare because the tax base for intergenerational transfers grows faster than pension totals, the reason being that the ratio of workers to retirees increases. This increase may therefore balance the negative effects of population growth caused by capital dilution. Thus Samuelson's work helps us to understand the transfers between generations, and has served as the basis for a generalization which is even more useful, if also less known.

Arthur and McNicoll developed Samuelson's model to include the entire population and not only workers and retirees (Arthur and McNicoll 1978). This was done by including age-specific labour productivity and consumption throughout the entire life cycle. They showed that, as long as the interest rate is equal to the population growth rate, then population growth will lead to economic growth in countries where the average age of productive individuals is lower than the average age of consumers. The fundamental conclusion is the same as Samuelson's; population growth will have a positive influence on economic welfare as long as the mean age of the producer is lower than the mean age of the consumer.

This was exactly the situation that prevailed in Sweden at the beginning of the twentieth century. The share of children declined through declining fertility, pushing up the average age of the consumer. The smaller family sizes resulting from lower birth rates enabled women to work outside of the household. Population growth at this time was still substantial, however, with each generation still larger than the preceding one, implying positive population momentum. Together with strong economic growth during the post-war period, it allowed for reforms of the pension system as well as other, more general welfare reforms. A beneficial demographic situation such as this ends when new generations of workers become smaller than those retiring and when population ageing becomes driven by the decline of mortality among the elderly.

Figure 2.3 presents earnings and consumption over the life cycle in Sweden in 2003 based on Forsell et al. (2008). Here it is clear that costs increase towards the end of the life cycle. From their early 20s through 70 years old, the average Swede consumes 200,000 SEK/year. This consumption is more than offset by labour income, and it is not until the individual reaches his/her late 60s that consumption exceeds income. At this point, consumption begins to rise in a monotonic fashion, to the point where individuals in their 90s consume between 400,000–500,000 SEK/year. This increase in the costs is publicly funded, with private consumption remaining stable at less than 100,000 SEK/year. It is primarily healthcare costs that increase by age, with the largest component being inpatient care during the final years of life.

One point not covered by this figure, however, is capital income. While an increase in savings can be expected to provide significant income, it will still only partially offset the huge increase in costs at the end of life.

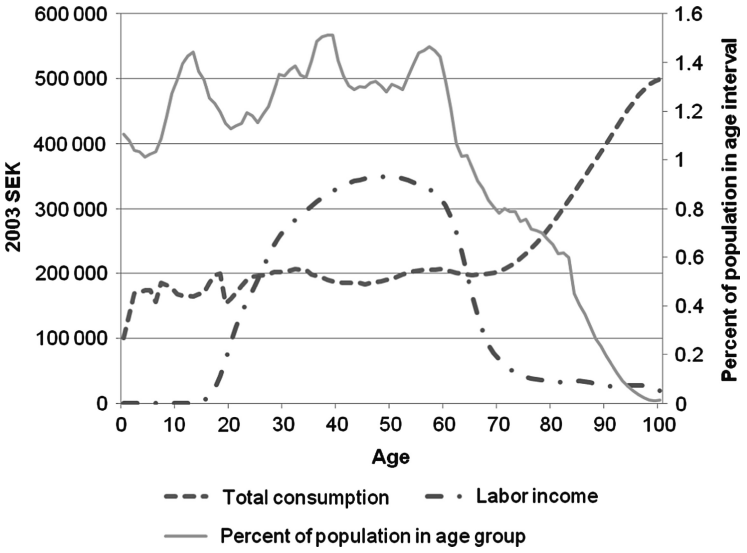

Fig. 2.3 Age-specific consumption, labour income, and size of cohorts, Sweden 2003
Source: Forsell et al. (2008)

