

Long-term supply of labour

The reduction in the size of the labour force in response to the ageing of the population will impair the growth potential of the Finnish economy over future decades. Already the impending retirement of baby-boomers over the next few years threatens to reduce the labour force. Cohorts presently entering the labour market are clearly smaller than those reaching retirement age, and no major improvement in the demographic balance is to be expected from immigration either, judging from the population projection of Statistics Finland. This change in population structure – unique both historically and by international standard – presents a huge challenge especially for the financing of general government expenditures. There is a threat of a long-term economic growth slowdown and mounting public expenditure.

These developments have long been perceptible, and economic and structural policy actions have been taken to underpin the supply of labour. Incentives built into the pension scheme and closure of pathways to early retirement, together with the adoption of tax policies aimed at

growing the supply of labour, are among the key measures to encourage people of working age to remain in the labour force for as long as possible.

The higher labour force participation rate is also related to cohort-based trends, as well as to policy actions and business cycles. Participation in the labour force is influenced by a number of structural factors, including better working conditions, lower physical work load, better health conditions and a higher level of education. It is, for example, widely known that cohorts born in the 1940s are not as well-educated and healthy as younger cohorts. In step with the older cohorts being replaced by cohorts with higher levels of education and much longer life expectancies, the average labour force participation rate will rise. But it is also known that working career developments and labour market status over a whole working life may also be dependent on the cyclical situation prevailing at the time of labour market entry (path dependency). All of these factors may shape the pattern of labour supply in Finland.



*Helvi Kimmunen
Adviser
Monetary Policy and
Research*



*Petri Mäki-Fränti
Economist
Monetary Policy and
Research*

This article presents an analysis of cohort-based trends in labour force participation rates and looks at the implied long-term changes in the supply of labour. The analysis builds on calculations¹ undertaken at the Bank of Finland in 2008. Compared with earlier

calculations, the present analysis draws on a more recent population projection by Statistics Finland, with an estimation horizon extended to 2010 that better captures the participation of baby-boomers towards the close of their working lives.

Labour force participation rate model

The decision whether to participate in the labour market or not is essentially a choice between working or searching

¹ Kostiainen, J (2008) Työvoiman tarjonta pitkällä aikavälillä ('Long-term supply of labour'). BoF Online 14/2008. Bank of Finland. See also Box 3. Labour supply. Economic Outlook, special issue of the Bank of Finland Bulletin 1/2010. The same approach has been taken for instance by Balleer, A, Gomez-Salvador, R and Turunen, J (2009), Labour force participation in the euro area: a cohort based analysis. ECB Working Paper no. 1049.

for work or pursuing other activities. The latter typically means studying, looking after the home or retirement. Hence, the individual's labour market position is highly dependent on age, with the labour force participation rate (LFPR) being lower at both ends of working life. In addition, LFPRs differ for women and men.

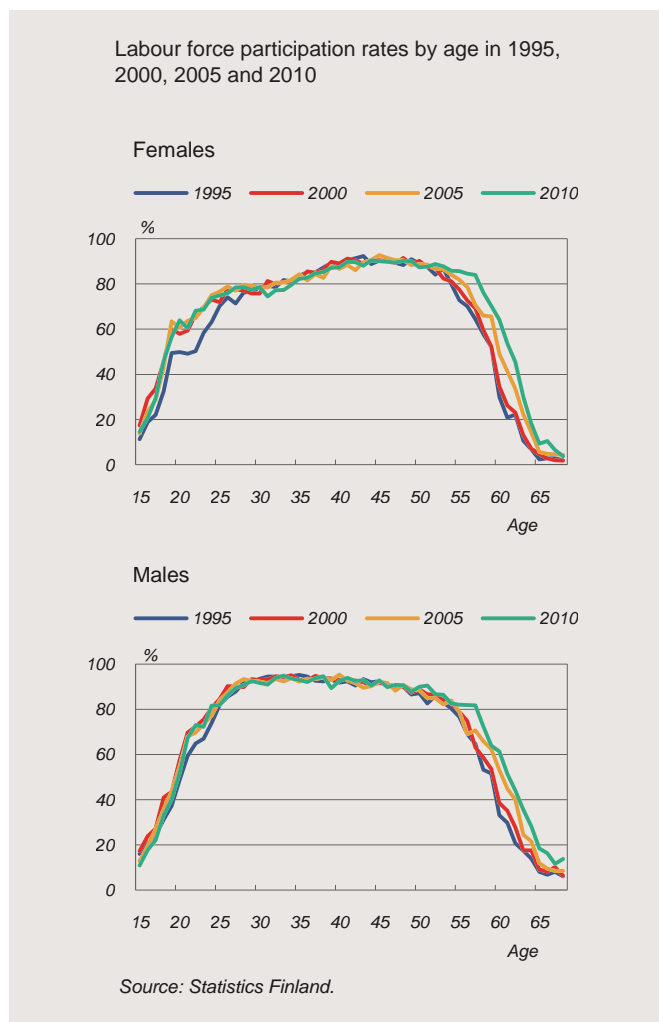
The LFPR is also dependent on the year of birth. The rates for different age groups have shown a high degree of variation over time. This is referred to

