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The Labour Market Impact of Rapid Ageing of Government Employees: Some Illustrative Scenarios

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ABSTRACT/RÉSUMÉ

This paper estimates and discusses some of the potential labour market implications arising from the rapid ageing of government employees in a number of OECD countries. Under alternative scenarios for future public employment policies, available labour resources for the private sector are estimated taking into account the declining age cohorts entering the labour market. These scenarios suggest that, in the absence of considerable increases in labour utilisation, maintaining government sector hiring at their historical share of new labour market entrants will entail sharp declines in the production of government services. On the other hand, if present levels of government services are to be preserved, governments are likely to hire an increasing share of labour market entrants, creating a strong crowding-out effect for the private sector. Alternatively, productivity in the government sector would have to increase substantially.

JEL classification: H11, J11, J45, O57
Key words : Ageing, retirement, government sector, employment, productivity, labour supply and demand, and social services

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Cette étude donne des estimations et analyse quelques implications potentielles du vieillissement rapide des employés du secteur public dans plusieurs pays de l'OCDE. Sous des scénarios alternatifs de politique d'emploi public, l'accroissement de l'offre d'emploi disponible pour le secteur privé a été estimée prenant en considération l'évolution future des cohortes de jeunes entrant dans le marché du travail. Ces scénarios suggèrent qu'en absence d'un accroissement considérable de l'utilisation de la force de travail, le maintien de la part de l'embauche dans le secteur public à son niveau historique impliquerait un déclin assez considérable dans la production des services publics. Alternativement, si les niveaux actuels de service public devraient être maintenus, le secteur public devra pendre un part croissant des nouveaux entrants dans le marché du travail, créant un fort effet d'éviction pour le secteur privé. Une autre solution serait d'accroître substantiellement la productivité dans le secteurs publics.

Classification : JEL
Mots clés : veillesse, retraite, secteur des administrations publiques, emploi, productivité, offre et demande de travail, services sociaux

THE LABOUR MARKET IMPACT OF RAPID AGEING OF GOVERNMENT EMPLOYEES: SOME ILLUSTRATIVE SCENARIOS

By Jens Høj and Sylvie Toly[1]

1. Introduction

1.   Government sector employment in many (predominately European) OECD countries grew rapidly during the build-up of welfare states from the 1960s into the 1980s. Subsequently, government employment flattened, as fiscal positions were consolidated. At the turn of the century, these developments had resulted in a high and increasing average age among government employees in most European countries. As a result, over the next decades a relatively large share of government employees will be retiring, while at the same time demographic trends imply that progressively smaller new cohorts of workers will be entering the labour force. This paper shows, by means of simple projections, that these two concomitant phenomena are likely to create significant pressures on the labour markets in some OECD countries and on the ability of government sectors to maintain current service levels.

2.   The paper begins with a brief recall of ageing trends. It then outlines four possible scenarios concerning future developments in the demand for government employees. These scenarios are used to discuss the impact of government employment levels on available labour supply for the private sector over the coming decades for a selection of OECD countries (Australia, Belgium, Canada, Denmark, France, Germany, Italy, Spain and Sweden). Next, the attention is turned to the required increases in government sector productivity if governments wish to maintain present government sector service levels without negatively affecting the private sector's access to new labour market entrants. These required productivity increases tend to be higher than the productivity rates than can be observed (or assumed) historically. The paper concludes with a discussion and a summary.

2. Demographic trends

3.   Demographic shocks over the next fifty years will be substantial, as illustrated by the change in the age pyramids between 1970, 2030 and 2050 (Figure 1). In the 1970s, welfare states had to cater for populations with relatively few retirees and relatively large young cohorts. Thus, public resources were allocated to child care and education rather than health and care for the elderly. According to UN population projections the overall population structures in the OECD countries will be reversed by 2030, requiring a corresponding shift in resource allocation within the government sector. The following two decades will see further ageing of the populations as the oldest age cohorts expand and the young cohorts remain unchanged. Inspection of the projected age pyramids suggests that the largest swings could take place in countries such as Germany, Italy and Spain, where "top heavy" age pyramids will reflect both the increasing number of older citizens, as well as relatively low birth rates. In the other countries, the age pyramids will become more of a "square type", with a certain rebound or stability of fertility rates limiting the change in the structure towards older cohorts. A common feature for all countries is that the combined share of young and old cohorts relative to the working age population would remain relatively stable until 2030 because the increases in retired population will be, by and large, offset by declines in the young cohorts. Thereafter, the share will increase somewhat in most countries, but considerably in Spain and, to a

lesser extent, Italy. However, this relative stabile share rests on, perhaps optimistic, assumptions concerning a certain rebound in or stable fertility rates and increases in longevity that are about half of the historical developments. If fertility rates falls further and/or longevity increases more than assumed, then the implied demand on public services will be higher with consequent higher hiring needs or required productivity increases in the government sectors (see below).

[Figure 1. Evolving population structure, 1970, 2030 and 2050]

4.   The ageing trend is more marked for government sectors than for the overall labour markets. Applying a simple model for constructing an age pyramid for government sector employees allows for estimating median and average ages for government sector employees (see Box 1. Projection methodology). These estimates suggest by the turn of the century, the median ages are centred on 40 years and the averages on 45 years (Table 1). Official estimates tend to support these results with for example Danish official estimate of the median age of government employees being nearly 40 years (Finansministeriet, 2000). The age structures of teachers, a group for which separate information is available and which illustrates the point, are tilted towards the older cohorts in almost all of the countries examined in this paper. In Germany, Italy and Sweden around 40% or more of all teachers are above 50 years of age (OECD, 2004). Not only does this confirm the general picture of relatively old employees in the government sector, but it is also an indication of more severe ageing in some areas of the government sector.

Table 1. **Estimated average and median age of government employees in 2002**

	Average age	Median age
Australia	48	38
Belgium	46	39
Canada	46	42
Denmark	47	38
France	45	43
Germany	38	36
Italy	47	40
Spain	42	45
Sweden	50	37

Source: UN-Population database and authors' calculations

Box 1. Projection methodology

There is no internationally-comparable data on the age distribution of government employees in OECD countries. Therefore, an indirect approach had to be adopted. The methodology combines historical and projected population data by age cohorts (from the Population Division of the United Nations) with OECD data on government employment, in order to calculate the age structure of government employees. The first step is to assume that the age distribution of government employees in the initial observation (typically in the 1950s or early 1960s) is equal to that of the working age population. As a next step, subsequent government hiring (both expansion of the government sector and replacement of retirees) was assumed to consist of persons in the age cohort 25-29 years with the simplifying additional assumption that hiring consists of one-fifth of each individual age group in the cohort. Moreover, it was assumed that government employees would only leave upon retirement and that their effective retirement age was identical to the economy-wide *effective* retirement age as reported in Blöndal and Scarpetta (1998).[2] Iteration of these two steps allowed for the construction of a time series of age pyramids for government employees, using the following formulas:

$$AgeGov_{t=i} = \sum_{sh=[25-29]}^{sh=[60-64]} \alpha_{sh} LF_{t=i} \text{ , i= initial period}$$

$$\Delta AgeGov_t = H_t - R_t, t > i$$

$$AgeGov_t = AgeGov_{t=i} + \sum_{i+1}^{t} H_t - \sum_{i+1}^{t} R_t \text{ , t} \triangleright i$$

where AgeGov is the age structure of government employment, α_{sh} is the share of each age cohort of the labour force at time = i, where i = initial period, and LF is the labour force, H is government hiring and R is government retirees.

Over the projection period from the beginning of the century to 2050, the following assumptions were applied: the effective retirement age of public employees and the labour market participation rates of successive 25-29 year cohorts were assumed to remain constant and equal to their historical level.[3] In countries and scenarios where the applied assumptions imply falling government employment, it was assumed that this reduction was achieved by retirement or pre-retirement of the oldest employees (a first-in, first-out rule). One advantage of this assumption is that it prevents an upward bias in the age structure of government employment.

The selected countries are characterised by either relatively large government sectors and/or well-developed welfare states, and will have ageing populations (at varying speeds) over the projection period. The shares of government employment in the total labour force were around 33% for Denmark and Sweden; about 20% in Canada and France, 17% in Belgium and in the other countries ranging from 13 to 15%.