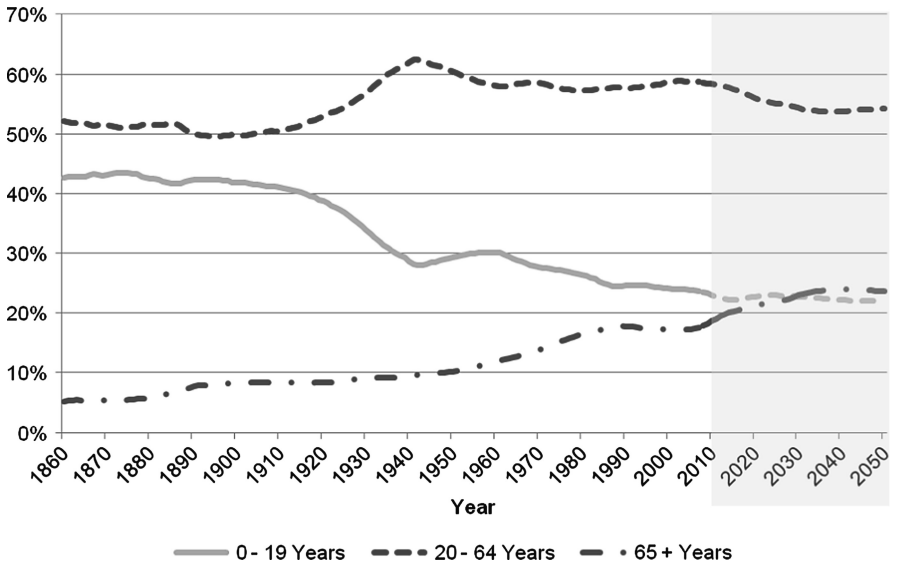

Fig. 2.4 Share of the population in age groups 0–19, 20–64, 65+, 1860–2050
Source: Statistics Sweden

Figure 2.4 shows the share of the population aged 0–19, 20–64, and 65+ from 1900 onwards with official forecasts from 2008 to 2050 from Statistics Sweden (Statistics Sweden 2004). These forecasts are based on the assumptions that life

expectancy will increase to 84 years for men and 86 years for women, and that the total fertility rate will stabilize at 1.83 from 2029 onwards. The share of the population of working age is expected to decline continuously until 2050 due to the increase in the share of people aged 65 and higher.

Figure 2.5 combines the information from Figs. 2.3 and 2.4. We have calculated future costs of consumption as well as incomes by single-year age groups, thereby assuming that age-specific consumption and production remain constant at 2003 levels, or that they change at the same rate. As in Fig. 2.3, income from capital is not taken into account. Based on this projection, we calculate the difference in aggregated lifetime consumption and labour incomes for each year up to 2050 and index this series to the base year 2008. The change over time is driven by the ageing of the population, but here we take not only the numbers in each age-group but also the age-specific consumption and production patterns into account.

This total life cycle deficit, defined as the aggregated consumption minus earnings for every age category in a given year, will, as shown in the figure, increase by 350% by 2050. In this development we can see the strong economic impact of population ageing. This deficit is largely financed by positive transfers from other countries, primarily in the form of capital income. It is unlikely that increases in this source of income will fully cover future deficits, since this would require very large investments abroad. The increase in the life cycle deficit over the next 40 years corresponds to an increase in labour productivity of roughly 0.3% per year, a bit more until 2035, when population ageing levels off. While it may seem a fairly easy task to increase labour productivity at this rate, there is evidence that increasing productivity will not

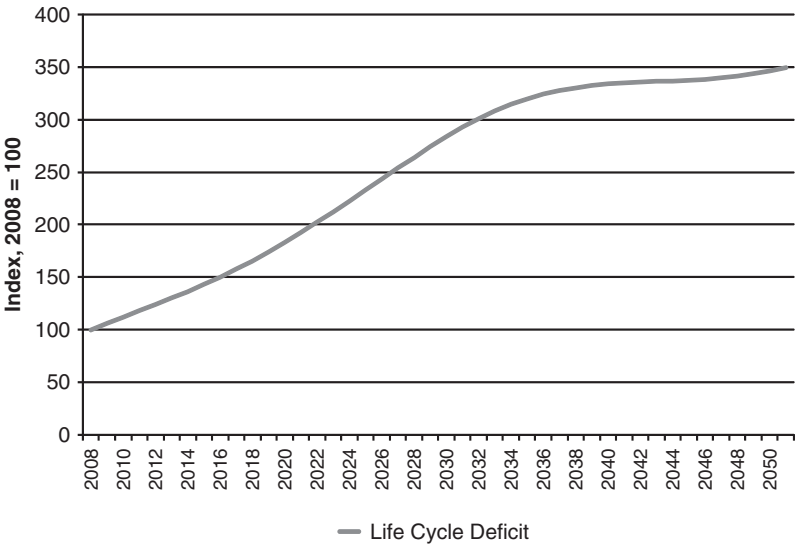

Fig. 2.5 Projected aggregated life cycle deficit, 2008–2050. 2008 = 100
Source: Calculations based on Statistics Sweden and Forsell et al. (2008)

be particularly helpful. As productivity rises, wages increase, not only for the productive occupations, but even those occupations which do not see improvement in productivity tend to ride along on the wave of rising wages. The phenomenon, often called Baumol's disease, is also accompanied by rising public sector expenses to the extent that productivity increases can increase overall consumption more rapidly than production (see Arbejdsmarkedskommissionen 2009).