as the cohort effect, ie the effect of the year of birth on the LFPR, after controlling for the age effect. There are a number of institutional factors underlying the cohort effect, such as the rising level of education, better labour-market possibilities for women and changes in pension provisions. The cyclical situation prevailing at the time when a cohort enters the labour market may also play a part.

Participation decisions are also related to the prevailing cyclical situation. In a weak business cycle, the risk of unemployment is higher and salary prospects are worse. Moreover, at a certain point in the life cycle there may be competitive alternatives to working. In particular, people suffering from prolonged unemployment may increasingly respond by opting out of the labour market. In addition, elderly employees may find it difficult to re-enter the labour market once they have become unemployed. However, in an especially favourable employment situation, the labour market tends to attract entirely new groups of potential employees, such as housewives and students.

In Finland, participation behaviour has shown wide variation with age, gender and cyclical conditions. A cohort-based approach reveals the predominant trends in the annual variation in the LFPR. The LFPR for elderly employees has varied considerably, irrespective of gender. Since the mid-1990s, the rate for 60-year-olds has increased from 30% to close to 60% (Chart 1). In other respects, developments have been more gender-specific.

Chart 1.



The female participation rate shows a high degree of variation at fertility age, between the ages of 20 and 35. Even in their later years, the participation behaviour of women has varied relatively much, still reflecting the effects of the 1990s recession in a number of ways. For example, the LFPR for women over 40 had not yet in 2010 fallen back to pre-recession levels. During the years of the recession, young women, especially, were forced out of the workforce.² The male participation rate has been much quicker to recover. In fact, their LFPR shows very little variation after the age of 27.

Changes in LFPRs can be more accurately projected if actual experience is more finely disaggregated into age and cohort effects. The labour market status of the population depends on a variety of factors. For women, a low participation rate may reflect family policy or changes in local government day care provision, whereas for the young, lower participation rates may be related to higher levels of education and extended periods of study. Higher participation rates among elderly employees may in turn be explained by changes in pension provisions.

The following analysis of male and female 1-year cohorts aims to differentiate between the characteristic determinants of each cohort, gender, reference year and prevailing cyclical situation. The underlying mechanisms will, however, not be further elaborated.

² See Grönqvist, C and Kinnunen, H (2009) Taantuman vaikutus työvoiman tarjontaan: 1990-luvun kokemuksia ('Effects of the recession on labour supply: experiences from the 1990s'). BoF Online 1/2009. Bank of Finland (in Finnish only).

LFPR models were separately estimated for males and females for the period from 1994 to 2010. The time period was defined to exclude the years of the early 1990s recession, so that the coefficient estimates would more accurately reflect the employment flexibility of normal times, compared with previous analyses. The LFPRs for 1-year cohorts of employees between 21 and 64 was the dependent variable. The LFPRs and cohort-based unemployment rates used to measure business-cycle effects were derived from data from the Labour Force Survey of Statistics Finland.