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3. Government employment scenarios

5.   In order to assess the impact of the above ageing trends of government employees on labour markets, four scenarios were considered:

- The *no new hiring scenario* presents a 'naïve' projection, where new hiring in the government sector is completely frozen. In other words, there is no replacement of retiring cohorts of government employees and thus government employment declines in line with its age structure. This allows for an international comparison of the pure effect of ageing on government sector employment.

- The *replacement scenario* assumes that retiring cohorts are replaced by new labour market entrants in order to maintain the level of government employment constant at its most recent historical observation. This provides a benchmark for the potential effect of ageing in the government sector on future labour demand.

- In the *historical share scenario,* new hiring in the public sector is determined as the average share of new entrants in the labour force that historically entered the government sector. This provides for a scenario where government sectors do not exert, in relative terms, any additional pressures on labour market entry as compared with past trends. In this scenario, the level of government employment over the projection period is determined by demographic developments of new labour market entrants.

- Finally, in the *constant service scenario* new hiring in the government sector is projected in such a way that the ratio between total government employees and the non-active population remains constant. Given that the latter ratio can be viewed as a proxy for the supply of social services to the population, government employment in this scenario can be seen as being the implication of maintaining present service levels. Moreover, given the implied high demand for new government employees, this scenario also represents an upper limit for future labour demand from the government sector.

6.   An important feature of these projections is that smaller age cohorts of young workers enter the labour force at roughly the same time as increasing numbers of government employees retire, which implies a *concentration in time* of government hiring pressures on the labour market, particularly if current service levels are to be maintained.

3.2 Results

The "no new hiring scenario"

7.   Under this "naïve" projection, implying a freeze on new hiring from 2004 onwards, the accelerated ageing in government sectors induces a dramatic decline in employment (Figure 2). As an order of magnitude of these pressures, in Australia, Belgium, Germany,[4] Denmark and Sweden, government employment would be halved by 2010-15 relative to 2000 levels. In the other countries (particularly Spain), the halving of government employment would take place somewhat later (2015-2020).

[Figure 2. The "no new hiring scenario"]

8.   These projections show that government sectors are faced with the challenge of replacing a relatively large part of their – sometimes fairly specialised – employees in a relatively short time horizon.[5] An additional observation is that in some parts of the government sector the employees tend to be predominately female (*e.g.* in many countries there is a clear majority of female teachers in primary and secondary schooling), implying that increasing the female labour participation rate may at least partially counteract the problems of concentration in time and the specialisation needs (Jaumotte, 2004, OECD, 2005). Moreover, the shift in the population structure from younger to older age cohorts entails a need for restructuring government services from a focus on education to a larger emphasis on health and elderly care services. As this takes place roughly at the same time as a relatively large number of government employees retire means there is a window of opportunity for a less costly restructuring of government services by refocusing hiring as compared with re-training existing staff.

The "replacement scenario"

9.   In this scenario, government sector hiring is equal to the number of its retirees. For most European countries, this hiring pattern will induce governments to hire an increasingly larger share of new labour market entrants.[6] On average, this share doubles in Germany to one-fifth of all new entrants. Considerable increases in the shares also take place in Denmark and Sweden, bringing them to more than half of all new entrants (Figures 3-11). The raises in the shares are smaller in the other European countries, although the shares of new labour market entrants hired by the government sectors remain at high levels, reaching 20% to 30 %. On the other hand, in Australia and Canada the shares remain roughly constant.

[Figures 3-11 Simulation results for individual countries]

10.   The *timing* of these labour market pressures is also important. The need for replacement hiring emerges earlier in Denmark and Sweden. As a result of the relatively faster ageing of government employees from 2005 to 2015, the government sectors in these countries must, on average, hire more than two-thirds of all new entrants in the labour market in order to keep government employment levels constant. These pressures are less concentrated over time in the cases of France and Germany, although the shares often reaches 40 per cent or more. Equally, there is relatively little concentration over time in the case of Italy, although after 2030 the hiring share increases somewhat. For Spain, most of the replacement pressures come after 2020, reflecting that its government sector is still relatively 'young' as a result of the more recent build-up of the Spanish welfare state. For all countries, a second round effect is taking place after 2035. This second wave is mostly the result of an "echo" effect of the increased hiring after the turn of the century as these employees start to retire. An additional, but smaller, effect arises from further declines in the relative size of the age cohorts that are entering the labour market. These second round effects are particularly pronounced for Australia and Canada where prior to 2035 there is little impact. In Italy and the Scandinavian countries, this second round effect is as important as that of the first round.

The "historical share scenario"

11.   In this scenario, the shares of government intake of new labour market entrants remain constant at their average historical levels, defined as the average of the period 1970-2000. Thus the number of new hiring is determined by the projected demographic developments. Government sector employment would decline in most countries. In Germany, employment in the government sector will be more than halved over the projection period as a result of the smaller young cohorts. In Italy and Denmark, it would decline by more than a third by 2050. Sweden would see a similar sized decline, although the development will not be smooth as the level of government employment reaches its lowest level by 2015 before recovering somewhat over the remaining horizon. Over the projection period, Belgium and France would experience a reduction of about 15% in government employment relative to their initial levels. Over the same period, on the contrary, Australia and Canada would have to increase government employment, while Spain may see a mild decline only after 2030. For these countries, this reflects that relatively large young cohorts are entering into the labour force and relatively young structures of government employees.

The "constant service scenario"

12.   Government employment in this scenario is determined by keeping the ratio between government employment and the non-active population constant, making government employment a function of demographic developments. As could be expected, this scenario is the most demanding in terms of hiring pressures on new labour market entrants. Nonetheless, it provides only a lower bound for possible future pressures, as in this scenario it is implicitly assumed that government employees are perfectly substitutable inputs in the production of different types of public services -- an assumption that may be viewed as optimistic, as it would imply an important transfer of labour resources within the government sector.[7]

13.   Along these lines, the level of government employment in Australia and Canada has to be increased by almost one-third and one-half, respectively, over the projection period in order to maintain government service levels. In the other countries, government employment would have to increase considerably (from 10% to 20%), with the exception of unchanged government employment in Italy. For all countries, the pattern of government hiring is similar to that observed in the replacement scenario, but the magnitude of the share of new labour market entrants entering government employment would be higher. Thus, this scenario high-lightens that if governments want to preserve present service levels the implication would be government hiring pressures on new labour market entrants would well above their historical levels. This suggests an incompatibility of policy objectives with respect to maintaining service levels and avoiding unwarranted government hiring pressures on the labour market.

4. Implications for employment and productivity growth in public service sectors

14.   The scenarios above suggest that considerable pressures may arise in maintaining the level of service in the public sectors, while avoiding crowding out new and scarce labour inputs for the private sector. Along these lines, this section presents a 'thought experiment', which allows for the computation of the required increases in productivity growth in the government sectors that maintain present service levels and allow the private sector relatively unrestricted access to new labour market entrants.[8]

15.   The experiment was constructed as follows. The 'constant service scenario' described above provides a baseline for how much production of government services that is needed to maintain a constant service level. The 'historical share scenario' provides a benchmark for how government employment will develop if governments maintain hiring pressures on new labour market entrants at their historical levels, thus providing the least demanding case in terms of how governments influence demand pressures on the labour market. The difference in employment levels between these two scenarios gives the required change in the levels of government sector productivity that would allow both to maintain the level of government services and would not create additional crowding out of new labour resources to the private sector.

16.   The results of these calculations are driven by both the level and speed of the ageing trend in government sectors as well as in the society at large. Most European countries would need to expand the production of government services by ½ to ¾ per cent per year between 2005 and 2030 in order to maintain service levels.[9] In Australia and Canada, production would have to increase by an average annual rate of around 1% (Table 2). Due to the demographic developments, this demand pressure on government services would tend to soften after 2030. Production of government services could actually fall in the Scandinavian countries and Italy.

17.   In order to match these production trends with the employment levels of the 'historical share scenario', the implied productivity increases are substantial. On average, they are above 1% annually in most European countries until 2030, with the highest increases needed in Denmark and Germany. Given the rapid ageing in public sectors, these pressures tend to be concentrated early in the period particularly for Belgium, Denmark, Germany, and Sweden. After around 2030, there is a second wave of required productivity increases in a number of countries, reflecting a decline in the number of new labour market entrants and a second wave of retirement from the government sectors. Over the entire period, the implied productivity increases are in the range ½ to 1 ½ per cent.