The alternative is to increase the tax rate, but since increasing tax levels is likely to create problems in our globalized world, as shown by Hansson (Chap. 3), we need to increase the tax base instead, by expanding the supply of labour to offset a rising surplus of consumption over production.

2.4 Can We Increase Fertility?

Increased fertility would, over a 25–30-year period, have a negative effect on the balance between production and consumption. This is due to the fact that very few individuals work before the age of 25 years and parents tend to reduce their supply of market labour. In the longer run, however, a period of increased fertility can meet the challenge brought on by an increasing share of elderly in the population. The question at hand is how do we arrive at such a position? One possibility is to take measures to further increase the compatibility between labour force participation and childrearing. Another possibility is to redistribute some of our consumption to childrearing. As incomes rise, a relatively smaller share of the income is spent on necessities such as food, clothing, and shelter. This should create the economic conditions to allow more children per family. One feature of the current Swedish labour market which points to the ability to increase incomes is the fact that the average number of hours per week spent in market activity, distributed evenly among all individuals of working age, only amounts to 21 hours per person (SOU 2004, p. 11). Given these factors, it appears that the economic preconditions for increased levels of fertility indeed do exist. Nevertheless, very few scholars today believe that fertility rates will increase more than marginally in the future and even if they do, an increase in fertility will not be of any help during the period of rapidly increasing share of elderly up to 2035.

2.5 Is Immigration the Answer?

If increased fertility levels are seen as an impossible solution to increase labour supply in the next 30 year period, what else can be done to counter the effects of population ageing? One solution that is regularly put forward is increased migration. There tends to be an overrepresentation of migrants in the lower working ages, and as such, immigration would appear to be a good solution that lowers the average age of the producer without increasing the population share that is below

working age. However, this intuitive understanding is not quite as straightforward as it may appear.

Sweden has been a country of net immigration since the 1930s (Lundh and Ohlsson 1999; Statistics Sweden 1999, p. 130). Almost 25% of the Swedish population today was either born abroad or has at least one parent who was born abroad. This raises the question of how the age structure would have looked in the absence of migration. Figure 2.6 shows the share of the population over the age of 65 in two separate scenarios – one depicting the actual development, and one showing a counter-factual development in which no immigration takes place. We can see that immigration has had a restraining effect on the share of elderly in the population, but this effect has not been very dramatic. If Sweden had not experienced any immigration, the share of the population above the age of 65 would be only 2.5 percentage points higher than it actually is, or 20.2% instead of 17.7%. These calculations take into account not only immigration, but also the effects of immigrant fertility. These results indicate that population ageing can be offset by immigration, but only to a limited extent. Another factor that must be considered is that immigrants also become older, which means that immigration must increase at an increasing rate if it is to compensate for population ageing.

A further argument for immigration helping to "correct" the shifting age structure is that immigrants tend to arrive during their childbearing years and generally have more children per family than native Swedes. While these statements are true, the latter should not be exaggerated. Foreign-born individuals comprise roughly 10% of the Swedish population, yet account for ~20% of all children

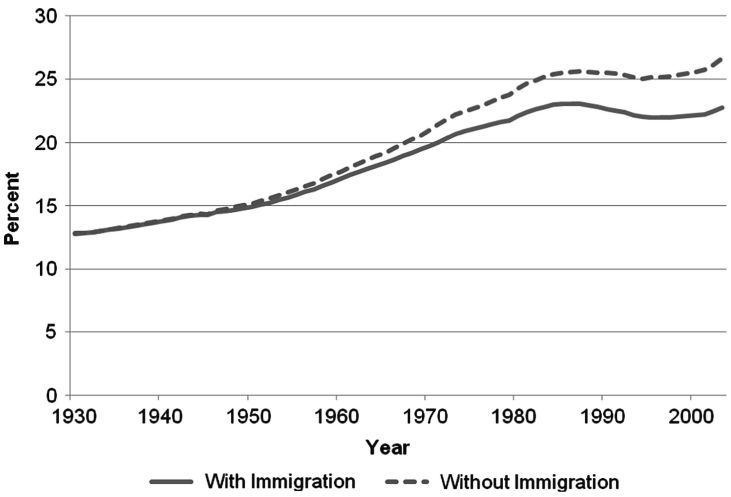

Fig. 2.6 Share of the population above the age of 65, 1930–2003. Actual development and the development as it would have been without any immigration
Source: Own calculations using yearly data on births, deaths and migration in one-year age groups from BiSOS; Befolkning (Statistics Sweden)

born (Statistics Sweden 2004, p. 200). This high figure, however, can largely be explained by the fact that the foreign-born are overrepresented in the childbearing ages and are more likely to be married or cohabiting than native Swedes. An examination of birth rates within marriage shows that foreign-born women tend to have *fewer* children than Swedish women of the same age. While fertility patterns do vary widely among women of different national origin, there is evidence to suggest that even women from cultures with high fertility rates adapt quickly to Swedish fertility patterns (Andersson 2004).