The equation to be estimated is therefore:

$$LR_{i,t} = c + \alpha_i + \beta_{t-i} + \lambda_i X_t + \varphi_{t=2005-10} + \varphi_{t=1994-97}$$

Here $LR_{i,t}$ denotes the LFPR for cohort i in year t . The variable c is a constant (independent of both age, year of birth and business cycle), α_i is an age-dependent factor, and β_{t-i} represents the cohort effect of birth in $t-i$. The effect of the business cycle is controlled for by the unemployment rate X_t , whose coefficient estimate, λ_i , is age-dependent. The yearly dummy variables $\varphi_{t=2005-10}$ and $\varphi_{t=1994-97}$ were employed to account for abnormal years during the period of estimation. During the first years of the estimation period, the labour market was recovering from the severe recession of the 1990s, with the mid-1990s being marked by abnormal developments in the labour market. In addition, the estimation period coincided with many reforms of the pension scheme, which is

likely to have influenced the participation rates of older cohorts. Of these pension reforms, the model captures the 2005 reform, which introduced an accelerated rate of accrual to encourage employees to remain in the labour force after age 64 up to 68.

The annual fluctuations in LFPRs were broken down into age, cohort and cyclical components by estimating the above equation using the fixed effect model. The coefficient estimates for these components represent the effects of individual factors on the average variation in participation rates.

Chart 2.



Estimation results

There is a clear association between labour force participation rates and life cycle phase. This is reflected in the age-related components when one examines how many percentage points of LFPR for the 1-year cohorts is explained by age alone, if the other influences are accounted for (Chart 2). Men are in their prime working age between 25 and 50, after which their LFPRs start to fall sharply. Female participation rates peak only after the age of 35, as child care and studies keep younger female cohorts outside of the labour market until then. For women approaching 60, participation rates start to decline markedly. However, for men labour market exit seems to start already after the age of 50, some five years earlier than for women. The labour market exit of older cohorts is facilitated by the pension scheme. Female participation rates are significantly reduced at the ages of 30–40, as compared with men of similar age.

An analysis of cohort effects points to rising participation rates for males and females alike up to the cohorts born in the early 1960s (Chart 3). Even cohorts born thereafter have shown higher participation than younger cohorts. According to the model, the increase in the LFPRs for women would continue until the 1990s. However, owing to the scarcity of observations during the last years of the estimation period, the model seems to overestimate the female cohort effects of the last cohorts. Male participation rates seem to show a slightly downward trend among younger cohorts, but this

coefficient estimate is not reliable, either. The coefficient estimate for younger cohorts is unreliable because it is based only on incomplete working careers. A striking feature of cohort-based trends is the shifting of female LFPRs closer to those of males.

In the model, the cyclical conditions were represented by annual averages of age-related unemployment rates. However, the model was not so useful in identifying the business-cycle effect on age-related employment rates because unemployment rates did not fluctuate greatly during the estimation period between 1994 and 2010. For most cohorts, we did not get statistically significant estimates of the unemployment coefficient, and, contrary to expectations, the estimate was in most cases positive. However, inclusion in the estimation of the years of the early 1990s recession, which is reflected in both unemployment and labour force participation, fundamentally changes the estimated cyclical effects. Here, the results confirmed with expectations.

Long-term supply of labour

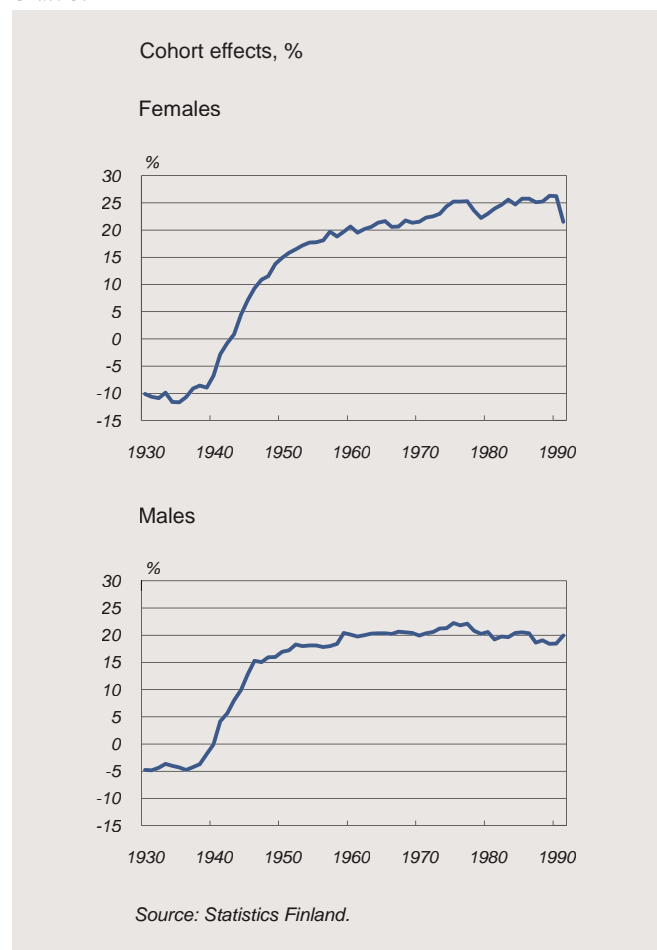
The labour force participation rate model can be used to forecast labour supply. For this purpose, assumptions are made regarding long-term changes in cohort effects, age effects and business-cycle effects. Forecasts for cohorts are weighted by average LFPRs, obtained from population projections.