**Table 2. Required increases in productivity to maintain current levels of
government services without additional pressures on labour demand[1]**

(Average annual percentage changes)

	2005-15	2015-25	2025-35	2035-50
Australia				
Changes in employment	1.0%	1.0%	0.9%	0.5%
Required changes in productivity	1.8%	-0.2%	0.1%	0.5%
Belgium				
Changes in employment	0.4%	0.6%	0.4%	-0.1%
Required changes in productivity	2.1%	-0.2%	2.2%	0.3%
Canada				
Changes in employment	1.0%	1.3%	0.9%	0.5%
Required changes in productivity	0.5%	1.0%	-0.2%	1.2%
Denmark				
Changes in employment	0.8%	0.3%	0.4%	-0.3%
Required changes in productivity	4.1%	-0.7%	1.5%	-0.1%
France				
Changes in employment	0.8%	0.7%	0.4%	0.0%
Required changes in productivity	1.0%	0.9%	1.1%	0.2%
Germany				
Changes in employment	0.0%	0.7%	0.5%	0.0%
Required changes in productivity	3.4%	2.4%	-0.4%	0.5%
Italy				
Changes in employment	0.0%	0.2%	0.4%	-0.4%
Required changes in productivity	1.0%	0.5%	2.5%	0.9%
Spain				
Changes in employment	0.0%	0.6%	0.9%	0.2%
Required changes in productivity	-0.5%	1.2%	2.4%	1.7%
Sweden				
Changes in employment	0.5%	0.4%	0.3%	-0.2%
Required changes in productivity	3.9%	-1.4%	0.9%	0.1%

1. *Changes in employment*: Required increases in employment in the 'constant service
scenario'. *Required changes in productivity*: Increases in productivity matching the
production levels in the 'constant service scenario' with the employment levels of the
'historical share scenario' (see main text).

18.   These results can be put into perspective by comparing with available information on general
government sector productivity growth for some OECD countries.[10] In the United States, for example, the
labour productivity gains in the federal government (including about two-thirds of all activities in the
sector) were, on average, 1.1% from 1967 to 1994 (Fisk and Forte, 1997). In Finland, productivity
increases in the central government sector were around 0.7% from 1994-97 and of a smaller magnitude in
the local government sector. In the Netherlands, labour productivity growth in the government sector was,
on average, 1½ per cent in the mid-1990s. Thus, available evidence indicates that typical productivity
growth in the government sector would be in the range of an assumed 0 per cent to a high of 1½ per cent.
Insofar as these trend productivity gains can be expected to continue, the results of the "thought
experiment" above should be interpreted as the <u>additional</u> required productivity increases. Thus, comparing
the two set of productivity increases suggests that there could be a need for roughly doubling the historical

productivity growth rates in the government sector over the entire period if service levels are to be preserved as government hiring is maintained at its historical share of new labour market entrants. In this context, it should be noted, however, that in the beginning of the projection period the additional required productivity increases could be up to three times the best historical performance in order to compensate for the contractions in government employment.

5. How robust are the simulation results?

19.   The presented calculations are based on a set of rough-and-ready assumptions. Applying more refined assumptions, however, is unlikely to markedly change the results as the effects of these new assumptions tend to offset each other. For example, the assumption that all new government employees are equally distributed over the age cohort 25-29 years and, once hired, never leave the government sector is somewhat restrictive. Introducing hiring from a broader range of age cohorts would increase the average age of government employees, which, however, would tend to be by the effects of relaxing the "never leave" assumption. The assumption of constant retirement age among public employees over the projection period could be considered rather conservative considering the historical trend towards lower retirement age, but recent policy changes aim at stabilising or increasing the overall effective retirement age and which should also have an impact on government employees.[11] Data availability may also affect the results, although simulations suggest a fairly conservative bias (Box 1). To sum up, the methodology could be further refined and other assumptions be applied, but given the large overall demographic movements in government sector employment and demographics in the coming years, it would appear unlikely that the overall picture would change significantly. Obviously, the projection results concerning the precise timing of the problems and their magnitude are sensitive to changes in the applied assumptions.

Box 2. The potential effect of data issues on the projections

The presented results may be influenced by the data availability concerning government employment. For most of the countries, the government employment series begin around 1960. The two exceptions are Denmark, with the first data point in 1950, and Spain, where government employment data exists from 1965 onwards. To illustrate the potential influence of data availability on the results, the replacement scenario was repeated for Denmark, but with the calculations starting 10 years later in 1960. These results show a five-year postponement of the entire scenario, as well as a lowering of the average magnitude of around five percentage points. The postponement of five rather than 10 years can be explained by the fact that the first cohorts in the original calculations had already retired at the time of the last historical observation as well as a younger initial age profile of government employees, both factors also contributing to the smaller magnitude. The implications for the other countries are that the timing of the problems may come earlier than estimated and that the estimated share of the share of new labour market entrants being hired by the government sector may be on the conservative side. The Spanish estimates may, in this context, appear particularly vulnerable, although the number of Spanish government employees only began to grow rapidly after the first oil crisis.

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6. Summary and conclusions

20.   The scenarios discussed in this paper have revealed that the interaction between an ageing government sector and an ageing population in a number of countries with well-developed welfare states could have serious repercussions on their labour markets. If governments continue to hire a share of new labour market entrants in line with the historical pattern, the result will be a substantial reduction in the volume of government services unless government productivity growth becomes markedly higher. On the other hand, if government services are to be maintained at present levels and there is no acceleration in government productivity, government sector hiring could pre-empt private sector access to new labour market entrants. Thus, governments are faced with a difficult choice between allocation of labour and maintaining government services. This policy dilemma could be solved through increasing productivity growth in the government sector. However, the required magnitudes of such additional productivity

increases indicate that this is likely to provide only a partial solution unless fairly strong measures are implemented and should be accompanied by other policy measures, such as labour market policies aimed at expanding the labour supply.

Figure 1. Age pyramids 1970, 2030 and 2050
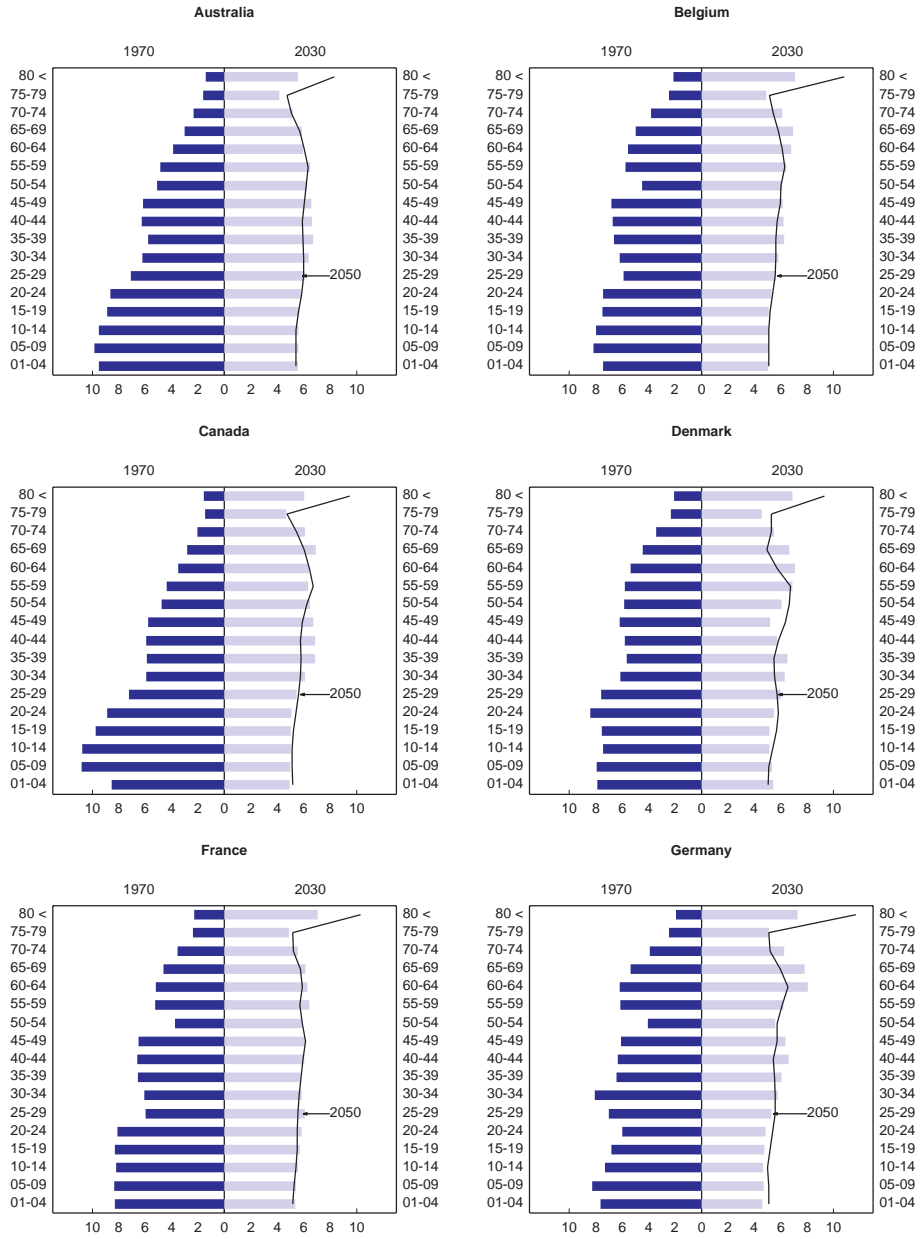
Share of each group age in total population