Stable population theory has been expanded in recent decades to include the effects of migration. Empirical studies show that the effects of immigration on the age structure of the receiving society can vary widely depending on the fertility of the migrants. Thomas Espenshade (1994) calculated the effects of immigration on the American age structure, and found only a marginal effect under the assumption that immigrants adjusted their fertility to American levels. Stefan Jonsson and Michael Rendell (2004) came to the opposite conclusion under the assumption that immigrants retain home-country fertility levels instead. These results make it clear that the potential impact of immigration is dependent upon the assumptions made regarding post-migration fertility. As mentioned above, there is evidence that migrants that come to Sweden adjust to Swedish levels, leading to the conclusion that immigration will not result in the large shifts in age structure needed to reverse population ageing. The infeasibility of a migration solution is illustrated by the fact that the EU15 would need to import 700 million immigrants between 1995 and 2050 simply to keep the ratio of those in working ages and those above 65 constant (UN 2001).

If immigration is to alleviate the problems associated with population ageing there must be more than simply an increase in the number of people in fertile ages or below. The primary problem associated with population ageing is the increased costs linked to healthcare and pensions, in the face of a decreasing workforce. For immigration to work as an effective brake on population ageing there is a precondition that immigrants become well-integrated into the Swedish labour force. This is not a particularly realistic expectation, given Sweden's experiences with immigration over the past two decades. Immigrant integration in Sweden has been a failure since the 1970s. Unemployment among foreign-born men was 7 percentage points higher than for native males in 2001 (Bennich-Björkman et al. 2002), but this is only part of the problem. Unemployment figures are based on those in the labour force, making the problem look less severe than it actually is. Only 78% of all foreign-born men were in the labour force in 2001, compared to 86% for Swedish-born men. Thus, 22% of all foreign-born men aged 20–59 were either in labour market retraining programs or completely outside of the labour force in 2001. This gives us an actual unemployment rate (redefined as those without employment/all those aged 20–59) of roughly 30% for immigrants and only around 18% for natives. The failure to integrate those immigrants in Sweden today must be seen as a warning sign for future integration.

This argument has been partially refuted by claims that new immigrants will be recruited for existing jobs, and as such will avoid the integration issues faced by

refugees and others arriving without a job offer in hand. This argument sounds reasonable, but also here we can find historical reasons which cast doubt on its long-term validity. Swedish migration from the 1950s through the early 1970s was dominated by exactly this type of labour migration. Moving the clock forward 40 years we can see that the labour migrants from that period experience higher unemployment rates than natives today, have higher rates of sickness absence, and are over-represented among those with disability pensions (Bengtsson and Scott 2006).

2.6 Other Ways to Solve the Problem?

Since an increase in fertility will not have any positive effect over the next 25–30 years and the effect of immigration is simply too small, how can we then expand the tax base? Is the solution an increase in the number of hours actually worked per worker and/or an increase in the share in working age that actually have employment?

There exists a great potential to increase the tax base through increasing the number of hours worked. Europeans work, on average, several weeks less per year than their American counterparts. Swedes, for example worked on average 40.6 weeks in 2009, while Americans worked 44.2 weeks (OECD 2009). The difference between the United States and Sweden is largely found in longer vacations.

For the Swedish case, sickness absence and other non-vacation absence accounts for a great deal of the difference from the European average. These figures are only applicable for those who have employment. Taking the Swedish case, a high of about 80% of those in working ages were actually employed up until 1990, at which time the share dropped to about 70% (AKU 2007). This implies that a considerable portion of the potential workforce was outside of the labour market. Reasons for this can be found in early retirement due to illness or injury or simply that a share of the population has never successfully established a foothold in the labour market.

A few of the more obvious ways to increase the tax base are: more rapid completion of education, reduced unemployment, reduction in the size of the informal labour market, a shift from home to market work, reductions in sickness absence, and an increase in the retirement age. All of these steps would be helpful, and incentives and possibilities to achieve them are needed. A recent study for Denmark has shown, however, that the potential gains of increasing the labour supply of the elderly are greater than those of increasing the supply in other ages (Arbejdsmarkedskommissionen 2009). Since the situation is rather similar for Sweden, the question is how much does pension age need to increase to offset the negative effects of population ageing?