It was assumed that the age effects will remain at the same level in the long run as in the estimation period 1994–2010. This was, in effect, a stance taken in respect of several structural

factors. The assumptions include that the periods of study of the young do not change, that fertility rates remain unchanged and that working lives are not extended. At the same time, it was implicitly assumed that no changes will be made to social security benefits or taxation that will have a bearing on labour supply incentives.

The cohort effects were assumed to remain on the same level as for the cohort born in 1970. The cohort effect should be higher for younger age groups, but the coefficient estimate is

Chart 3.



not reliable. Insofar as LFPRs for older cohorts presently in the labour market diverge from average developments, they will influence the labour supply analysed here up until the cohorts born in 1970 attain the age of 64.

In the estimations, the business-cycle effects on the supply of labour did not get a statistically significant estimate and continued at odds with

expectations. Hence, a gradual fall in the unemployment rate towards the expected long-term equilibrium value has no bearing on the results.

Under these assumptions, the model produces a projection path where the LFPR increases in the long term by around 1.5 percentage points (Chart 4). The increase in the participation rate is 0.4 percentage point higher for women than for men. The average LFPR should peak in the 2030s, until which time age-related factors offset the decline in labour supply due to demographic factors. Until then, the average participation rate of those born in the 1950s and 1950s is replaced by the higher-than-average participation rate of younger cohorts. After this, the cohort effects will disappear and the participation rate will reflect only demographic shifts.

The supply of labour generated by the LFPR model is much smaller than that assumed in the Finnish Stability Programme³ According to the Ministry of Finance projections, the labour force participation rate of persons aged 20–64 will be 1½ percentage points higher in 2015 and 3 percentage points higher in 2030 than the figures obtained in this study.

Labour supply and potential output

The cohort-based LFPR projections show that the reduction in the labour force would amount to half of the decline in the working age population.

Chart 4.

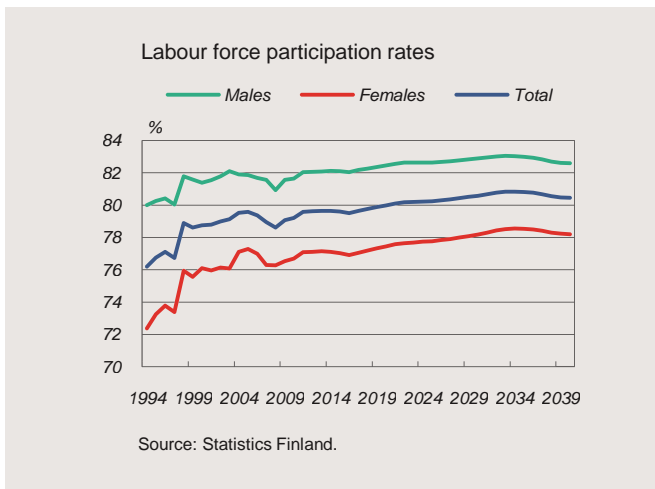
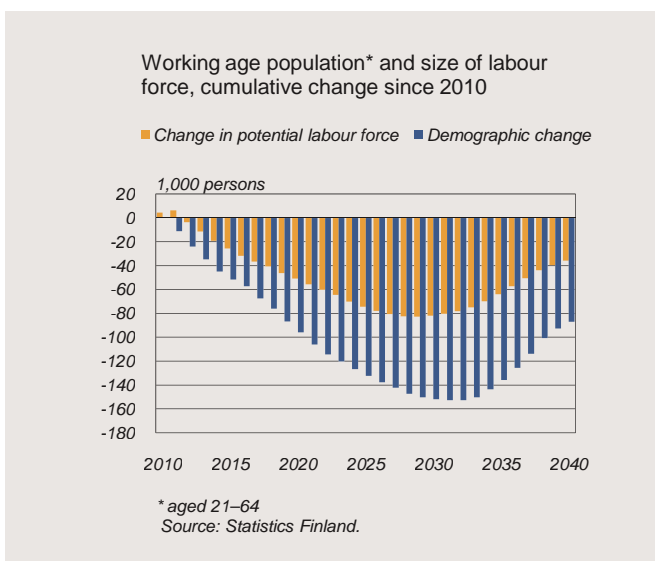