Figure 1. (continued) Age pyramid 1970, 2030 and 2050
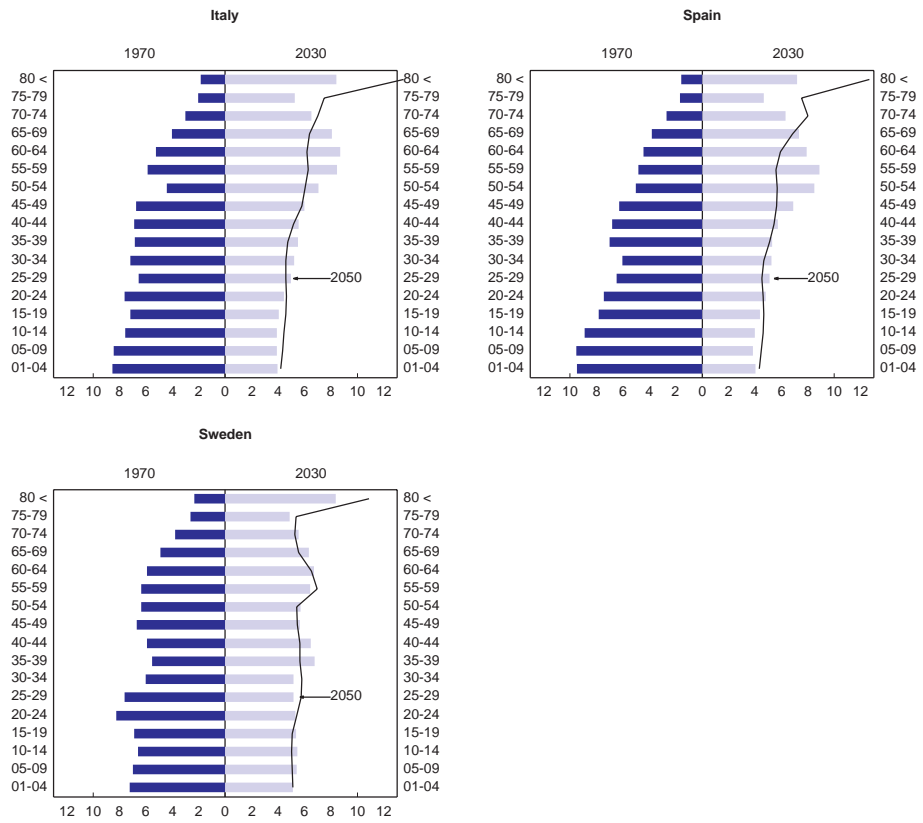
Share of each group age in total population