Based on the age-specific income and consumption patterns shown in Fig. 2.3 and the official population forecasts that we previously used (Statistics Sweden 2004), we have calculated the number of extra years individuals would have to remain in employment to keep age-specific consumption from falling. Under the assumption that we could add more of our best years, when the gap between labour

earnings and consumptions is highest, which is around age 50 years, we find that we would need to insert 5 years of work to maintain the 2008 life cycle deficit. In terms of raising the retirement age, however, it is not likely that we would see additional years of labour at 50 year-old levels, but rather at 65 year-old levels. Under this assumption, Sweden would need to increase the retirement age by roughly 12 years to keep age-specific consumption from falling. How does this compare with future increases in life expectancy?

Our calculations are based on the official forecast from Statistics Sweden, in which life expectancy at birth is assumed to increase to 83 years for men and 85.5 years for women until 2050; an increase of 3.9 and 2.35 years respectively. Against this, an increase of age at retirement by even 4 or 5 years seems very high. We must, however, also take into account the increase in life expectancy in previous years when retirement age was stable or even declining. Expected remaining years of life at age 65 are presently 18 years for men and 21 years for women. One should also add that the life expectancy forecasts from Statistics Sweden are very pessimistic. Even if we do not match the best practice in the world, Sweden could very well see life expectancies higher than the official forecast for 2050. This will, however, also imply an even faster increase in the share of elderly than predicted, but also allows considerable possibilities to increase the retirement age.

Adding years to our lives is likely to delay healthcare costs, since a large fraction of the costs comes from inpatient healthcare in the last years of life. Adding years of working requires, however, that we add healthy years as life expectancy increases, and there exists some ambiguity whether this really is the case (see Parker and Thorslund 2007 for Sweden; Christensen et al. 2009 for a general overview). Thus, the solution is perhaps not to be found by simply raising the retirement age, but also through an increase in labour force participation at other ages, both of which rely on the simultaneous creation of employment to absorb these increases.

While the costs for healthcare at older ages appear particularly daunting, the pension system is also an important issue with an increasing share of the population spending a longer period of time in retirement. This is the case with the "pay-as-you-go" system of financing the pensions, but the problem could be alleviated through the recent change in the system to one where individuals are made aware of the life-cycle aspect of pension systems, as discussed in Kruse (Chap. 4). The new pension system is designed to keep the total costs of public pensions at a fixed rate of about 11% of GDP. To keep the value of the pensions from falling relative to income of other groups, the share of pensioners need to stay stable at around 18%, which it is today. That will be obtained by increasing age of retirement to 70.5 years by 2050.

2.7 Summary

The share of elderly doubled in Sweden from 1950 to 2000, making Sweden a forerunner in terms of population ageing. During recent years other countries have caught up and the process of population ageing continues, with the world's share of

elderly being likely to more than double by 2050. During the first stage of population ageing its cause, the fertility decline, was also its solution. The increasing costs of population ageing were more than compensated for by diminishing costs for children. The next step of population ageing will be due to falling adult mortality and the old-age dependency ratio will increase to higher levels than ever before. The extensive immigration experienced since the 1950s has not had much effect on slowing population ageing, and cannot be expected to play a major role in the future. New baby-booms are welcomed but it takes some 25–30 years until it will improve the situation.

The net impact of population ageing corresponds to an increase in labour productivity of roughly 0.3% per year, but a simple productivity increase will not solve the problem. Since improvements in labour productivity tend to increase consumption more rapidly than production, we cannot expect that productivity improvements will be the sole solution to the challenge of ageing. Rather, the focus must be on improving the tax base by increasing the total number of hours worked. Our calculations show that it will take an increase of the retirement age of about 5 years to keep consumption from falling during the first half of the twenty-first century.

Even if it is possible to successfully navigate all potential problems of increasing the labour supply, there remains one final problem, namely whether the Swedish economy will be able to absorb this substantial increase in the labour force necessary to offset population ageing. The recent phenomenon of "jobless growth" in Sweden points to this obstacle. Needless to say, there exists no single solution to the problem associated with an ageing population. Since no demographic solution exists, at least not in a 30-year perspective, the focus is on increasing labour supply and/or productivity. If the economic impacts of population ageing are to be managed, it is likely to be the result of a combination of the abovementioned solutions.

Given the awareness of future problems with the public funding of an ageing population, individuals would have greater incentives to save throughout their careers to ensure an adequate standard of living in older ages. This savings would have the dual effect of providing for the elderly and creating a capital pool which could be invested to provide for sustainable economic growth. The additional capital saved and invested to provide for future retirement could account for a portion of this productivity growth, but cannot be expected to solve the problem completely.

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