Chart 5.



³ The Finnish Stability Programme update, 2011 Economic and economic policy surveys 16s/2011. Ministry of Finance publications.

According to the population forecast, the working age population is projected to fall by around 150,000 persons by the mid-2030s (Chart 5).

Changes in labour supply can also be analysed in regard to changes in potential output. Chart 6 shows changes in labour supply, including the constituents of change, ie the effects of LFPR and demographic shifts. In the labour supply projections, cohort-based factors account for part of the increase in the labour force over the next five years. However, the changing demographic structure is the major influence at work. The rise in the old-age dependency ratio will hold back the growth in labour input until the start of the 2030s, after which the working age population will begin to expand gradually. The effect of a declining labour supply on potential output will be most pronounced over the years 2013–2016. The situation will change fundamentally, compared with recent developments. In the early 2000s, the population structure still supported the growth of potential output.

The pension reform introduced in 2005 did not affect the labour force participation rates generated by the LFPR models. Hence, the developments in LFPRs witnessed over the years 2005–2010 did not show any statistical divergence from developments over the whole reference period. The higher participation rates of elderly employees were, thus, attributable to age and cohort effects alone. It is, nevertheless, possible that the pension reform will later result in longer working lives for elderly employees. As well as an

accelerated rate of accrual for those retiring between 64 and 68, the pension reform also provides for a life expectancy coefficient, which is not yet reflected in the retirement benefits of the cohorts of the sample period.

The objective of the economic policy strategy is to increase retirement expectancy by 3 years by 2025. The significance of this strategy for economic growth was demonstrated by the assumption, based on previous calculations, that age-related participation rates always rise to the level of three year younger cohorts.⁴ The change was assumed to apply to people over the age of 59.⁵

Extension of working lives would offset the decline in labour input due to

⁴ See Kostiainen (2008).

⁵ As the highest age covered by the model is 64, it was assumed for the baseline calculation that the participation rate would be the same as in 2010 from the age of 65 onwards.

Chart 6.