Figure 2. Naïve projections of no new hiring
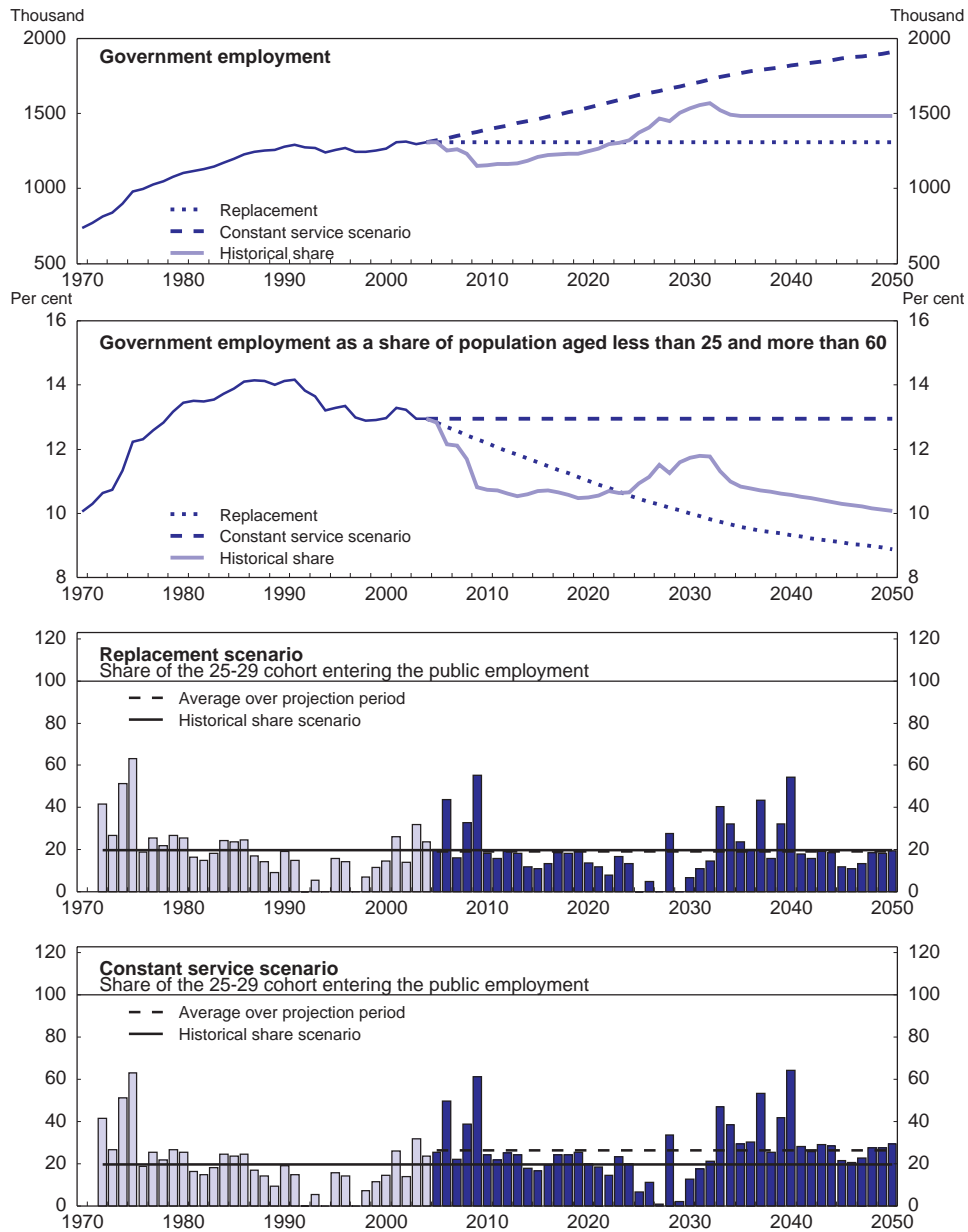2004 = 100
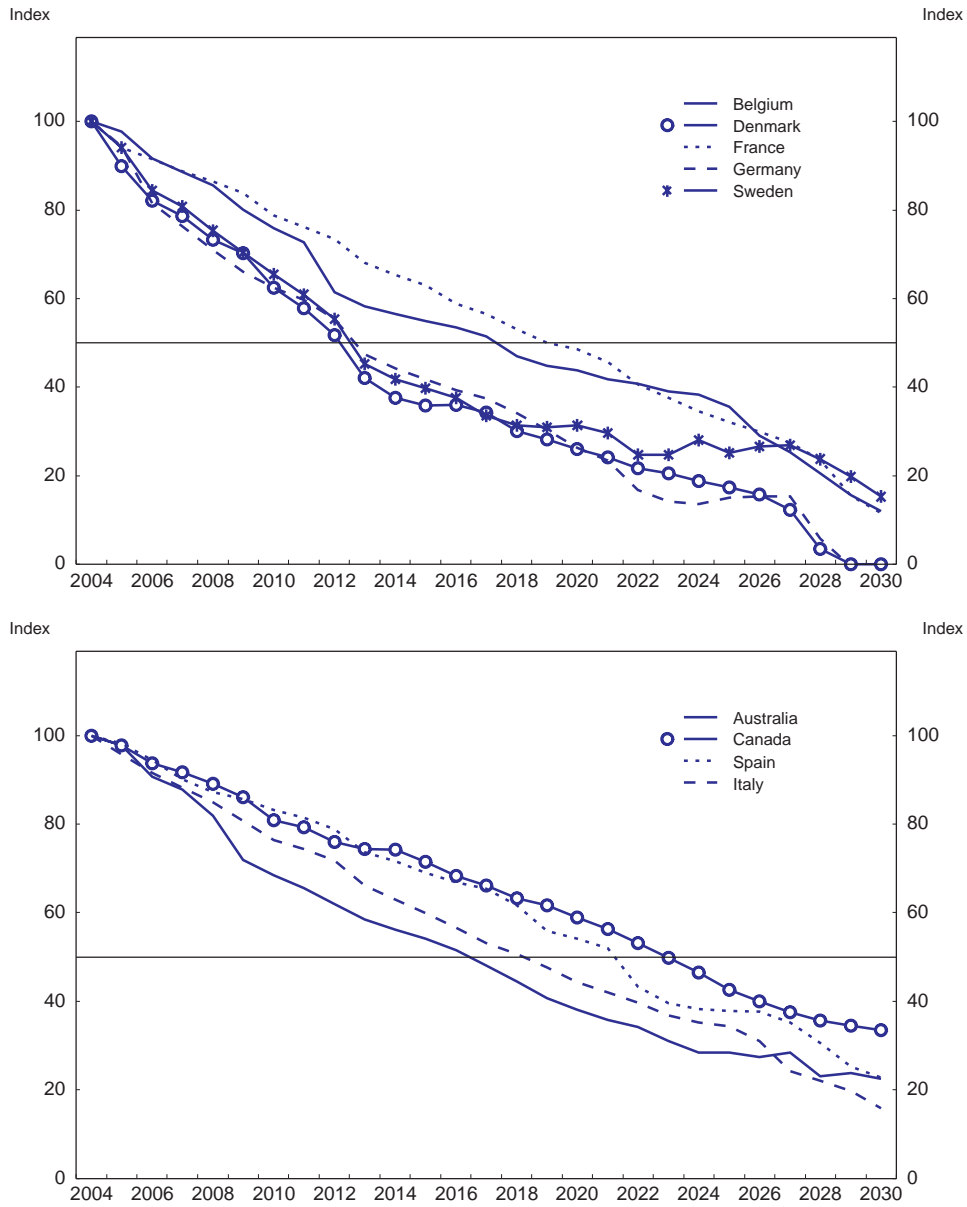
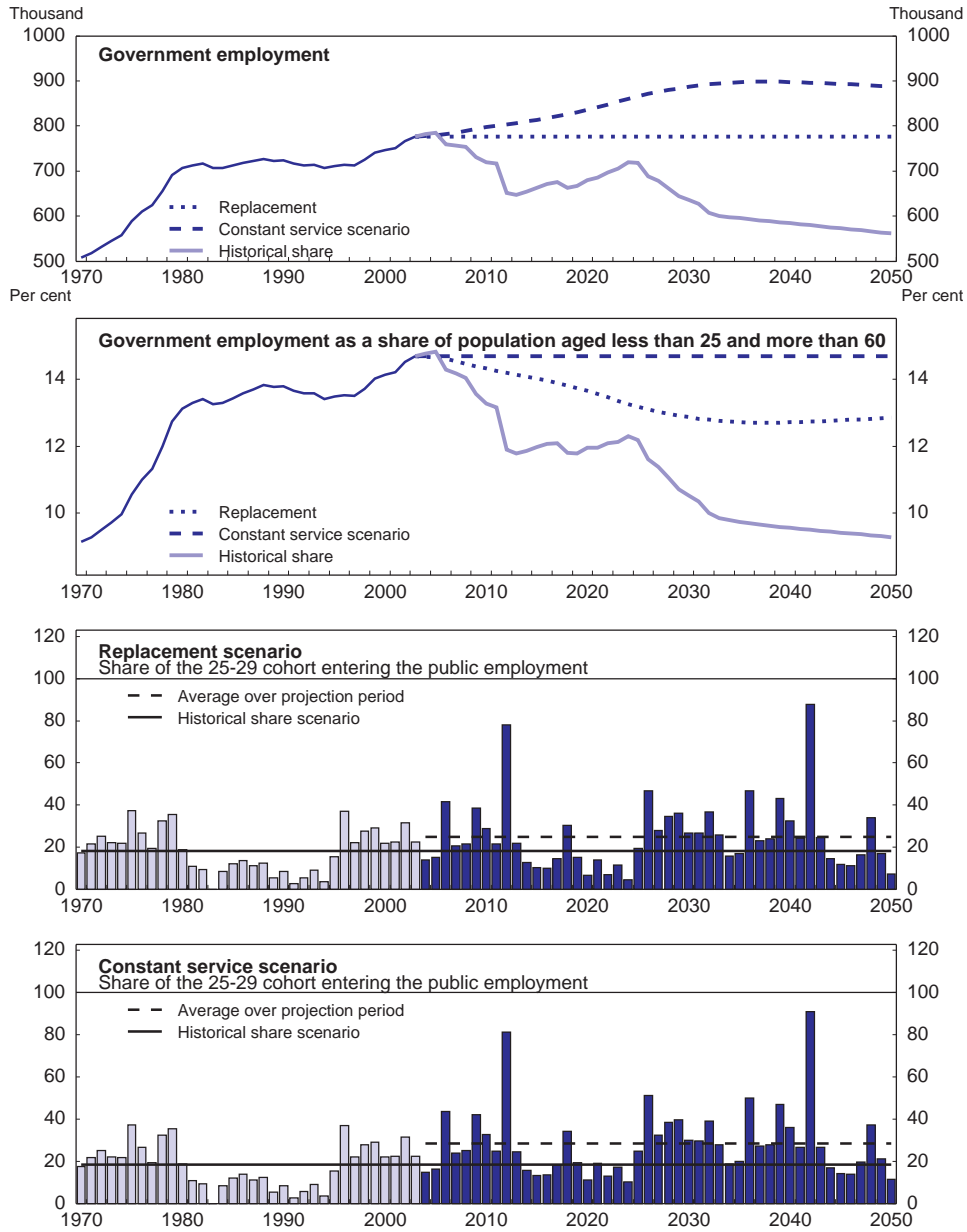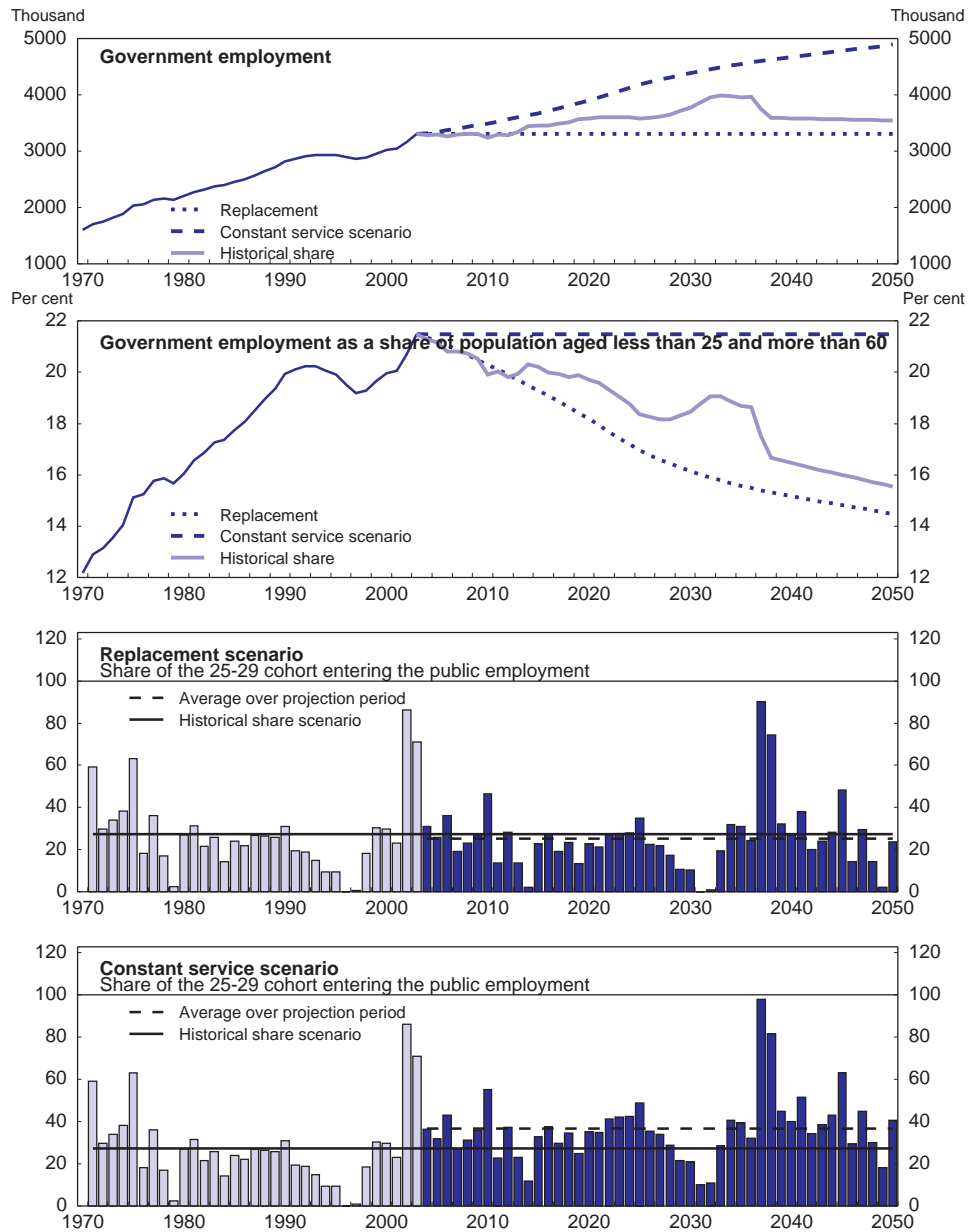**Figure 3. Australia**

Figure 4. Belgium

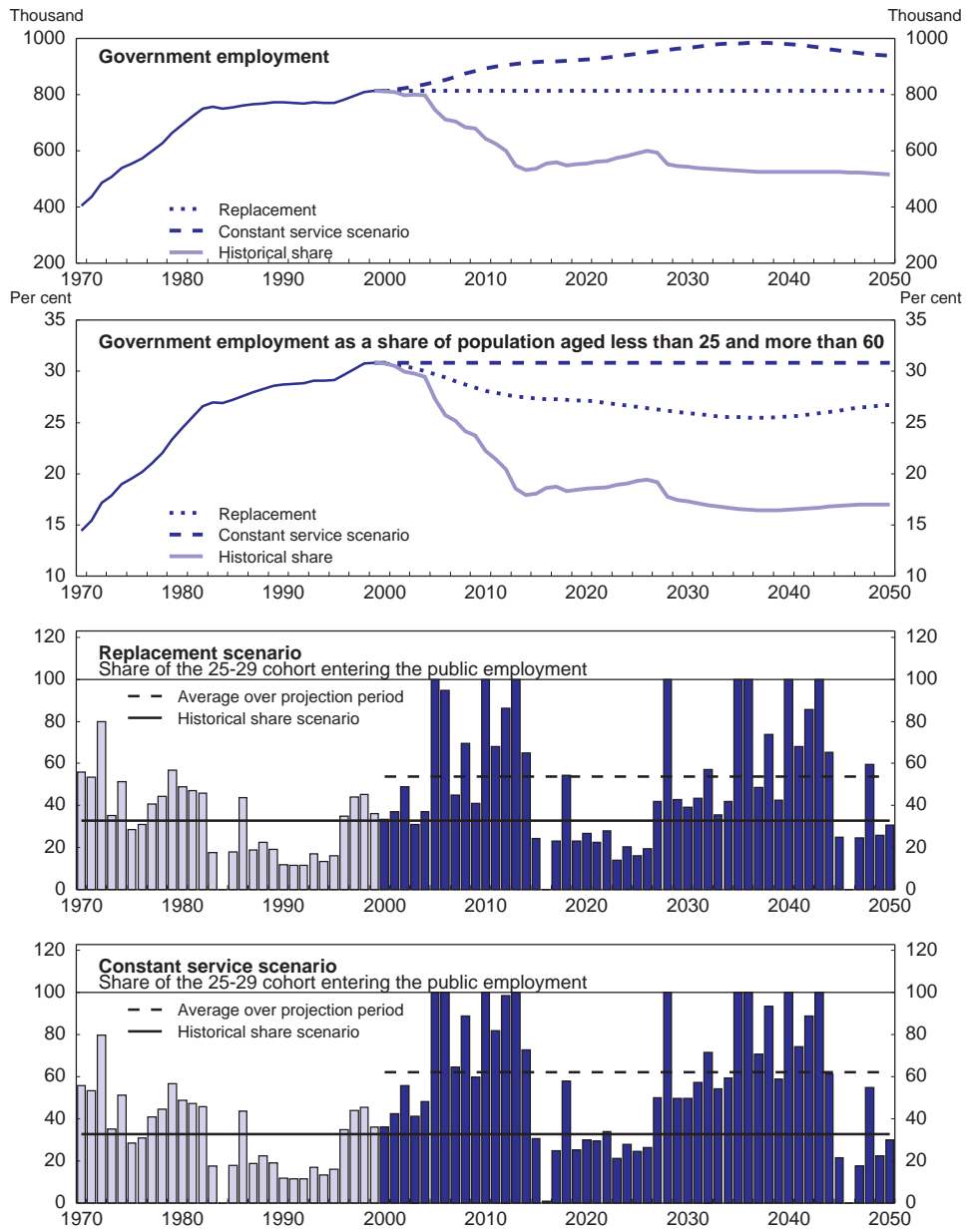**Figure 5. Canada**

Figure 6. Denmark

Thousand

Government employment

.... Replacement
- - - Constant service scenario
—— Historical share

Per cent

Government employment as a share of population aged less than 25 and more than 60

.... Replacement
- - - Constant service scenario
—— Historical share

Replacement scenario
Share of the 25-29 cohort entering the public employment

- - - Average over projection period
—— Historical share scenario

Constant service scenario
Share of the 25-29 cohort entering the public employment