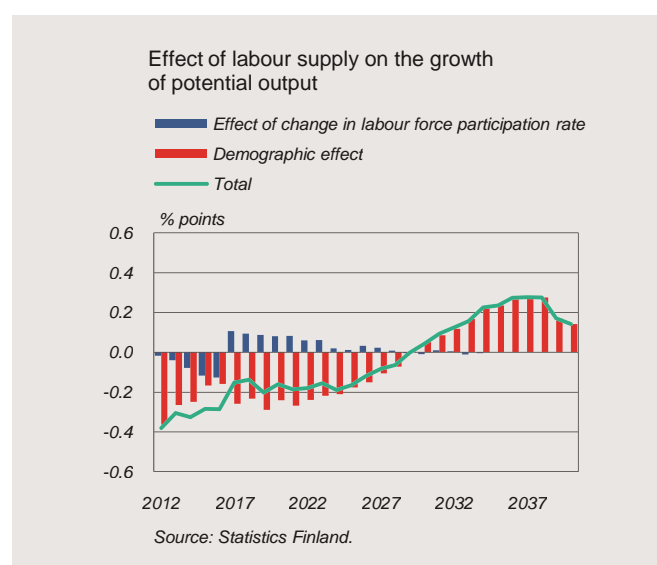
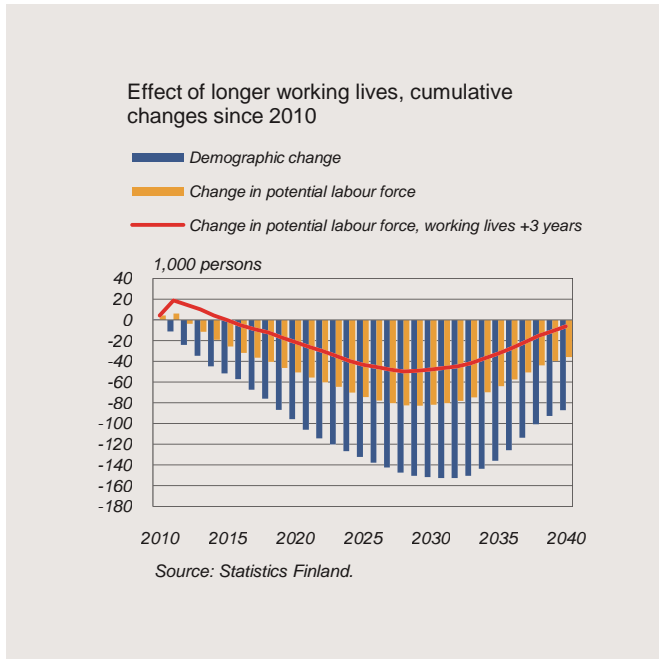


Chart 7.



the contraction of the working age population. If working lives were to be extended immediately, as assumed in the calculation, the supply of labour would not start to decline until 2015 (Chart 7). If working lives are extended, the potential labour supply would, at most, decline by around 50,000 persons. However, if working lives remain unchanged, the labour force will contract by as many as 83,000 persons. Hence, not even a substantial extension of working lives will make up for the loss of output growth potential due to population ageing.

Output growth hinges on productivity

In Finland, both cohort-based factors and changes in the population structure have a strong impact on changes in labour supply. Cohorts born in the

1940s and early 1950s differ in many respects from more recent cohorts, with average labour force participation rates clearly below those of younger cohorts. Differences in cohort sizes and variations in participation rates by age introduce dynamics into the supply of labour, which will operate until the end of the next decade.

Our findings demonstrate that the long-term supply of labour does not decline as much as indicated by demographic factors alone. The fall in the supply of labour in response to population ageing is, to some extent, offset by a cohort-based increase in participation rates. If the projection of labour supply proves accurate, the decline in labour input will reduce the growth potential of the economy until the end of the 2020s. After this, annual changes in labour supply would be positive, albeit very small.

When examining the changes in the labour force participation and employment rates of people of various age, cohort-based factors are easily forgotten. This may lead to false conclusions on the effects of policy measures. The higher labour force participation and employment rates for elderly employees have been interpreted as reflecting the financial incentives built into the pension scheme. The present analysis shows that the increase in their LFPRs is rather a product of the replacement of cohorts born in the late 1940s by cohorts with higher participation rates over the whole working life. This conclusion is also supported by survey findings, as health and level of education, as well as workplace charac-

teristics, seem to be the major determinants of the participation rate.⁶

The structural shifts in the labour market will absorb some of the decline in the supply of labour resulting from demographic change. Despite these structural changes, the long-term increase in the supply of labour could easily remain close to zero, unless working lives are extended. The situation looks gloomy, especially with regard to the financial base for public services. If economic growth has to rely solely on productivity growth, this is readily reflected fully in public sector pay developments. In this case, not even robust economic growth will eliminate the sustainability problem related to public finances. Longer working lives are essential for ensuring a larger supply of labour and hence long-term economic growth. However, not even this will fully address the problem of receding growth of potential output in the wake of population ageing.

Key words: population ageing, labour supply, cohorts, potential output

⁶ See eg Uusitalo, H (ed.) (2011) Työurat pidemmäksi – selvityksiä työuraryhmälle. ('Longer working careers - reports to the working career task force'). Reports of the Finnish Centre for Pensions 2011:1.