- - - Average over projection period
—— Historical share scenario

18

Figure 7. France
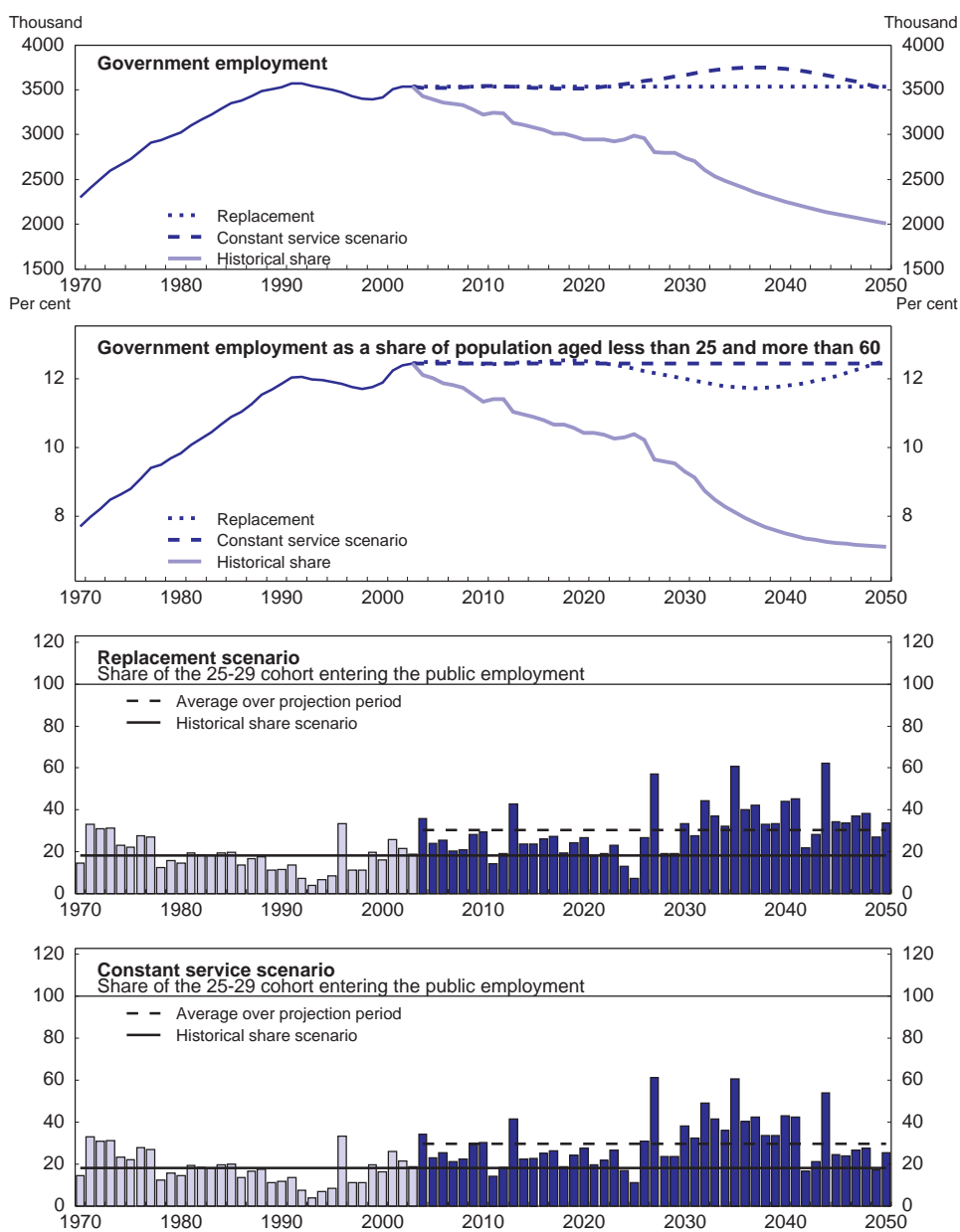
Figure 8. Germany
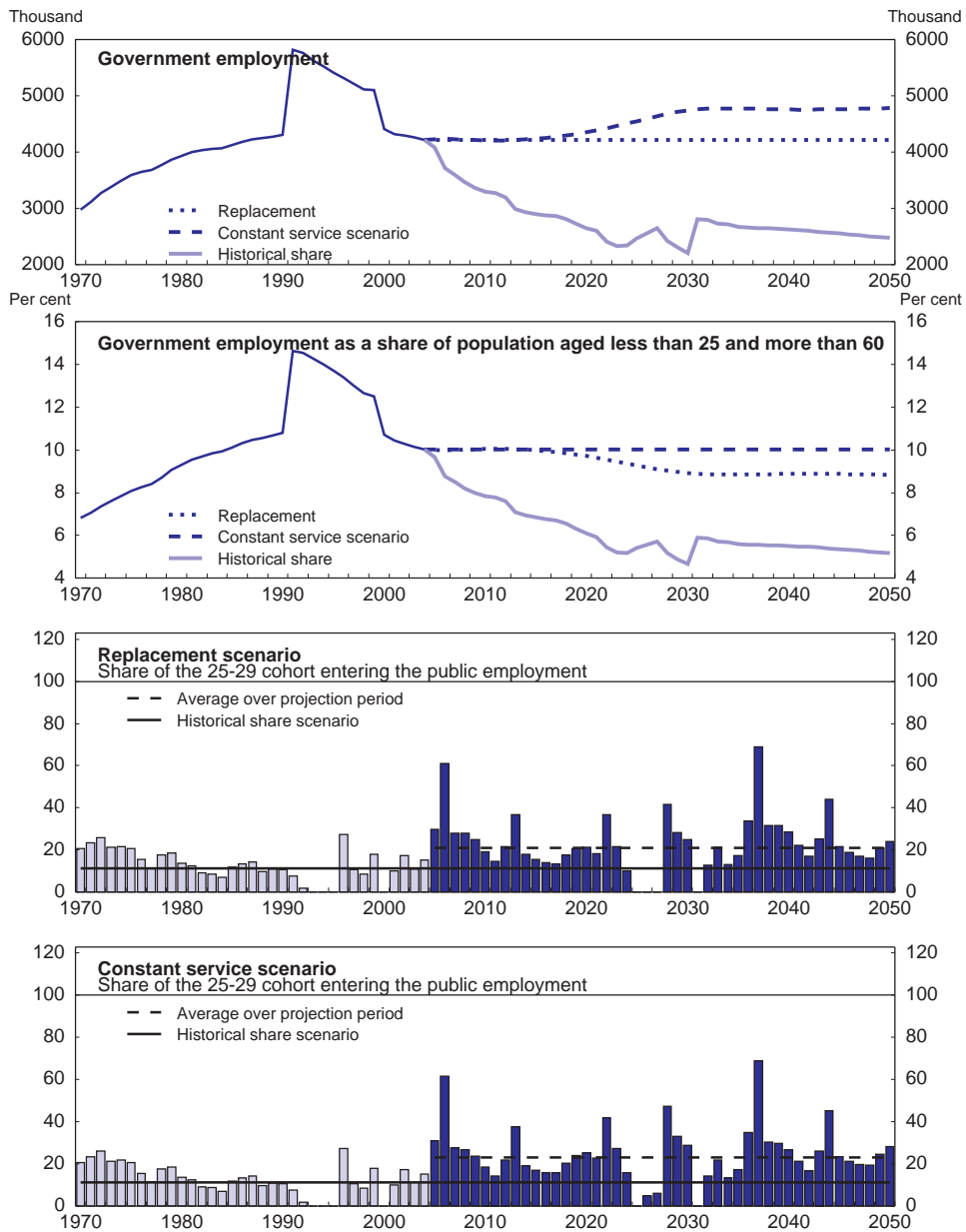
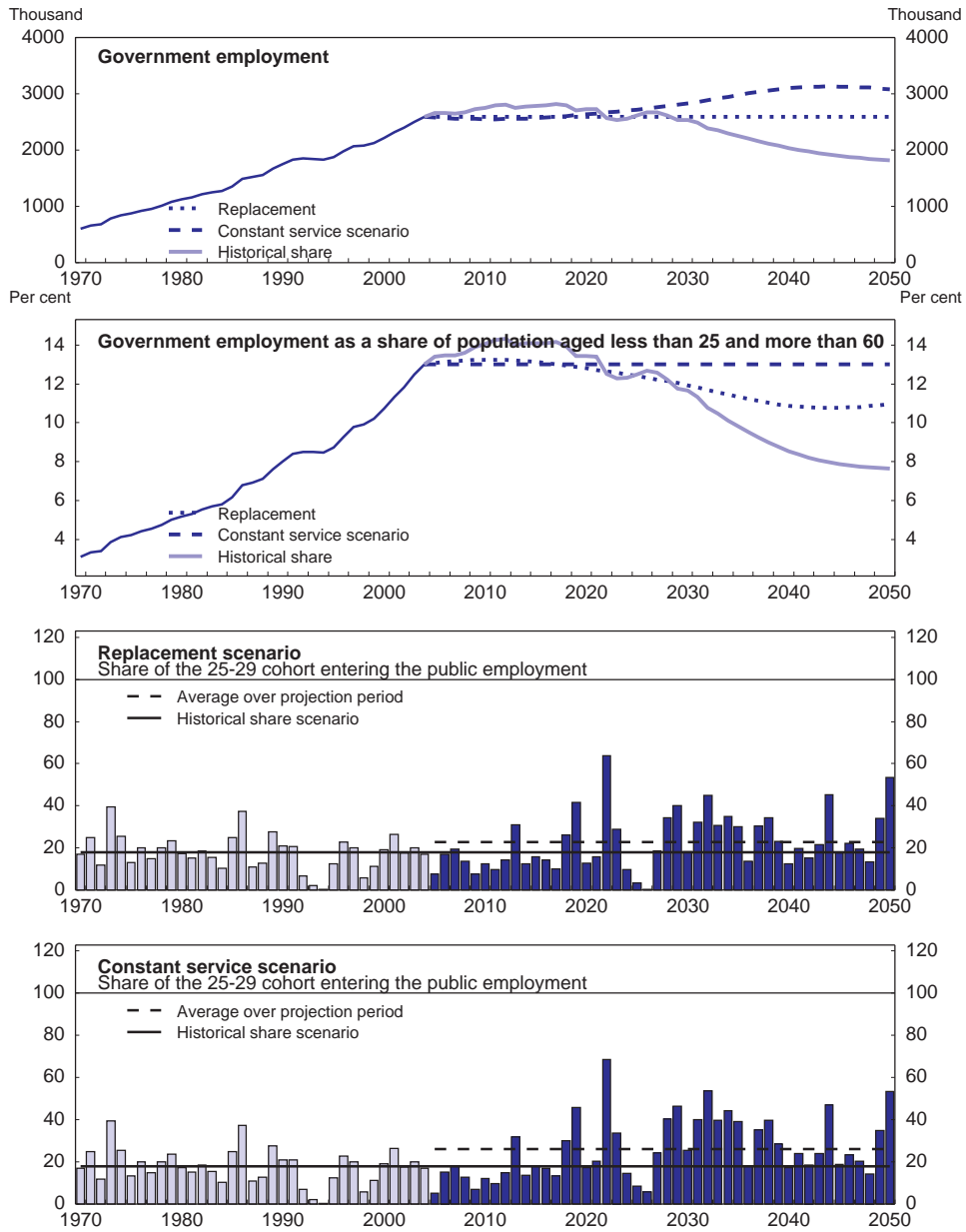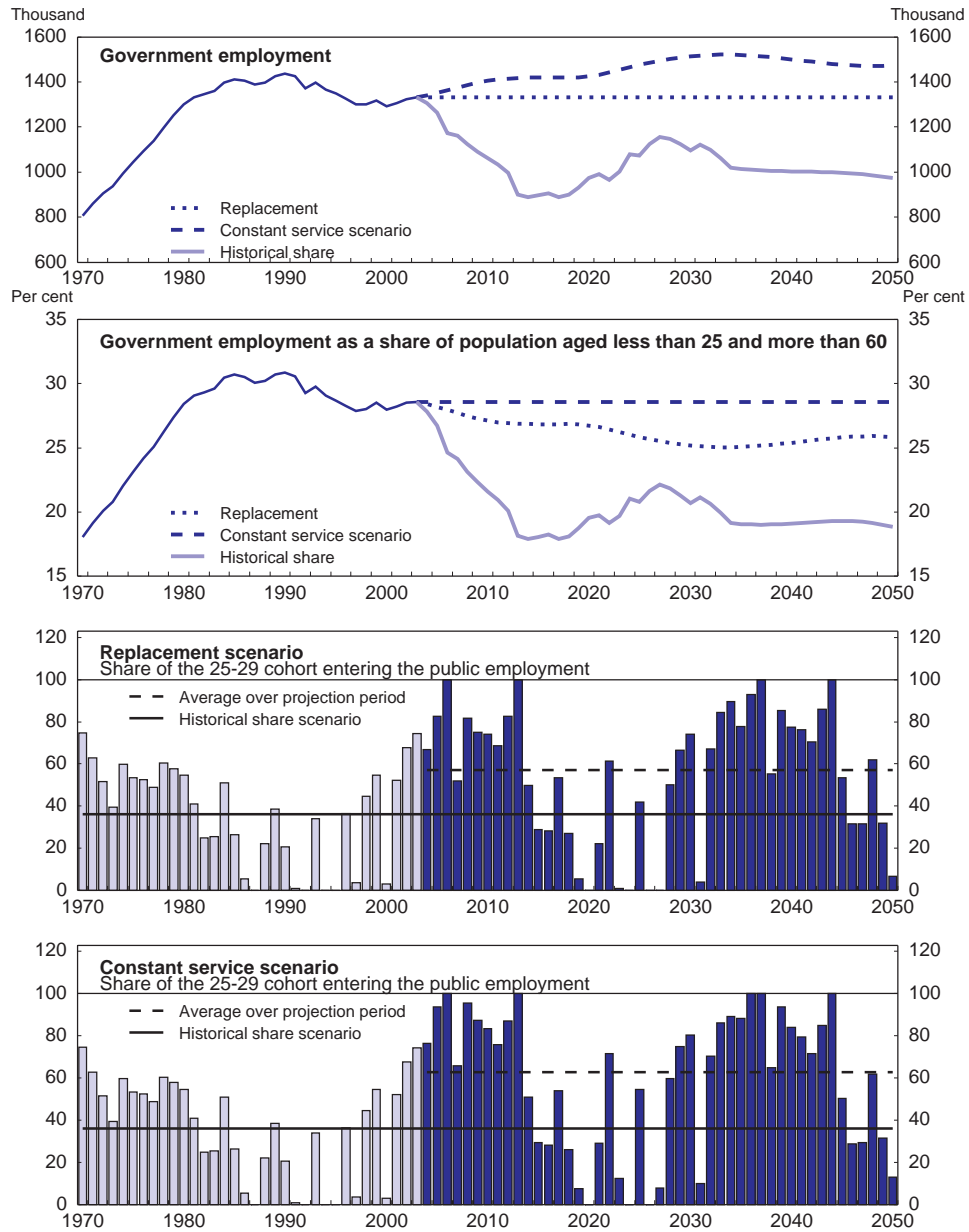**Figure 9. Italy**

Figure 10.   Spain

Figure 11.   Sweden

ENDNOTES

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2. As the starting age for employees in the government sector was assumed constant, the reduction in the effective retirement age implied a corresponding reduction of their working life. However, for some countries, such as France, there are stronger early retirement incentives for government employees than for other employees, implying that this assumption introduces an upward bias in the age structure of government employees.

3. In a number of countries, recent policy changes are aimed at increasing the effective retirement age. Insofar as these measures prove effective, this assumption would tend to bias the average age downwards.

4. German reunification was dealt with by assuming that the profile of East German government employees was equal to that of the East German working age population. As the age structure of the working age population was younger in East Germany than that of the government employees in West Germany at the time of reunification, this assumption reduces the average age of government employees. On the other hand, the assumption may lead to an upwards bias in the average age of German government employees as a considerable number of East German government employees took early retirement (OECD, 2000).

5. For example, Groes and A. Holm (1999) conclude that the government sector in Denmark will have few general recruitment problems, but that special recruitment problems may arise for about a third of government employees. The former conclusion, though, rests on an assumption of relatively high labour mobility between government and private sectors.

6. The implicit assumption underlying the replacement scenario is that (somewhat unrealistically) the government sectors can implement such rationing. In reality, such excess demands on the labour market will lead to difficult-to-project labour market reactions. However, for illustrative purposes such effects are disregarded.

7. An additional issue could be that labour intensity in the production of services for pensioners is higher than for younger cohorts.

8. In order to carry out this calculation, an implicit assumption is that labour resources can be transferred within government sectors without friction, in particular from institutions occupied with carrying and educating the youth to sectors that provide care for the elderly. Insofar as this assumption does not hold, the estimates will only represent a lower bound for the required increases in productivity. Another important caveat is that the level of government services cannot be compared across countries because the government employment level in various countries depends on whether important services, such as schools and hospitals, are produced by governments or the private sector.

9.   Relatively few countries try to measure productivity growth in the government sector. In most national accounts the assumed productivity growth is implicitly set at zero, although in Norway, for example, the assumed productivity growth is 0.5% per year.

10.   Measuring general government sector productivity is fraught with difficulties in terms defining relevant outputs, inputs and prices indexes both within sectors but also across sectors. See for example D. Fisk and D. Forte (1997) for a discussion.

11.   A further restriction on the interpretation of the results is that the calculations do not include employees in publicly-owned companies, which occupy relatively large shares of the labour force in some countries, such as France and Italy. Recent privatisations, however, are lowering the number of public employees concerned.

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